DOCKETED	
Docket Number:	23-AFC-03
Project Title:	Black Rock Geothermal Project (BRGP)
TN #:	249752
Document Title:	Black Rock Geothermal Project Application for Certification Volume 1
Description:	N/A
Filer:	Jerry Salamy
Organization:	Jacobs
Submitter Role:	Applicant Consultant
Submission Date:	4/18/2023 11:40:03 AM
Docketed Date:	4/18/2023

Black Rock Geothermal LLC
4124 NW Urbandale Drive
Urbandale, IA 50322

Steven C. Rowley
Vice President

April 13, 2023

Mr. Drew Bohan
Executive Director
California Energy Commission
715 P Street
Sacramento, CA 9814

RE: <u>Application for Certification for the Black Rock Geothermal Project</u>

Dear Mr. Bohan:

Black Rock Geothermal LLC (Applicant), an indirect, wholly owned subsidiary of BHE Renewables, LLC, submits this Application for Certification (AFC) for the Black Rock Geothermal Project (BRGP) within the Salton Sea Known Geothermal Resource Area located near Calipatria, Imperial County, California. The BRGP is an 87 megawatt (gross) and 77 megawatt (net) renewable geothermal power plant and related facilities, including generation tie-line, fluid and steam handling facilities, solids handling system, Class II Surface Impoundment, service water pond, stormwater retention basin, and process fluid injection pumps, in addition to geothermal production and injection wells and pipelines that will be permitted by Imperial County.

The BRGP will provide an efficient method to satisfy two of California's most important energy needs by providing firm, clean power from a renewable geothermal source. The BRGP will provide new generating capacity to meet the State's grid reliability needs, while assisting in the State's transition to a 100 percent renewable energy and zero-carbon grid by 2045. The BRGP also will provide jobs, tax revenues and investment in Imperial County, one of the poorest counties in the state.

Pursuant to Public Resources Code section 25540.2 and section 1803, Title 20 of the California Code of Regulations, the Applicant requests a final decision from the Commission on the AFC within 12 months after acceptance because a commercial resource has been discovered, and the Applicant can reasonably demonstrate that the BRGP site is capable of providing geothermal resources in commercial quantities.

I, Steven C. Rowley, an officer of Black Rock Geothermal LLC hereby attest under penalty of perjury under the laws of the State of California that the information set forth in the enclosed Application for Certification for the Black Rock Geothermal Project is true and accurate to the best of my knowledge and belief.

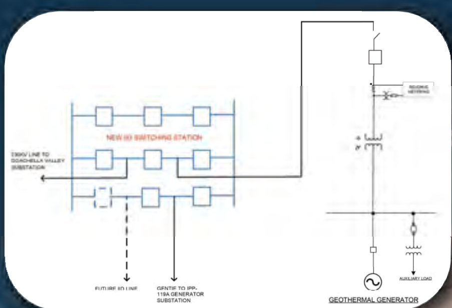
Sincerely,

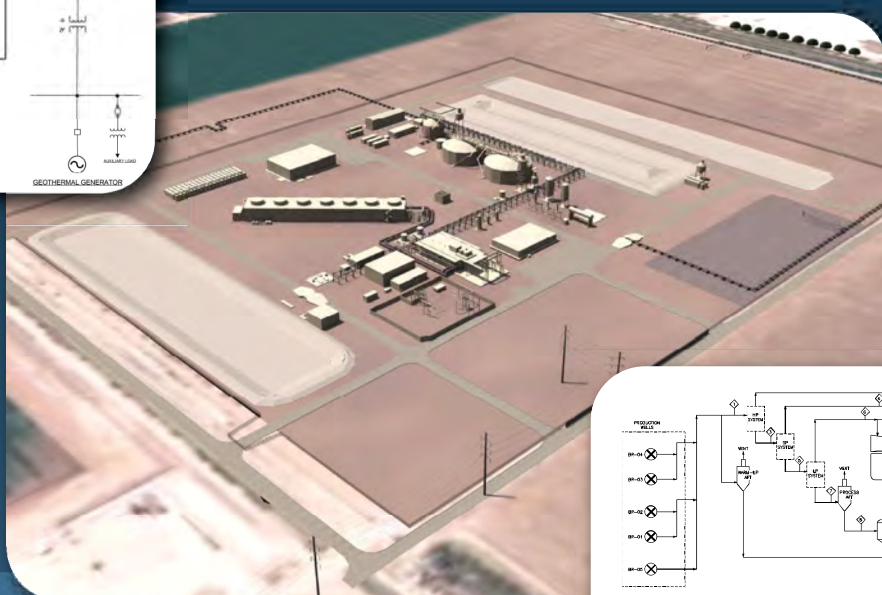
Steven C. Rowley
Vice President

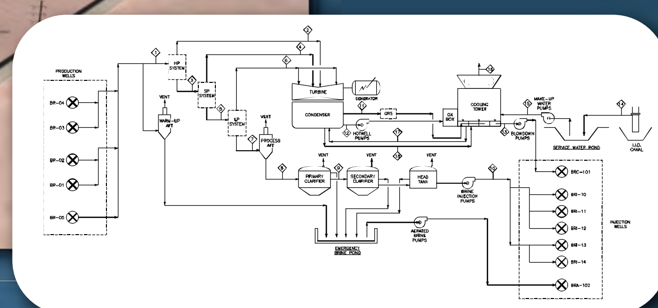
Application for Certification

Black Rock Geothermal Project

April 2023







Submitted by

Black Rock Geothermal LLC

BHE RENEWABLES®

With Technical Assistance from

Jacobs

Contents

Contents

Appendices

Tables

Figures

Acronyms and Abbreviations

ABDSP	Anza-Borrego Desert State Park
ACC	air-cooled condenser
ACCII	Advanced Clean Cars II
ACEC	American Council of Engineering Companies
ACSR	Aluminum Conductor Steel Reinforced
ADEQ	Arizona Department of Environmental Quality
AERMAP	AERMOD terrain processor
AERMET	AERMOD meteorological data processor
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AFC	Application for Certification
AFT	atmospheric flash tank
afy	acre-feet per year
AGOL	ArcGIS Online
AOC	area of concern
AP	Alquist-Priolo
APCD	Air pollution control districts
APLIC	Avian Power Line Interaction Committee
ARMR	Archaeological Resource Management Report
ASCE	American Society of Civil Engineers
AST	aboveground storage tanks
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
BACT	best available control technology
BCDM	Bird Collision Deterrent Proposal and Monitoring
BHER	BHE Renewables, LLC
BIOX	biooxidation
BLM	Bureau of Land Management

BMP	best management practice
BOE	Board of Equalization
BOP	balance of plant
BP	Before Present
BRGP	Black Rock Geothermal Project
BRMIMP	Biological Resources Mitigation Implementation and Monitoring Plan
BSA	Biological Study Area
CAA	Clean Air Act
CAAQS	California and National Ambient Air Quality Standards
CAISO	California Independent System Operator
CalARP	California Accidental Release Program
CalEPA	California Environmental Protection Agency
CalGEM	California Department of Conservation, Geologic Energy Management Division
CAM	Compliance Assurance Monitoring
CAPP	Community Air Protection Program
CARB	California Air Resources Board
CAS	Chemical Abstracts Service
CBC	California Building Code
CBSC	California Building Standards Code
CCR	California Code of Regulations
CDE	California Department of Education
CDFA	California Department of Food and Agriculture
CDFG	California Department Fish and Game
CDFTA	California Department of Tax and Fee Administration
CDFW	California Department of Fish and Wildlife
CDMG	California Division of Mines and Geology
CDWR	California Department of Water Resources
CEC	California Energy Commission
CEDD	California Employment Development Department

CEMS	continuous emissions monitoring systems
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERS	California Environmental Reporting System
CESA	California Endangered Species Act
CFD	Calipatria Fire Department
CFR	Code of Federal Regulations
cfs	cubic foot/feet per second
CGS	California Geological Survey
CH_4	methane
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CHSC	California Health & Safety Code
CIWMA	California Integrated Waste Management Act
CIWMB	California Integrated Waste Management Board
CLOMR	Conditional Letter of Map Revision
CMIM	computerized maintenance/inventory management
CNDDB	California Natural Diversity Database
CNEL	Community Noise Exposure Level
CNPS	California Native Plant Society
CNRA	California Natural Resources Agency
CO	carbon monoxide
CO_2/CO_2e	carbon dioxide/carbon dioxide equivalent
COC	Conditions of Certification
COS	Conservation and Open Space
CPM	Compliance Project Manager
CPR	cardiopulmonary resuscitation
CPUC	California Public Utilities Commission
CRBRWQCB	Colorado River Basin Regional Water Quality Control Board

CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CRS	Cultural Resources Specialist
CRTR	cultural resources technical report
CSH	Circulation and Scenic Highways
CTI	Cooling Tower Institute
cu ft	cubic foot/feet
CUPA	Certified Unified Program Agency
CVC	California Vehicle Code
CWA	Clean Water Act
CWC	California Water Code
DCS	distributed control system
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DESCP	drainage, erosion, and sediment control plan
DOC	Department of Conservation
DOF	Department of Finance
DOT	U.S. Department of Transportation
DPM	diesel particulate matter
DPR	Department of Parks and Recreation
DRE	destruction and removal efficiencies
DRECP	Desert Renewable Energy Conservation Plan
DTSC	Department of Toxic Substances Control
ECRMC	El Centro Regional Medical Center
ECSP	East County Substation Project
EFZ	Earthquake Fault Zone
EHS	Extremely Hazardous Substance
EIR	Environmental Impact Report

EIR	Environmental Impact Statement
EMF	electric and magnetic fields
EMT	emergency medical technician
ENGP	Elmore North Geothermal Project
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act of 1986
EPRI	Electric Power Research Institute
ERP	Emergency Response Plan
ESA	Endangered Species Act
ESV	emergency shutdown valve
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FGC	Fish and Game Code
FHWA	Federal Highway Administration
FMMP	Farmland Mapping and Monitoring Program
FP	Fully Protected
FTA	Federal Transit Administration
gen-tie	generation interconnect
GEP	good engineering practice
GHG	greenhouse gas
GIS	geographic information system
GLO	General Land Office
GO	General Order
GPS	global position system
GRS	gas removal system
GSU	generator step-up
GWP	global warming potential
H_2S	hydrogen sulfide

HAP	hazardous air pollutant
HAZMAT	hazardous materials
HCM	Highway Capacity Manual
HDPE	high-density polyethylene
HFC	hydrofluorocarbon
HI	hazard index
HMBP	Hazardous Materials Business Plan
HP	high pressure
HRA	health risk assessment
HSP	health and safety plan
HVAC	heating, ventilation and air conditioning
HWCL	Hazardous Waste Control Law
ICAPCD	Imperial County Air Pollution Control District
ICEHD	Imperial County Environmental Health Department
ICFD	Imperial County Fire Department
ICFPD	Imperial County Fire Prevention Department
ICSO	Imperial County Sheriff's Office
ICTC	Imperial County Transportation Commission
IDD	Irrigation District
IID	Imperial Irrigation District
IOPP	Inadvertent Overrun Payback Policy
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
IRWMP	Integrated Regional Water Management Plan
IWRMP	Integrated Water Resources Management Plan
IWSP	Interim Water Supply Policy
KGRA	Known Geothermal Resource Area
KOP	key observation point
LADPW	Los Angeles Department of Public Works

LAER	lowest achievable emission rate
lbs/day	pound(s) per day
LCR	Lower Colorado River
LCRS	Leachate Collection and Removal System
LEA	Local Enforcement Agency
LEPC	local emergency planning committee
LESA	Land Evaluation and Site Assessment
LLT	long-lead-time
LOMR	Letter of Map Revision
LORS	laws, ordinances, regulations, and standards
LOS	Level of Service
LO/TO	lock-out/tag-out
LP	low pressure
LSE	load-serving entity
LU	land use
LUC	land use covenant
MACT	Maximum Available Control Technology
MBGP	Morton Bay Geothermal Project
MBTA	Migratory Bird Treaty Act
MCC	Motor Control Centers
MCL	maximum contaminant level
MCR	maximum continuous rating
MCR	Monthly Compliance Reports
MEIR	maximally exposed individual resident
MEIW	maximally exposed individual worker
MERPS	Maximum Emission Rates of Precursors
MPO	Metropolitan planning organizations
MSA	Metropolitan Statistical Area
MT	metric ton(s)

MTU	mobile testing unit
MVA	megavolt-ampere(s)
MW	megawatt(s)
N_2O	nitrous oxide
NA	not applicable
NADB	National Archaeological Database
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCG	non-condensable gas
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NHD	National Hydrography Data
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NIEHS	National Institute of Environmental Health Sciences
NIOSH	National Institute for Occupational Safety and Health
NLCD	National Land Cover Database
NMED	New Mexico Environmental Department
NOI	Notice of Intent
NORM	Naturally Occurring Radioactive Material
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
NTP	normal temperature and pressure

NWI	National Wetlands Inventory
NWP	nationwide permit
NWR	National Wildlife Refuge
O&M	operations and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
OES	Office of Emergency Services
OHP	Office of Historic Preservation
OHWM	ordinary high water mark
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
OxBox	oxidation box
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	passenger car equivalent
PDC	power distribution and control
PFC	perfluorocarbon
PGA	peak ground acceleration
PGF	Power Generation Facility
PM	micrometer(s)
PMHD	Pioneers Memorial Healthcare District
PMI	point of maximum impact
PPE	personal protective equipment
PRC	Public Resources Code
PRIME	plume rise model enhancement
PRM	paleontological resources monitors
PRMMP	Paleontological Resources Monitoring and Mitigation Plan
PRS	Paleontological Resources Specialist
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit

PTO	permit to operate
PTU	production testing unit
RA	Resource Adequacy
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
REL	Reference Exposure Level
RET	Renewable Energy and Transmission
RM	rock muffler
RMP	risk management plan
RO	reverse osmosis
ROW	right-of-way
ROWD	Report of Waste Discharge
RPF	Resource Production Facility
RPS	Renewable Portfolio Standard
RQ	reportable quantity
RWQCB	Regional Water Quality Control Board
S&HC	California Streets and Highways Code
SARA	Superfund Amendments and Reauthorization Act
SB	State Bill
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCIC	South Coastal Information Center
SCR	selective catalytic reduction
SDS	Safety Data Sheet
SDWA	Safe Drinking Water Act
SERC	State Emergency Response Commission
SF_6	sulfur hexafluoride
SIL	Significant Impact Level
SIP	State Implementation Plan

SIS	System Impact Study
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLF	Sacred Lands File
SLR	single lens reflex
SMARA	Surface Mining and Reclamation Act
SMARTS	Stormwater Multiple Application and Report Tracking System
SMGB	State Mining and Geology Board
SOI	Secretary of the Interior
SO_x	sulfur oxides
SP	standard pressure
SPCC	Spill Prevention, Control, and Countermeasure
SRC	Stout Research Center
SSAB	Salton Sea Air Basin
SSC	Species of Special Concern
STG	steam turbine generator
SVP	Society of Vertebrate Paleontology
SWIS	Solid Waste Information System
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminants
TDS	total dissolved solids
TEWAC	totally enclosed water and air-cooled
TMDL	total maximum daily loads
TMP	Transportation Management Plan
TPQ	threshold planning quantities
tpy	ton(s) per year
TQ	threshold quantity
TSDF	Treatment, Storage or Disposal Facility
TSP	tubular steel poles

UBC	Uniform Building Code
UCMP	University of California, Berkeley, Museum of Paleontology
UIC	underground injection control
UMC	Uniform Mechanical Code
USACE	U.S. Army Corps of Engineers
USBR	United States Bureau of Reclamation
USC	United States Code
USDA	U.S. Department of Agriculture
USDW	underground sources of drinking water
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAC	volts of alternating current
VDC	volts of direct current
VDU	video display unit
VMT	vehicle miles traveled
VOC	volatile organic compound
WDR	waste discharge requirements
WEAP	Worker Environmental Awareness Program
WL	Watch List
WMU	waste management unit
WRCC	Western Regional Climate Center
ZEV	Zero Emissions Vehicle

1. Executive Summary

Black Rock Geothermal LLC (the Applicant), an indirect, wholly owned subsidiary of BHE Renewables, LLC (BHER), proposes to site and construct the Black Rock Geothermal Project (BRGP or Project) within the Salton Sea Known Geothermal Resource Area (KGRA) located near Calipatria, Imperial County, California. The Project will be owned and operated by Black Rock Geothermal LLC, along with the associated interconnection transmission line (gen-tie). The Project permanent facilities include geothermal production wells, pipelines, fluid and steam handling facilities, a solids handling system, Class II surface impoundment, service water pond, a retention basin, process fluid injection pumps, and injection wells.

The Project will provide an efficient method for meeting power needs in California by providing firm, clean power from a renewable geothermal source. The Project design applies known equipment, operational lessons learned, and corrosion resistant materials for a planned operational life of 40 years. The Project's maximum continuous rating is approximately 87 megawatts (MW) gross output, with an expected net output of approximately 77 MW.

1.1 Project Objectives

The Project's primary objective is to develop, construct and operate a baseload renewable electrical generating facility that supports grid reliability and the State's goal for a transition to a 100% renewable energy and zero-carbon resource supply to end-use customers by 2045.

1.2 Project Location

The Project will be located on approximately 55 acres of a 160-acre parcel within the unincorporated area of Imperial County, California, and is bounded by McKendry Road to the north, Severe Road to the west, and Boyle Road to the east. The town of Niland is approximately eight miles to the northeast, and the town of Calipatria is approximately six miles southeast of the plant site as shown on Figure 1-1. The surrounding area consists of actively farmed fields as well as other geothermal projects located throughout the area, including the Vulcan Power Plant and the Hoch (Del Ranch) Power Plant, collectively operated as the Region 2 facilities, both located to the southeast of the site. The Sonny Bono National Wildlife Refuge headquarters is approximately 0.7 mile northeast of the Project. A rendering of the Project site prior to construction is shown on Figure 1-2, and an architectural rendering is provided as Figure 1-3. A list of the owners of property within 1,000 feet of the Project and 500 feet of project linears is provided in Appendix 1A. A list of preparers is provided as Appendix 1B.

1.3 Project Elements

The main Project elements, including linear facilities and construction laydown areas, are shown on Figure 1-4 and are as follows:

- One steam turbine generator system consisting of a condensing turbine generator set with three steam entry pressures (high pressure, standard pressure, and low pressure).
- Geothermal fluid processing systems, including steam separation vessels, pipelines, and tanks.
- One seven-cell cooling tower.
- An interconnection to the proposed Imperial Irrigation District (IID) Elmore North switching station via an approximately 2.2-mile-aboveground generator tie-line that runs from the BRGP northeast to the substation.
- Twelve wells and seven associated well pads.
- Five production wells on three well pads adjacent to the plant; three production pipelines will connect production wells to the plant site.

- Seven injection wells on four well pads south of the plant; three aboveground injection pipelines will exit the southern border of the plant site and follow existing roads to the injection wells.
- A Class II surface impoundment (Brine Pond) sized to receive aerated process fluid, geothermal fluid from unplanned overflow events, geothermal fluid from the partial draining of clarifiers during maintenance events; aerated fluid from the Brine Pond will be directed to a dedicated aerated fluid injection well.
- Process water supply from IID via the Vail 4A Lateral Gate 459 or 460 immediately east of the Project, as well as an approximately 0.5-mile-long secondary connection via Vail 4 Lateral Gate 417 or 418 adjacent to Gentry Road to the east of the Project; potable water will be supplied through a reverse osmosis system or an equivalent system, and/or delivered through a commercial water service.
- Up to nine laydown and parking areas, two construction crew camps, and up to four borrow pits located throughout the region; most of the laydown and parking areas for BRGP will be located adjacent to the site immediately south and east; however, all sites may be used and will be shared between three proposed geothermal projects: the Project, Elmore North Geothermal Project, and Morton Bay Geothermal Project.

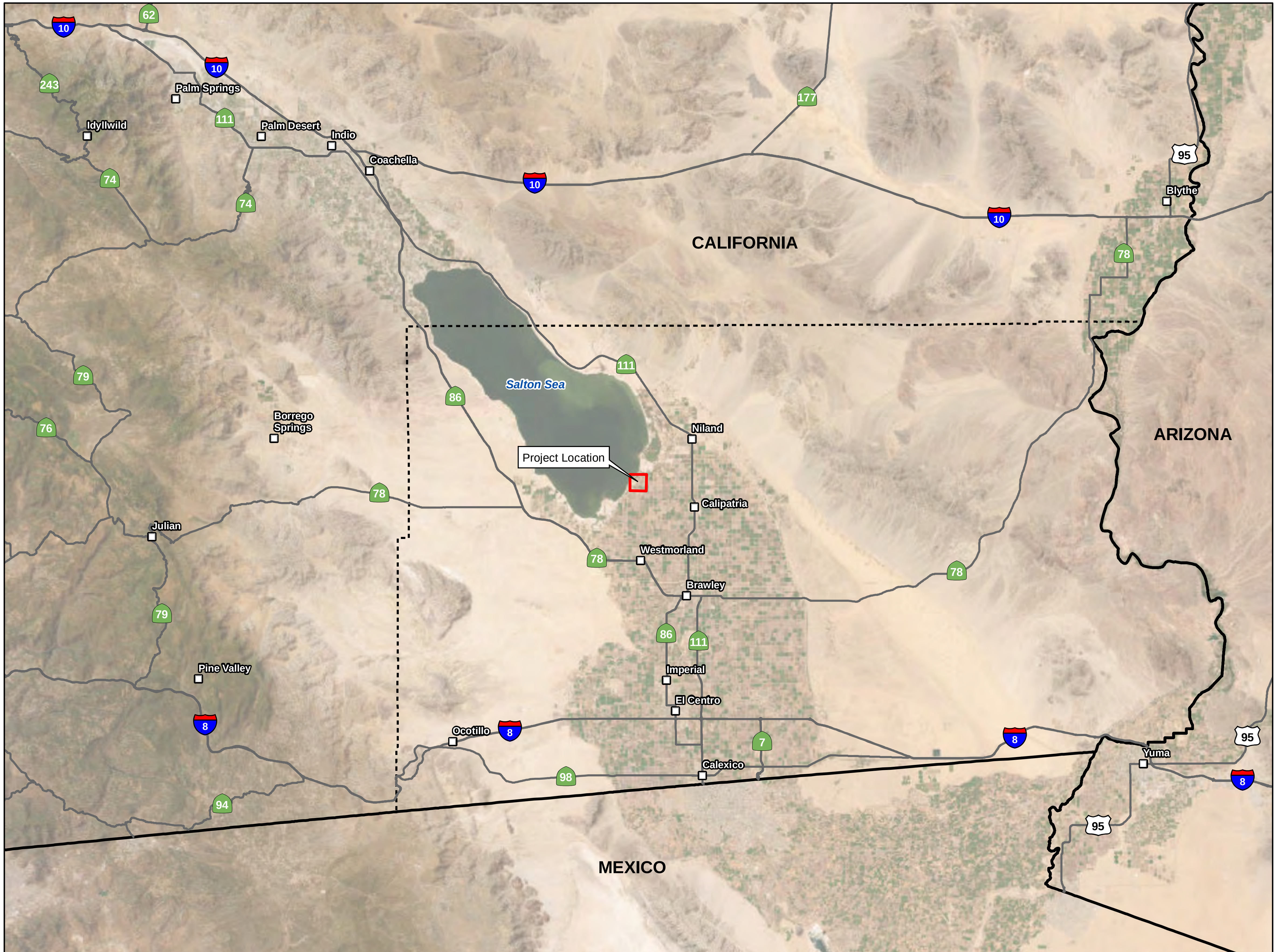
1.4 Project Benefits

BRGP will provide the following key environmental and economic benefits:

- **Baseload Renewable Portfolio Standard Resource:** The Project is an eligible renewable energy resource able to satisfy California's Renewable Portfolio Standard (RPS) requirements and will generate geothermal energy 24 hours a day, 365 days a year, with an average availability of 95% or higher. By providing clean, efficient power using renewable geothermal resources by the end of the second quarter of 2026, the Project helps fulfill the long-term energy needs of California and goals of State Bill (SB) 100.
- **Reliability Support for the California Grid:** As RPS goals increase, a larger portion of the power mix will be supplied by intermittent and weather-dependent resources; firm clean power will become a critical piece of the power mix. The Project's ability to provide much-needed renewable baseload generation was determined necessary for the reliability of the California grid, considering the projected 2030 closure of the Diablo Canyon Nuclear Generating Station.
- **Key Project for Baseload Clean Energy Production:** The Project will provide 77 MW (net) baseload renewable electricity using geothermal resources, which assists with meeting the State's goal for a transition to a 100% renewable energy and zero-carbon resource supply to end-use customers by 2045.
- **Numerous Construction Jobs:** The Project will provide for a peak of approximately 426 construction workers over a 29-month construction and commissioning period.
- **Substantial Property Tax Revenue for Imperial County:** The Project will generate approximately $5.9 million to $10 million in property tax per year.
- **Local Economic Benefits:** Once operating, the Project will not significantly impact local housing, educational, or emergency response resources. In addition to the direct employment benefit of approximately 61 jobs when online, the Project will enhance the local economy by using the services of local or regional firms for major maintenance and overhauls, plant supplies, and other support services throughout the life of the Project.

1.5 Project Ownership

The Applicant, an indirect, wholly owned subsidiary of BHER, will construct, own, and operate the Project. The geothermal leasehold is owned and will be operated by Magma Power Company, a parent of the Applicant.



Legend

- City or Town
- Major Road
- Imperial County Boundary
- State or National Boundary

0 5 10 20
Miles

Figure 1-1
Project Vicinity
Black Rock Geothermal Project
Imperial County, California

Jacobs

Figure 1-2
Project Site Prior to Construction,
Black Rock Geothermal Project
Imperial County, California

Jacobs

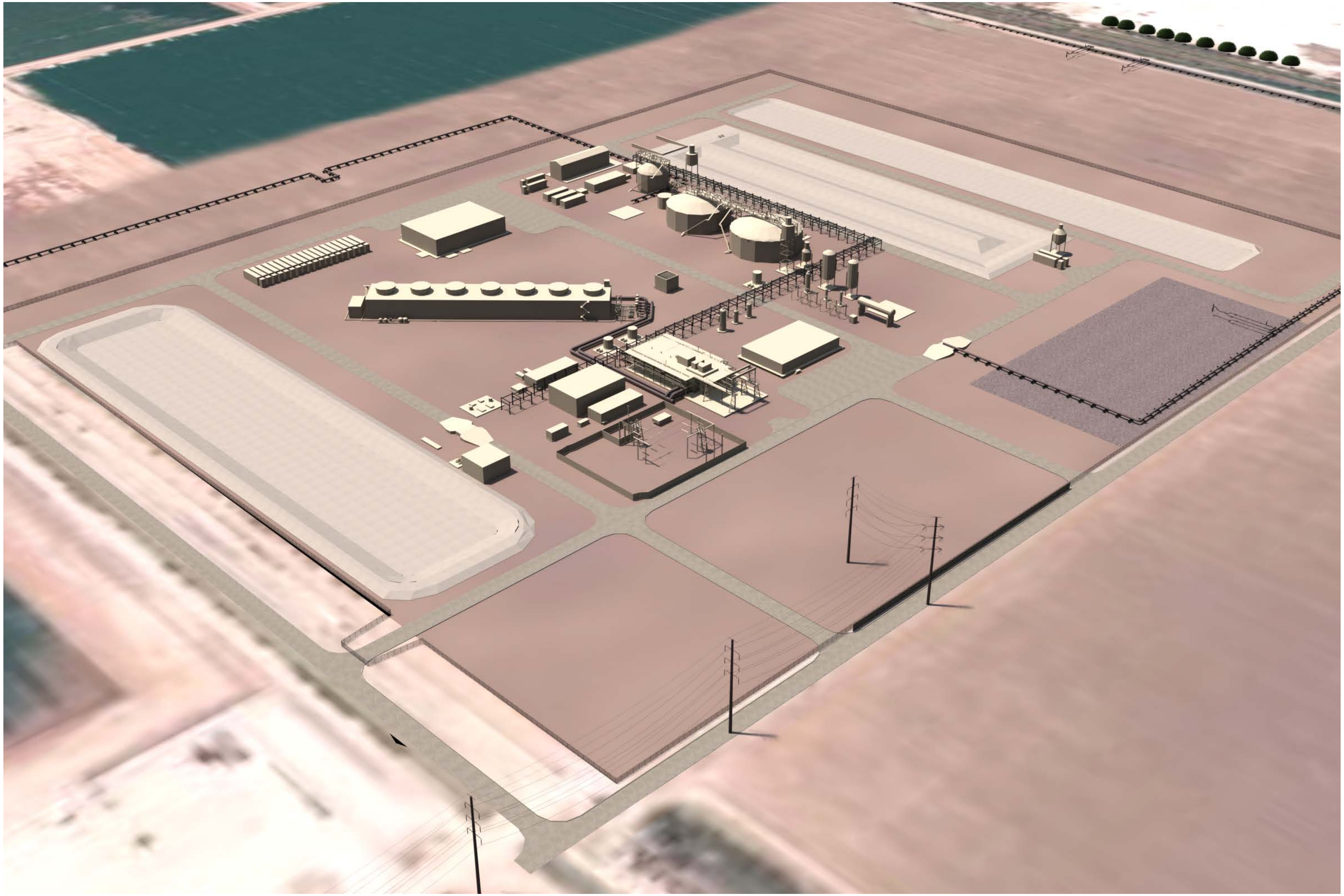


Figure 1-3
Architectural Rendering,
Black Rock Geothermal Project
Imperial County, California

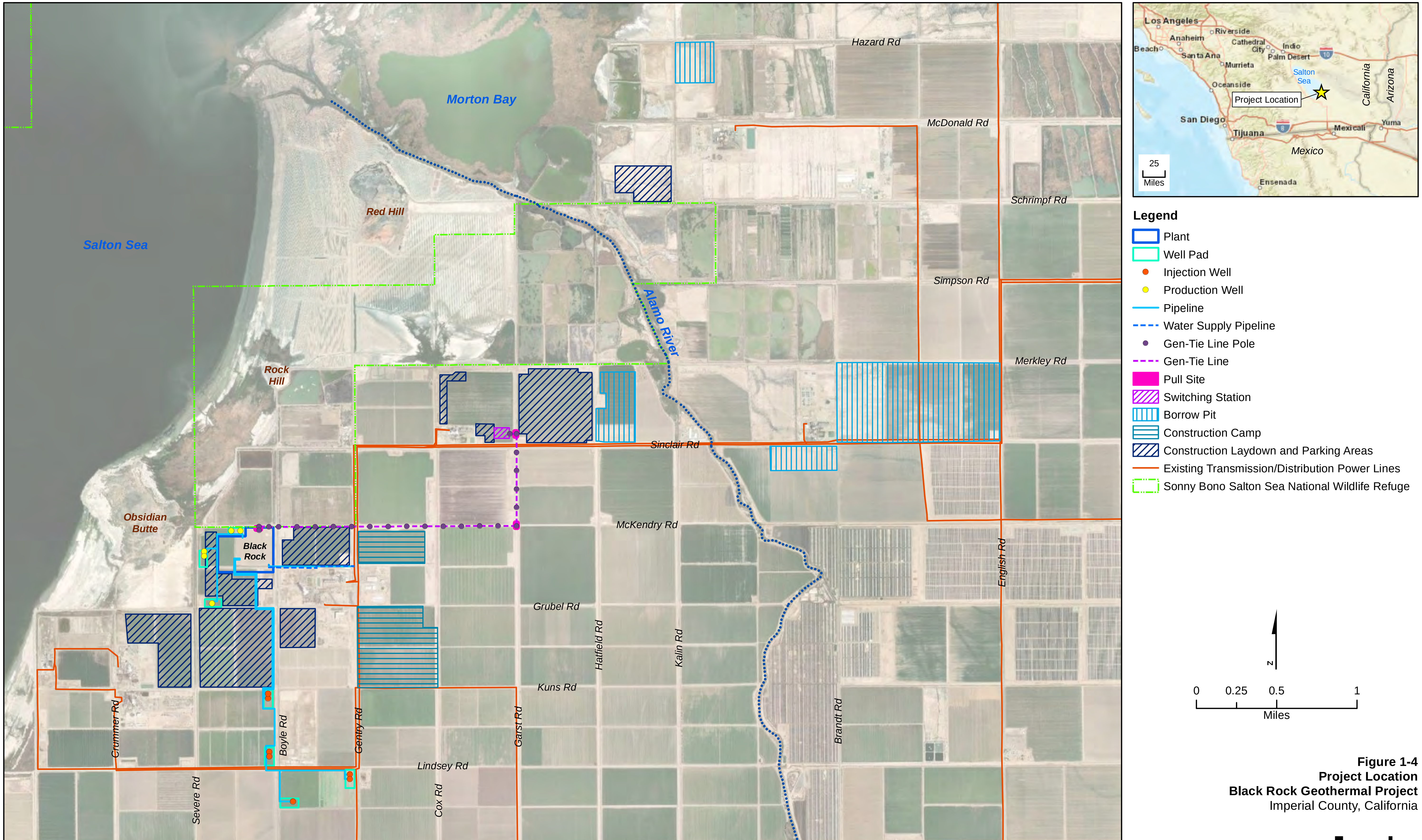


Figure 1-4
Project Location
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Executive_Summary\BR\Figure_1-4_230315.mxd

1.6 Project Schedule

The Applicant is filing this Application for Certification (AFC) under the California Energy Commission's (CEC's) 12-month licensing process for geothermal projects located on a site capable of providing geothermal resources in commercial quantities. Construction of the Project is expected to begin no later than second quarter 2024 and full-scale commercial operation is expected to begin by the second quarter of 2026.

1.7 Environmental Considerations

Pursuant to the requirements set forth in existing environmental laws and the CEC's regulations, 16 areas of possible environmental impact from the Project were investigated. Detailed descriptions and analyses of these areas are presented in Sections 5.1 through 5.16 of the AFC. As discussed in detail in this AFC, with the implementation of the proposed mitigation measures and the anticipated Conditions of Certification, there will be no significant unmitigated environmental impacts associated with the construction and operation of BRGP. This Executive Summary highlights seven subject areas that have historically been of interest in CEC proceedings: air quality, biological resources, cultural resources, land use, noise, visual resources, and water resources.

1.7.1 Air Quality

An assessment of the potential impact on air quality was conducted based on the Project emission estimates and air dispersion modeling. As discussed in Section 5.1, the predicted impacts are expected to be less than the California Ambient Air Quality Standards for the attainment pollutants (carbon monoxide, nitrogen oxides, and sulfur dioxide). The Project is located in an area designated by the U.S. Environmental Protection Agency as nonattainment for ozone and by the California Air Resources Board as nonattainment for ozone and particulate matter with a diameter less than 10 microns. The Project's potential air quality impacts will be mitigated by the installation and operation of best available control technology for hydrogen sulfide emissions from geothermal processes and for particulate emissions from cooling tower operations. After mitigation, the Project will have less than significant air quality and public health impacts. Refer to Section 5.1 for a detailed analysis of air quality and Section 5.9 for a detailed analysis of public health.

1.7.2 Biological Resources

The Project is located on privately owned lands in a low area surrounded by mountains with no outlet for flowing water. This area is highly disturbed by agriculture and geothermal development and does not contain high-quality natural habitat. Land cover types are mostly nonnatural, including agriculture, developed, and disturbed. The natural vegetation types include Barren, Invasive Southwest Riparian Woodland and Shrubland, North American Arid West Emergent Marsh, and North American Warm Desert Playa. The Project does not contain any California Department of Fish and Wildlife special-status habitats or U.S. Fish and Wildlife Service (USFWS)-designated critical habitat. However, there are six special-status species that have a high potential to be present or are present at the Project, including burrowing owl and long-billed curlew.

Standard avoidance and mitigation measures will be developed in the Biological Resources Mitigation Implementation Monitoring Plan that will be submitted to CEC. The Project may have temporary and/or permanent impacts on biological resources. Section 5.2, Biological Resources, provides a detailed discussion of potential impacts on biological resources from the construction and operation of the Project.

1.7.3 Cultural Resources

There is one identified archaeological property within the Project's area of potential effect which does not appear to be eligible for inclusion in the California Register of Historical Resources (CRHR). Initial information requests with Native American Tribes have identified resources and cultural landscapes in the area. A historic architectural literature search and field survey indicates that a building and several structures older than 50 years are located in the area surrounding the Project, but that this building and structures do not meet the criteria for listing in the National Register of Historic Places or CRHR. Section 5.3 provides a detailed discussion of potential impacts on cultural resources from the construction and operation of the Project. The Applicant has been and will continue to be in close communication with Native American Tribes and other stakeholders to ensure that potential Project impacts on these resources will be mitigated.

1.7.4 Land Use

The Project is consistent with all applicable federal, state, and local plans and policies, and as such, there are no significant land use impacts associated with the implementation of the Project. The Project is subject to applicable policies in the *Imperial County General Plan* and has a General Plan Land Use designation of Agriculture. The Project is on land that is zoned A-3 with a Geothermal Overlay. Per Imperial County Code Section § 90509.02, major geothermal projects that meet the requirements of Division 17 are conditionally permitted in the A-3 zoning. Further, the Geothermal Overlay identifies the parcel as suitable for geothermal activities. The Project will not conflict with air navigation operations associated with Calipatria Municipal Airport. Section 5.6 contains a detailed discussion of the Project's land use.

1.7.5 Noise

There will be no significant adverse noise impacts from the construction or operation of the Project. The Project will comply with Imperial County's guidelines, which have established a sound limit of 70 A-weighted decibels Community Noise Exposure Level at the nearest residence. A USFWS-owned house at Sonny Bono National Wildlife Refuge headquarters used for employee housing is approximately 0.7 mile from the Project and the nearest permanent private residence is located approximately 2.5 miles from the Project. Given the large distances to the closest residence, the steady-state operations of the Project will readily comply. Section 5.7 contains a detailed discussion of the noise impact assessment.

1.7.6 Visual Resources

The Project will not result in significant adverse visual impacts, nor will it significantly degrade the existing visual character or quality of the site and its surroundings. Surrounding land uses include existing agricultural operations, geothermal powerplant facilities, and open space. Approximately five existing geothermal powerplants are located within a 10-mile radius of the Project. The Project will be visible from nearby public viewpoints, including roadways, Red Hill Marina County Park, Rock Hill, and within other areas of the Sonny Bono Salton Sea National Wildlife Refuge. The existing visual character and quality of the area includes industrial and utility structures, primarily from existing geothermal powerplants, electrical distribution lines, and various agricultural facilities. Therefore, even where the Project would be seen, it will not substantially degrade the visual character or quality of the surroundings. The Project is not located within a designated scenic area and there are no state scenic highways in its vicinity. Section 5.13 contains a detailed discussion of the visual resources assessment.

1.7.7 Water Resources

There will be no significant adverse impacts on water resources from the construction or operation of the Project. The largest water demand for the facility is cooling tower makeup water to offset water lost through evaporation. Cooling tower makeup water will primarily be provided by condensed geothermal steam from the main condenser except during high ambient conditions when supplemental water will be used from the service water pond. Approximately 80% of the operational water required by the facility will be generated by steam condensed in the main condenser. On an annual average basis during operation, water needs from the IID canal are approximately 1,125 acre-feet per year at design conditions, which is less than 20% of the total facility water needs. IID canal water also will serve as the water source for maintenance activities, the fire protection system, and to fill the cooling tower prior to startup. IID, the water service provider, has requested a water supply assessment. Section 5.15 contains a detailed analysis of water resources.

1.8 Conclusion

The Project will provide reliable and clean renewable energy meeting California's goals, enhance the local economy and create jobs, and have no significant adverse impacts to the local environment. Accordingly, the Project is in the public interest and should be expeditiously permitted.

2 Project Description

2.1 Introduction

Black Rock Geothermal LLC (the Applicant), an indirect, wholly owned subsidiary of BHE Renewables, LLC (BHER), proposes to site (Assessor Parcel Number 020-110-008) and construct the Black Rock Geothermal Project (BRGP or Project) within the Salton Sea Known Geothermal Resource Area (KGRA) near Calipatria, Imperial County, California. The BRGP will be owned and operated by Black Rock Geothermal LLC, along with the associated interconnection transmission line (gen-tie line).

The Salton Sea KGRA is known to have significant geothermal reserves. A ''known geothermal resource area'' is an area in which the geology, nearby discoveries, competitive interests, or other indicia would, in the opinion of the Secretary of the Interior, engender a belief in those who are experienced in the subject matter that the prospects for extraction of geothermal steam or associated geothermal resources are good enough to warrant expenditures of money for that purpose. Refer to 30 United States Code (USC) 1001.

The BRGP will deliver an efficient method for meeting power needs in California by providing firm, clean power from a renewable geothermal source. The Project design applies known equipment, operational lessons learned, and corrosion-resistant materials for a planned operational life of 40 years. BRGP's maximum continuous rating (MCR) is approximately 87 megawatts (MW) gross output, with an expected net output of approximately 77 MW.

The BRGP is located on a site capable of providing geothermal resources in commercial quantities. Therefore, as provided for in California Public Resources Code Section 25540.2 and Section 1803 of the California Energy Commission (CEC) regulations, the Applicant requests a 12-month certification process for this Application for Certification (AFC).

2.2 Project Objectives

It is the policy of the state of California to encourage the use of geothermal resources for thermal power plants, wherever feasible, recognizing that such use has the potential of providing direct economic benefit to the public, while helping to preserve limited fossil fuel resources and promoting air cleanliness (Public Resources Code Section 800). The Project objectives of the BRGP are described in the following sections.

2.2.1 Primary Objective

The Project's primary objective is to develop, construct, and operate a baseload renewable electrical generating facility that supports grid reliability and the state's goal for a transition to a 100% renewable energy and zero-carbon resource supply to end-use customers by 2045.

2.2.2 Related Objectives

1. Construct and operate an approximately 77-MW (net) baseload renewable electrical generating facility that uses geothermal resources.
2. Develop a renewable electrical generating facility that minimizes significant environmental impacts of project development through the use of existing infrastructure, existing real property interests and rights-of-way, project design measures, and feasible mitigation measures.
3. Develop new incremental capacity from a facility eligible under the Renewables Portfolio Standard (RPS) program with a capacity factor of at least 80% capable of satisfying the procurement requirements of California's utilities under the California Public Utilities Commission's (CPUC's) Decision 21-06-035 (Mid-Term Reliability Decision) and subsequent decisions.
4. Develop an eligible renewable energy resource facility that can assist community choice aggregators, investor-owned utilities, and publicly owned utilities in meeting their California Renewables Portfolio Standard (RPS) requirements.

5. Encourage the responsible development and revitalization of the Salton Sea KGRA region in a manner that benefits local and regional communities and tribes.

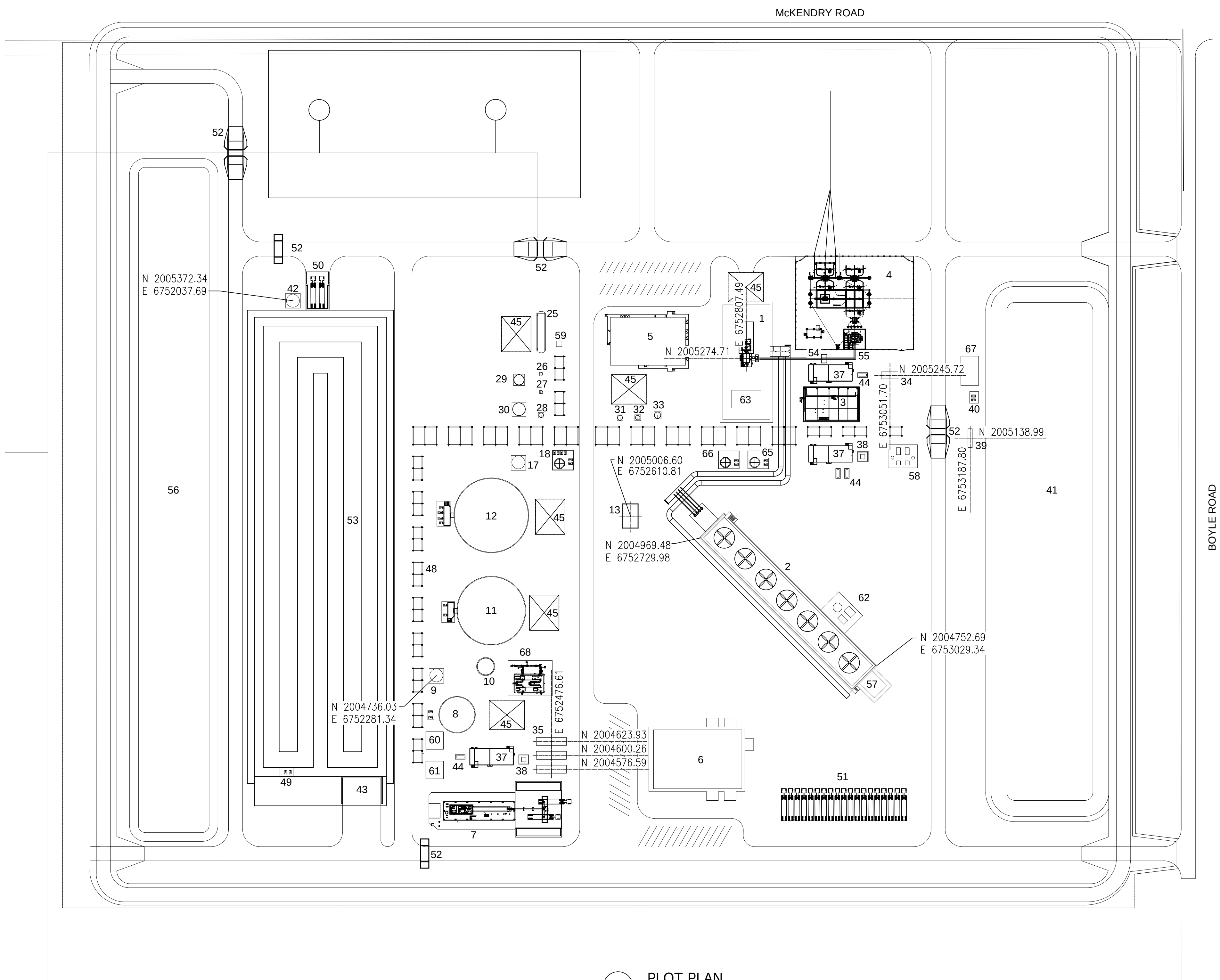
6. Create new, high-paying construction jobs, operations and maintenance jobs, and skilled trades and professional roles in Imperial County, California.

2.3 Facility Description and Location

2.3.1 Introduction

The BRGP consists of a proposed geothermal Resource Production Facility (RPF), a geothermal-powered Power Generation Facility (PGF), and associated facilities. Figure 1-1 shows the project regionally, and Figure 1-4 depicts the Project area, including proposed generation interconnection gen-tie line, production/injection well pads, and pipelines. The RPF includes geothermal production wells, pipelines, fluid and steam handling facilities, a solid handling system, Class II surface impoundment, service water pond, a retention basin, process fluid injection pumps, power distribution centers, and injection wells. The RPF also includes steam-polishing equipment designed to provide turbine-quality steam to the PGF. The PGF electrical power is generated using a triple pressure condensing turbine/generator set with a surface condenser, non-condensable gas (NCG) removal system, a sparger NCG abatement system (located within the cooling tower basin), condensate bio-oxidation abatement systems adjacent to the cooling tower, a heat rejection system cooling tower, and a generator step-up transformer (GSU). The PGF also includes a 230 kilovolt (kV) substation and power distribution centers, and five emergency standby diesel-fueled engines (four generators and one fire water pump). Shared facilities among the RPF and PGF include a control building, a service water pond, and other ancillary facilities. Heat rejection for the steam turbines will be accomplished with a mechanical draft counterflow wet cooling tower. The steam turbine will have a maximum continuous rating (MCR) of 77 MW (net) and the generator will have an approximate rated capacity of 97,000 kilovolt-amperes (kVA) at a 0.85 power factor, for a maximum annual electrical production of 674,500 megawatt-hours. Figure 2-1 presents a general arrangement plan and Figure 2-2 presents a process flow diagram. A heat and mass balance is provided as Appendix 2C, submitted under a request for confidential designation.

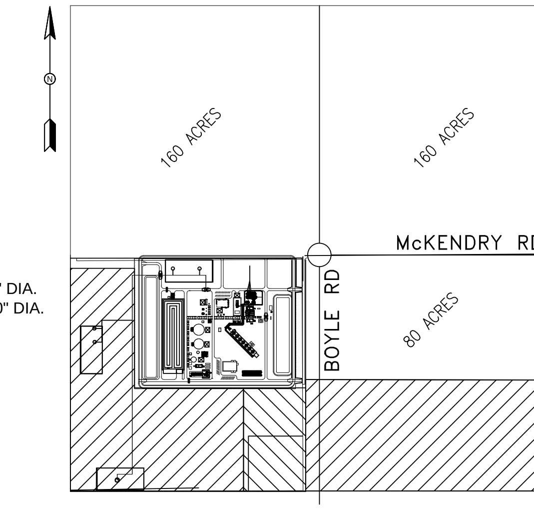
Geothermal fluid will be produced from five initial production wells near the PGF (Figure 1-4). The fluid will flow, without pumping, through aboveground production pipelines to the steam-handling system adjacent to the PGF. At the steam-handling system, the geothermal fluid will be separated from the steam phase (flash) to produce high-pressure (HP) steam. The fluid then will be flashed at successively lower pressures to produce standard-pressure (SP) and low-pressure (LP) steam for use in the steam turbine. A final steam separation will occur in an atmospheric flash tank to ensure that no residual pressure is transferred to the clarifier tanks. The depressurized fluid will flow into the primary and secondary clarifiers to remove suspended solids that precipitated upstream, by design, in the RPF. Solids precipitation returns geothermal fluid to chemical equilibrium from a state of super saturation, particularly for silica and iron constituents, during reductions in temperature and pressure. Stabilizing the geothermal fluid makes the injection process sustainable. Injection of super saturated silica fluid and suspended solids would be an unmanageable process because of scaling and plugging of wells. Geothermal fluid is injected and returned to the geothermal reservoir to maintain pressure and allows for the fluid to be reheated causing the resource to be renewable and sustainable. Spent geothermal fluid is returned to the reservoir using fluid specific injection wells for three types of fluids; spent geothermal fluid, aerated fluid, and condensate. The fluid streams are separated through the RPF process; remixing the fluids risks sustainable injection through scaling and excess solids precipitation. These reactions between fluid streams are caused by differentials in oxygen content, pH, and temperature. Spent geothermal fluid comes from the process described here. Aerated fluid is oxygenated and near ambient temperature, which comes from RPF surface impoundment and similar sources. Condensate comes from the cooling tower as an aerated mix of condensed steam and cooling tower makeup water. All production and injection wells will be operated in accordance with California Department of Conservation, Geologic Energy Management Division (CalGEM) regulations.



1 PLOT PLAN

PLANT DESCRIPTION

1. TURBINE GENERATOR TG-3001
2. COOLING TOWER
3. GAS REMOVAL SYSTEM
4. SWITCHYARD
5. CONTROL ROOM/LAB 130'x80'
6. MAINTENANCE BLDG 100'x150'
7. HORIZONTAL BELT FILTER
8. TK-2801 THICKENER
9. FLASH/DRAIN AFT
10. TK-2701 HEAD TANK
11. TK-2601 SEC. CLARIFIER 115'-0" DIA.
12. TK-2501 PRIM. CLARIFIER 125'-0" DIA.
13. ROCK MUFFLER
14. NOT USED
15. NOT USED
16. NOT USED
17. T-2401 A PROCESS AFT
18. T-5101 PURGE WATER
19. NOT USED
20. NOT USED
21. NOT USED
22. NOT USED
23. NOT USED
24. NOT USED
25. V-2101 HP SEP
26. V-3131 HP SCRB
27. V-3231 SP SCRB
28. V-3331 LP SCRB
29. V-2201 SP CRYST
30. V-2301 LP CRYST
31. V-3161 HP DMSTR
32. V-3261 SP DMSTR
33. V-3361 LP DMSTR
34. EMERGENCY GENERATOR
35. EMERGENCY GENERATOR
36. NOT USED
37. POWER DISTRIBUTION CENTER (PDC)
38. 4160V TRANSFORMERS
39. FIRE WATER PUMPS
40. DOMESTIC WATER PUMPS
41. SERVICE WATER POND (180,000± SF)
42. WARM-UP AFT
43. HYDRO BLAST PAD
44. 480V TRANSFORMERS
45. CRANE ACCESS
46. NOT USED
47. NOT USED
48. PIPE RACK
49. AERATED BRINE INJ. PUMPS
50. TRAILER DUMP
51. TRAILER PARKING
52. CULVERT
53. BRINE POND (CONCRETE LINED)
54. GENERATOR CIRCUIT BREAKER
55. ISOLATED PHASE BUS DUCT
56. RETENTION BASIN
57. OX BOX
58. INSTRUMENT AND SERVICE AIR SYSTEM
59. ANTI-FOAM STORAGE AND INJECTION SYSTEM
60. NORMS STORAGE AND INJECTION SYSTEM
61. POLYMER STORAGE AND INJECTION SYSTEM
62. COOLING TOWER CHEMICAL FEED SYSTEM
63. STEAM TURBINE LUBE OIL SYSTEM
64. NOT USED
65. CONDENSATE STORAGE TANK
66. EXCESS CONDENSATE STORAGE TANK
67. POTABLE WATER SYSTEM
68. PROCESS BRINE INJECTION PUMPS



2 BLACK ROCK LOCATION PLAN

Scale: 1"=1000'

TOWNSHIP 11 SOUTH, RANGE 13 E,
SECTION 33, NE 1/4 OF SW 1/4
APPROXIMATELY 60 ACRES

Figure 2-1
General Arrangement,
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-M3-101-1H, 4/5/2023.

Jacobs

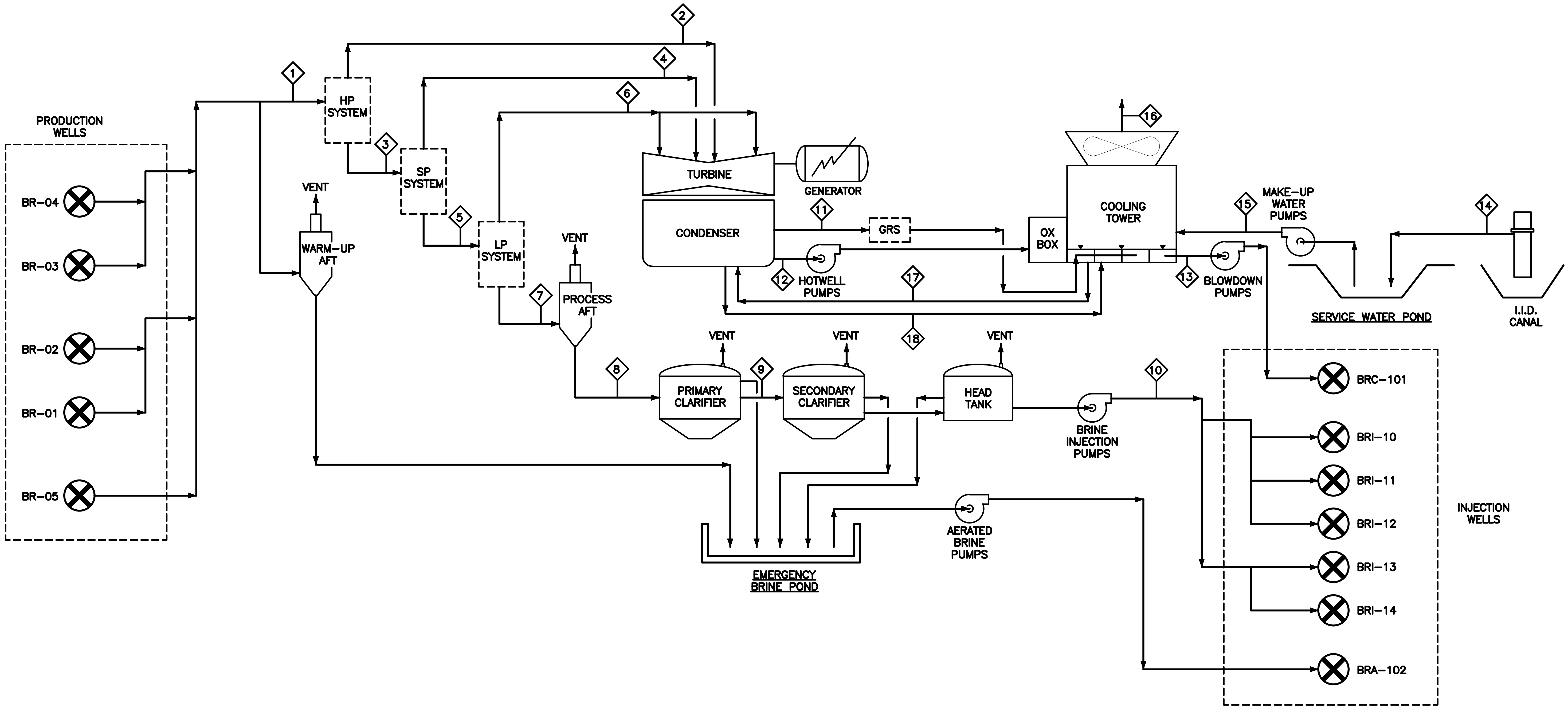


Figure 2-2
Process Flow Diagram
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-M0-200-1F, 4/5/2023.

Steam from the RPF will have impurities removed, after which it will be delivered to a triple-pressure condensing steam turbine. Steam condensed in a surface condenser will be used as makeup water for the cooling towers, turbine steam washes, and other minor process activities. NCGs will be extracted from the main condenser by the gas removal system and then directed to the cooling tower basin for abatement.

Electricity generated by the BRGP will be delivered to a substation near the northeast corner of the BRGP site. This substation will deliver energy through a generation interconnection gen-tie line into the Imperial Irrigation District (IID) transmission system at a new switching station near the intersection of Garst Road and West Sinclair Road.

The Project anticipates supplying capacity and energy to California's electric markets, supporting the state's pursuit of an environmentally clean and reliable electrical system.

The location and the configuration of the Project have been selected to best match operating needs and the available geothermal resource. A System Impact Study concluded IID network (transmission) upgrades are required to deliver additional energy to the Southern California Edison (SCE) Devers Substation, including a new gen-tie with capacity for BRGP and future projects (refer to Section 3.3.6). IID's network upgrades will support sustainable operation of IID's system and further power generation projects not affiliated with the BRGP. IID will construct and complete the network updates prior to Project operations.

2.3.2 Salton Sea KGRA Geothermal Resources

2.3.2.1 Regional History of Geothermal Resources

The Salton Trough is a 3,100-square-mile geological structural depression that extends from the Transverse Mountain Range on the north to the Gulf of California on the south. The Peninsular Mountain Range forms the western boundary, and the Colorado River forms the eastern boundary. The Salton Trough is a seismically active rift valley where sedimentation and natural tectonic subsidence are nearly in equilibrium. The California Department of Conservation, California State Mining and Geology Board (SMGB) recognizes the Salton Trough as an area with thermal water of sufficient temperature for potential geothermal energy development. Distinct geothermal anomalies are distributed throughout the Salton Trough, where hotter fluids suitable for electric generation are accessible (Imperial County General Plan, Renewable Energy and Transmission Element, 2015).

The Salton Sea KGRA has been known to have significant geothermal reserves since oil and gas companies first discovered the field in 1958 during exploration. The Salton Sea KGRA comprises 161 square miles (103,221.51 acres). The SMGB also has designated the Salton Sea as a geothermal field.

Development of the resource was slow in the 1960s and 1970s because of technical challenges associated with processing the highly corrosive and scaling hypersaline fluid. Union Oil Company of California (Unocal), Magma Power Company, and various governmental agencies overcame these challenges. Commercial operation of the Salton Sea geothermal reservoir began in 1982 at Unocal's Salton Sea (Unit) 1 power plant and subsequently, in 1986, at Magma Power Company's Vulcan plant. Since then, nine additional generating units were developed and operate at a total capacity of 395 MW (net). The most recent facility, Hudson Ranch Power 1, began commercial operations in 2012 (Table 2-1).

Table 2-1. Geothermal Power Plants Operating in the Salton Sea Area

Project Name/Location	Net Capacity (MW)	Commercial Operation Date
Elmore Backpressure Turbine	7	2019
Elmore	42	1989
Leathers	42	1990
Vulcan	38	1986
Del Ranch	42	1989

Project Name/Location	Net Capacity (MW)	Commercial Operation Date
CE Turbo (backpressure turbine)	10	2000
Salton Sea 1	10	1982
Salton Sea 2	16	1990
Salton Sea 3	50	1989
Salton Sea 4	42	1996
Salton Sea 5	46	2000
Hudson Ranch Power I	50	2012
Total Existing	395	

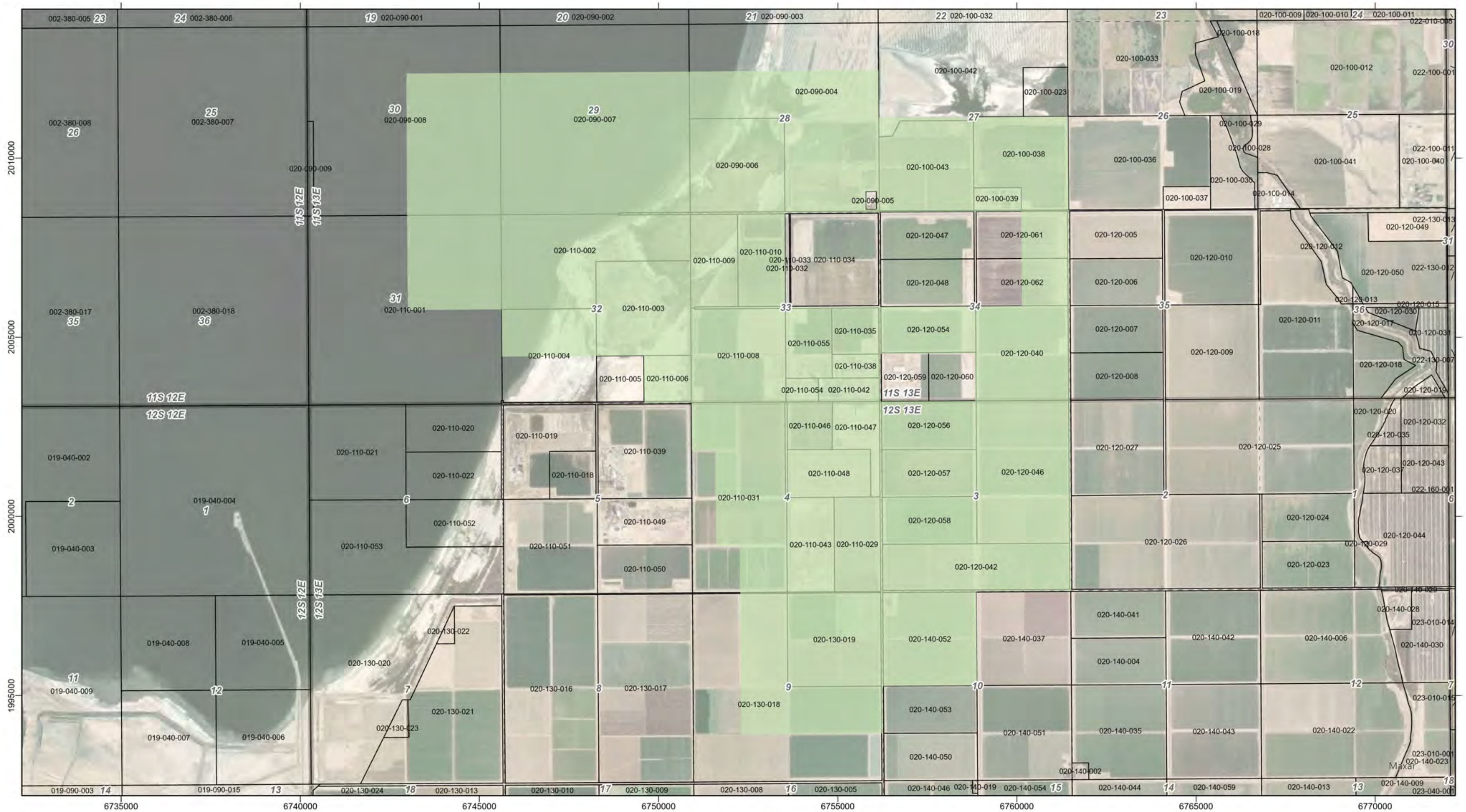
2.3.2.2 Project Site Selection

The BRGP incorporates a feasible and practical layout for the generation of geothermal energy from the Salton Sea Geothermal Reservoir, which contains proven resources. The proposed well locations, resource area, power plant site, production supply, and associated injection capacity will provide the geothermal energy required, while maintaining sufficient spacing between wells to minimize possible thermal and pressure impact without undue interference between wells. This well spacing will yield sustainable production and injection capacity over the Project's life. The Applicant's and its affiliates' mineral and geothermal interests for BRGP are shown on Figure 2-3. Appendix 2A presents the Applicant's Incorporation documentation and legal description for the Project site.

The Salton Sea Geothermal Reservoir is distinguished from the Salton Sea KGRA by its producible fluids contained within the geothermal reservoir, whereas the overall Salton Sea KGRA contains an elevated geothermal gradient (higher temperatures near the surface) that potentially could be harnessed for electricity production or direct used. Simply put, it is the heart of the resource. Production wells access the hotter parts of the reservoir to produce geothermal fluid that will be used to convert thermal and pressure energy to electricity. The production wells would have average flow rates of about 1.6 million pounds per hour (which includes spare capacity for well scaling and associated performance decline) at wellhead pressures of 350 to 400 pounds per square inch at wellhead temperatures of 430 to 480 degrees Fahrenheit (°F). The production wells would be drilled to an average total depth of approximately 7,500 feet. Injection wells will receive the cooled and clarified (solids removed) geothermal fluids and return the fluid to the geothermal reservoir. The spent geothermal fluid injection wells are estimated to have an injection capacity of up to 3.0 million pounds per hour per well at a temperature of about 220 to 225°F and wellhead pressure of 200 pounds per square inch. Injection wells would be drilled to a total depth of approximately 7,500 feet. The aerated fluid and condensate injection wells will be of similar depth, but the fluid temperature will be near ambient temperatures.

Reservoir characteristics in the BRGP site are modeled and measured to be 530 to 600°F and a total dissolved solid content of approximately 22.4% with non-condensable gases of 0.14% at reservoir condition (preflash). Dissolved elements within the geothermal fluid consist primarily of chloride, sodium, calcium, and potassium. There are also significant amounts of zinc, manganese, iron, and silica dissolved in the fluid. The major component of the non-condensable gases is carbon dioxide, which is naturally occurring from the diagenesis of minerals and rocks. There is a large variety of other components in the geothermal fluid, although each is less than 0.01%.

The reservoir is hydrologically disconnected from the neighboring inland shallow Salton Sea (Salton Sea Lake). The static fluid level within the reservoir is measured at depths ranging from 300 feet to 1,400 feet below ground level, whereas the deepest point of the Salton Sea Lake is 51 feet. The reservoir continually creates a clay envelope on its outer edges. Dissolved minerals within the geothermal fluid circulate away from the heat source then begin to cool and precipitate clays, which create a secondary boundary between the similarly named Salton Sea Geothermal Reservoir and Salton Sea Lake.



BHE RENEWABLES®	Imperial County - Black Rock Geothermal Leaseholds	N	**Legend**

Drafted By: RJL | Date: 4/4/2023 | Scale: 1:30,000

Coordinate System: NAD 1983 2011 StatePlane California VI FIPS 0406 Ft US
Datum: NAD 1983 2011
Projection: Lambert Conformal Conic
Map Units: Foot US

0 1,000 2,000 4,000 Feet

BHER Mineral Leases for Black Rock
Assessor Parcel Numbers
Section
Township

Development_Permit_Tabloid_004001_AFC-Permit-ApxBb3B-BR

Figure 2-3
Applicant's Mineral Leases,
Black Rock Geothermal Project
Imperial County, California

Jacobs

Wells are sited to maintain the renewable and sustainable geothermal energy process. Sufficient distance between production and injection areas ensures that production fluid is not quenched by injection fluid and the reservoir receives adequate pressure support from the returned injection fluid. Adequate pressure and temperature in the reservoir allow production wells to flow, after initial stimulation, without use of pumps. The corrosive, high temperature, and scaling nature of the reservoir's fluid would not allow for sustainable use of downhole production well pumps. Additionally, injection and production must be planned so that spent geothermal fluid is placed slightly deeper than production to allow gravity to support the migration of denser injection fluid toward the heat source for reheating, while hotter, less-dense fluid upwells toward the production area.

The guiding principles used in locating the wells for the BRGP are as follows:

- Production wells would be located near known production areas.
- Sufficient spacing between production and injection wells is maintained to prevent thermal breakthrough of injection fluid.
- Production wells are located to minimize production impacts to existing geothermal projects.
- Well spacing will ensure adequate resource to support generation for the project life.
- Well pads, when possible, will support multiple directionally drilled wells to limit the impact on surface lands.

2.3.2.2.1 Individual Well Pad Locations

Five initial production wells will be located on three well pads, and seven initial injection wells will be located on four well pads. The injection wells include five wells for spent geothermal fluid, one well for condensate, and one well for aerated fluid. The Applicant identified additional wells and well pads for future wells, known as makeup wells, that would potentially be drilled during the Project's operational life to support continual power generation at full capacity.

2.3.2.2.2 Geothermal Resource Adequacy

Reservoir properties vary laterally and vertically and are dependent on distance from the heat source, host geology, and structural controls (faults and fractures), which result in variation in heat content, fluid chemistry, gas chemistry, and pressure. The reservoir properties and associated reservoir response from production and injection activity were modeled mathematically using a reservoir model. Historical measured data (for the past 40 years), including reservoir pressure, reservoir temperature, enthalpy, and total dissolved solids, were used to calibrate the reservoir model such that the modeled results are matched with historical measured data. This process is referred to as history matching and validates the ability of the reservoir model to forecast the effect of production and injection associated with BRGP on the reservoir, the operating geothermal power plants, and the ability to operate BRGP throughout the Project life. The numerical reservoir modeling results demonstrate that the geothermal resource can support BRGP while supporting the existing geothermal projects and other geothermal developments proposed by affiliates of the Applicant, including the Elmore North Geothermal Project and the Morton Bay Geothermal Project.

2.3.3 Facility Description

2.3.3.1.1 Site Access

The BRGP site can be reached via either State Route 86 (SR 86) or State Route 111 (SR 111) on existing roads. Upgrades to existing roads, if required, are expected to be minor. From SR 86, access to the site is via Forrester Road, Gentry Road, and McKendry Road. From SR 111, access to the site will be via Sinclair Road, Gentry Road, and McKendry Road. The site is located southwest of the intersection of McKendry Road and Boyle Road.

Production well pads will be located adjacent to the project site and injection well pads will be located to the south of the project site. All well pads are adjacent or near to existing roads, which are either paved or rock surfaced.

2.3.3.1.2 Site Location

The BRGP site is in the Imperial Valley, southeast of the Salton Sea. The Imperial Valley is the southwest part of the Colorado Desert that merges northwestward into the Coachella Valley near the northern shore of the Salton Sea. The BRGP is located in a region of the Imperial Valley characterized mostly by agriculture and geothermal power production, with more recent additions of utility scale solar power plants. The area surrounding the BRGP site is primarily agricultural land.

The BRGP site is bounded by McKendry Road to the north, Boyle Road to the east, and Severe Road to the west. The town of Niland is approximately eight miles northeast of the plant site, and the town of Calipatria is approximately six miles southeast of the plant site. The Red Hill Marina County Park is approximately two miles east of the power plant. The Sonny Bono Wildlife Refuge Headquarters is approximately 0.7 mile northeast of the power plant. The Alamo River is approximately 3.5 miles southwest of the plant site and the New River is approximately five miles southwest.

The power plant will be located on approximately 55 acres (plant site) of a 160-acre parcel (APN 020-110-008) (Township 11 South, Range 13 East, Section 33, NE 1/4 of SW 1/4) within Imperial County, California. The BRGP will include onsite and offsite laydown/parking areas in addition to borrow pits. These construction laydown/parking areas and four borrow pits also will be used by other applicant-owned projects currently before the CEC (the Elmore North Geothermal Project and Morton Bay Geothermal Project).

The location and configuration of the BRGP was selected to most effectively and efficiently use the geothermal resources at the site.

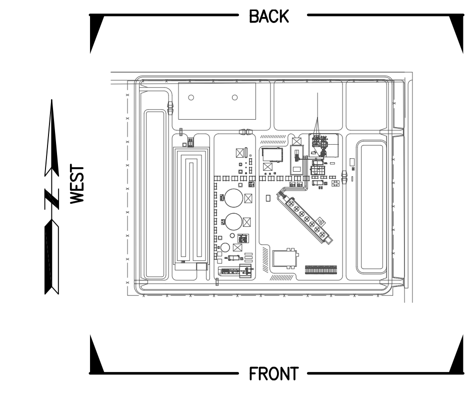
2.3.3.1.3 Site Layout

The BRGP general arrangement drawing is shown on Figure 2-1. Elevation drawings of the Project are shown on Figures 2-4a to 2-4c. The BRGP will comprise the following elements:

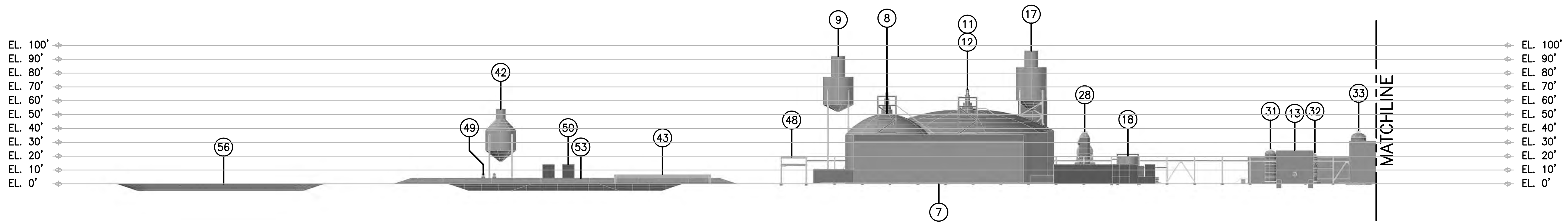
- Turbine/generator
- Cooling tower
- Gas removal system
- Surface condenser
- Switchyard
- Control room and laboratory
- Maintenance building
- Solids dewatering system
- Thickener clarifier
- Flash/drain atmospheric flash tank
- Head tank
- Secondary clarifier
- Primary clarifier
- Rock muffler
- Process atmospheric flash tank
- Purge water system
- High pressure separator
- High pressure scrubber
- Standard pressure scrubber
- Standard pressure crystallizer
- Low pressure crystallizer
- High pressure demister

PLANT DESCRIPTION

1. TURBINE GENERATOR TG-3001
2. COOLING TOWER
3. GAS REMOVAL SYSTEM
4. SWITCHYARD
5. CONTROL ROOM/LAB 130'x80'
6. MAINTENANCE BLDG 100'x150'
7. HORIZONTAL BELT FILTER
8. TK-2801 THICKENER
9. FLASH/DRAIN AFT
10. TK-2701 HEAD TANK
11. TK-2601 SEC. CLARIFIER 115'-0" DIA
12. TK-2501 PRIM. CLARIFIER 125'-0" DIA
13. ROCK MUFFLER
14. NOT USED
15. NOT USED
16. NOT USED
17. T-2401A PROCESS AFT
18. T-5101 PURGE WATER
19. NOT USED
20. NOT USED
21. NOT USED
22. NOT USED
23. NOT USED
24. NOT USED
25. V-2101 HP SEP
26. V-3131 HP SCRB
27. V-3231 SP SCRB
28. V-3331 LP SCRB
29. V-2201 SP CRYST
30. V-2301 LP CRYST
31. V-3161 HP DMSTR
32. V-3261 SP DMSTR
33. V-3361 LP DMSTR
34. EMERGENCY GENERATOR
35. EMERGENCY GENERATOR
36. NOT USED
37. POWER DISTRIBUTION CENTER (PDC)
38. 4160V TRANSFORMER
39. FIRE WATER PUMPS
40. DOMESTIC WATER PUMPS
41. SERVICE WATER POND (180,000± SF)
42. WARM-UP AFT
43. HYDRO BLAST PAD
44. 480V TRANSFORMERS
45. CRANE ACCESS
46. NOT USED
47. NOT USED
48. PIPE RACK
49. AERATED BRINE INJ. PUMPS
50. TRAILER DUMP
51. TRAILER PARKING
52. CULVERT
53. BRINE POND (CONCRETE LINED)
54. GENERATOR CIRCUIT BREAKER
55. ISOLATED PHASE BUS DUCT
56. RETENTION BASIN
57. OX BOX
58. INSTRUMENT AND SERVICE AIR SYSTEM
59. ANTI-FOAM STORAGE AND INJECTION SYSTEM
60. NORMS STORAGE AND INJECTION SYSTEM
61. POLYMER STORAGE AND INJECTION SYSTEM
62. COOLING TOWER CHEMICAL FEED SYSTEM
63. STEAM TURBINE LUBE OIL SYSTEM
64. NOT USED
65. CONDENSATE STORAGE TANK
66. EXCESS CONDENSATE STORAGE TANK
67. POTABLE WATER SYSTEM
68. PROCESS BRINE INJECTION PUMPS



KEY PLAN



FRONT VIEW (LOOKING NORTH)

HORIZONTAL: 1"=40'
VERTICAL: 1"=40'

FRONT VIEW (LOOKING NORTH)

HORIZONTAL: 1"=40'
VERTICAL: 1"=40'

NOTE:
1. GRID ELEVATIONS FOR REFERENCE ONLY, NOT TRUE ELEVATIONS.
2. (#) PLANT DESCRIPTION ITEM.

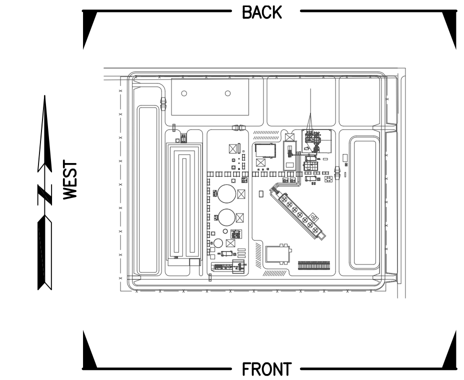
Figure 2-4a
Elevation View Looking North, Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-M3-301-1C, 4/5/2023.

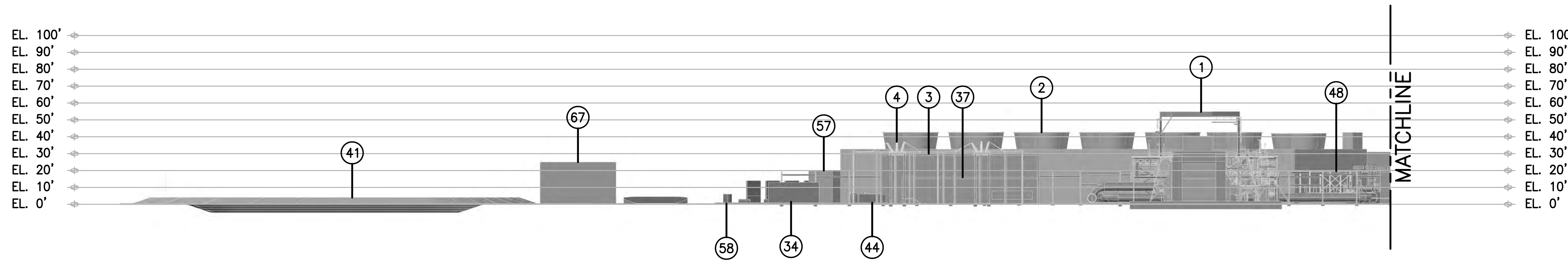
Jacobs

PLANT DESCRIPTION

1. TURBINE GENERATOR TG-3001
2. COOLING TOWER
3. GAS REMOVAL SYSTEM
4. SWITCHYARD
5. CONTROL ROOM/LAB 130'x80'
6. MAINTENANCE BLDG 100'x150'
7. HORIZONTAL BELT FILTER
8. TK-2801 THICKENER
9. FLASH/DRAIN AFT
10. TK-2701 HEAD TANK
11. TK-2601 SEC. CLARIFIER 115'-0" DIA
12. TK-2501 PRIM. CLARIFIER 125'-0" DIA
13. ROCK MUFFLER
14. NOT USED
15. NOT USED
16. NOT USED
17. T-2401A PROCESS AFT
18. T-5101 PURGE WATER
19. NOT USED
20. NOT USED
21. NOT USED
22. NOT USED
23. NOT USED
24. NOT USED
25. V-2101 HP SEP
26. V-3131 HP SCRB
27. V-3231 SP SCRB
28. V-3331 LP SCRB
29. V-2201 SP CRYST
30. V-2301 LP CRYST
31. V-3161 HP DMSTR
32. V-3261 SP DMSTR
33. V-3361 LP DMSTR
34. EMERGENCY GENERATOR
35. EMERGENCY GENERATOR
36. NOT USED
37. POWER DISTRIBUTION CENTER (PDC)
38. 4160V TRANSFORMER
39. FIRE WATER PUMPS
40. DOMESTIC WATER PUMPS
41. SERVICE WATER POND (180,000± SF)
42. WARM-UP AFT
43. HYDRO BLAST PAD
44. 480V TRANSFORMERS
45. CRANE ACCESS
46. NOT USED
47. NOT USED
48. PIPE RACK
49. AERATED BRINE INJ. PUMPS
50. TRAILER DUMP
51. TRAILER PARKING
52. CULVERT
53. BRINE POND (CONCRETE LINED)
54. GENERATOR CIRCUIT BREAKER
55. ISOLATED PHASE BUS DUCT
56. RETENTION BASIN
57. OX BOX
58. INSTRUMENT AND SERVICE AIR SYSTEM
59. ANTI-FOAM STORAGE AND INJECTION SYSTEM
60. NORMS STORAGE AND INJECTION SYSTEM
61. POLYMER STORAGE AND INJECTION SYSTEM
62. COOLING TOWER CHEMICAL FEED SYSTEM
63. STEAM TURBINE LUBE OIL SYSTEM
64. NOT USED
65. CONDENSATE STORAGE TANK
66. EXCESS CONDENSATE STORAGE TANK
67. POTABLE WATER SYSTEM
68. PROCESS BRINE INJECTION PUMPS

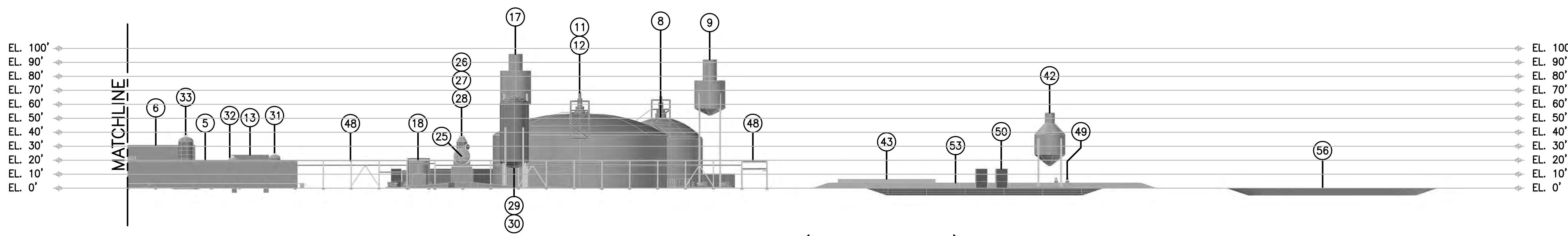


KEY PLAN



BACK VIEW (LOOKING SOUTH)

HORIZONTAL: 1"=40'
VERTICAL: 1"=40'



BACK VIEW (LOOKING SOUTH)

HORIZONTAL: 1"=40'
VERTICAL: 1"=40'

NOTE:
1. GRID ELEVATIONS FOR REFERENCE ONLY, NOT TRUE ELEVATIONS.
2. (#) PLANT DESCRIPTION ITEM.

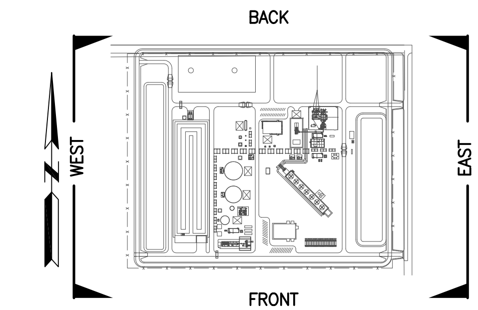
Figure 2-4b
Elevation View Looking South,
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-M3-301-2C, 4/5/2023.

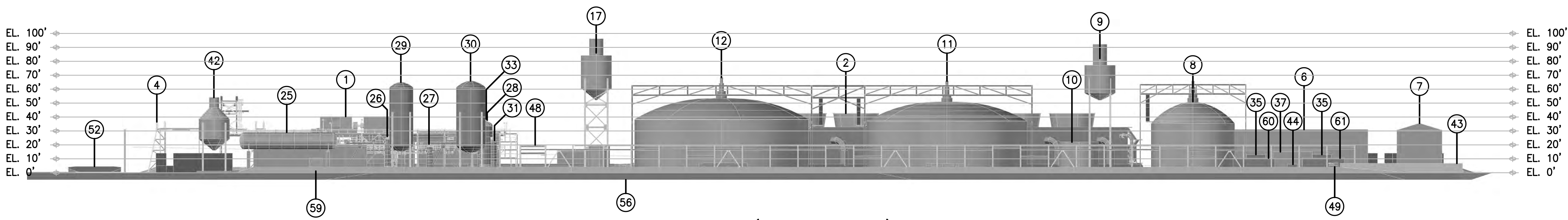
Jacobs

PLANT DESCRIPTION

1. TURBINE GENERATOR TG-3001
2. COOLING TOWER
3. GAS REMOVAL SYSTEM
4. SWITCHYARD
5. CONTROL ROOM/LAB 130'x80'
6. MAINTENANCE BLDG 100'x150'
7. HORIZONTAL BELT FILTER
8. TK-2801 THICKENER
9. FLASH/DRAIN AFT
10. TK-2701 HEAD TANK
11. TK-2601 SEC. CLARIFIER 115'-0" DIA
12. TK-2501 PRIM. CLARIFIER 125'-0" DIA
13. ROCK MUFFLER
14. NOT USED
15. NOT USED
16. NOT USED
17. T-2401A PROCESS AFT
18. T-5101 PURGE WATER
19. NOT USED
20. NOT USED
21. NOT USED
22. NOT USED
23. NOT USED
24. NOT USED
25. V-2101 HP SEP
26. V-3131 HP SCRB
27. V-3231 SP SCRB
28. V-3331 LP SCRB
29. V-2201 SP CRYST
30. V-2301 LP CRYST
31. V-3161 HP DMSTR
32. V-3261 SP DMSTR
33. V-3361 LP DMSTR
34. EMERGENCY GENERATOR
35. EMERGENCY GENERATOR
36. NOT USED
37. POWER DISTRIBUTION CENTER (PDC)
38. 4160V TRANSFORMER
39. FIRE WATER PUMPS
40. DOMESTIC WATER PUMPS
41. SERVICE WATER POND (180,000± SF)
42. WARM-UP AFT
43. HYDRO BLAST PAD
44. 480V TRANSFORMERS
45. CRANE ACCESS
46. NOT USED
47. NOT USED
48. PIPE RACK
49. AERATED BRINE INJ. PUMPS
50. TRAILER DUMP
51. TRAILER PARKING
52. CULVERT
53. BRINE POND (CONCRETE LINED)
54. GENERATOR CIRCUIT BREAKER
55. ISOLATED PHASE BUS DUCT
56. RETENTION BASIN
57. OX BOX
58. INSTRUMENT AND SERVICE AIR SYSTEM
59. ANTI-FOAM STORAGE AND INJECTION SYSTEM
60. NORMS STORAGE AND INJECTION SYSTEM
61. POLYMER STORAGE AND INJECTION SYSTEM
62. COOLING TOWER CHEMICAL FEED SYSTEM
63. STEAM TURBINE LUBE OIL SYSTEM
64. NOT USED
65. CONDENSATE STORAGE TANK
66. EXCESS CONDENSATE STORAGE TANK
67. POTABLE WATER SYSTEM
68. PROCESS BRINE INJECTION PUMPS

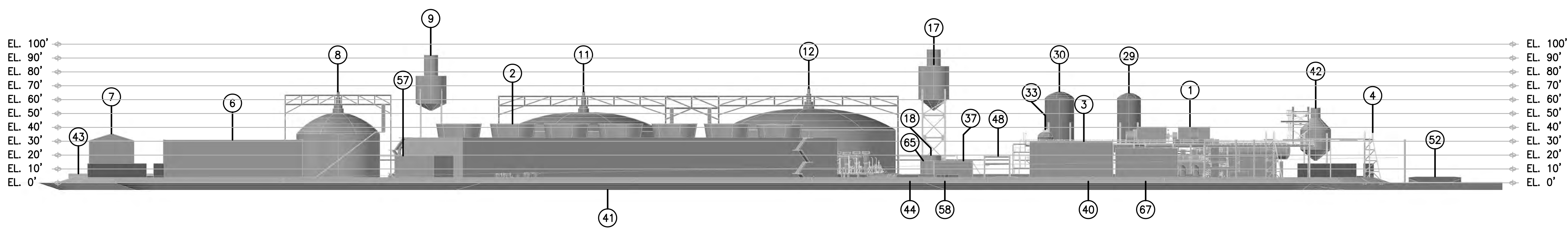


KEY PLAN



WEST VIEW (LOOKING EAST)

HORIZONTAL: 1"=40'
VERTICAL: 1"=40'



EAST VIEW (LOOKING WEST)

HORIZONTAL: 1"=40'
VERTICAL: 1"=40'

NOTE:
1. GRID ELEVATIONS FOR REFERENCE ONLY, NOT TRUE ELEVATIONS.
2. (#) PLANT DESCRIPTION ITEM.

Figure 2-4c
Elevation View Looking East and West,
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-M3-301-3C, 4/5/2023.

Jacobs

- Standard pressure demister
- Low pressure scrubber
- Low pressure demister
- Emergency diesel generators
- Power distribution centers
- Auxiliary transformers (4,160 volt)
- Fire water pumps (electric and diesel powered)
- Domestic water pumps
- Service water pond
- Warmup atmospheric flash tank
- Hydro blast pad
- Auxiliary transformers (480 volt)
- Aerated fluid injection pumps
- Class II surface impoundment
- Generator circuit breaker
- Isolated phase bus duct
- Retention basin
- Instrument and service air system
- Anti-foam chemical storage and injection system
- Naturally Occurring Radioactive Material (NORM) inhibitor chemical storage and injection system
- Polymer storage and injection system
- Cooling tower chemicals storage and feed system
- Steam turbine lube oil system
- Dilution water pumps
- Condensate storage tank
- Excess condensate storage tank
- Potable water system
- Process fluid injection pumps
- Bio-oxidation box (OxBox)
- Non-condensable gas sparger system (located within the cooling tower basin)
- Production well pads and pipelines
- Injection well pads and pipelines

2.3.3.2 Resource Production Facility

The purpose of the RPF is to extract geothermal fluid, produce steam to power the turbine, and inject the spent geothermal fluid. There are two different types of wells associated with the RPF. Production wells are used to extract geothermal fluid. Injection wells are used to return spent geothermal fluid to the geothermal reservoir after heat and steam have been harnessed for power generation. The RPF components are described in the following subsections.

2.3.3.2.1 Production Wells and Pipelines

Initially, five production wells will be required for full PGF operation. The well pads will be located near the PGF, with aboveground production pipelines that run to the RPF. Numerous factors were considered in selecting well locations, including efficient utilization of the geothermal resource, minimizing interference with existing production wells, and environmental constraints. The proposed production wells are spatially separated from injection wells to optimize field development and reservoir management. Each well pad will be equipped with a production warmup pipeline. This will be used for starting up wells during facility startup. During initial startup, the warmup pipeline will discharge into the atmospheric flash tank and then discharge into the Class II surface impoundment located at the PGF site.

Production fluids will be piped through production pipelines to the HP separator located at the PGF site. Each well will produce approximately 1,626,000 pounds per hour of a mixture of steam, NCG, and fluid. Expected properties of the produced fluid are as follows:

- 22.4% total dissolved solids (TDS) at reservoir conditions (pre-flash)
- 0.14 weight % NCG in the production fluids at reservoir conditions (pre-flash)
- Total enthalpy: 402 British thermal units per pound (Btu/lb)

The chemical composition of the produced fluids is shown in Table 2-2.

Table 2-2. Expected Chemical Composition of Produced Fluids Constituent Concentration

Chemical	Milligrams per Kilograms
Hydrogen (H^+)	ND
Beryllium (Be^{+2})	ND
Ammonium (NH_4^+)	322.9 (for NH_3)
Sodium (Na^+)	49,889.0
Magnesium (Mg^{+2})	55.5
Aluminum (Al^{+3})	ND
Potassium (K^+)	12,430
Calcium (Ca^{+2})	23,220
Chromium (Cr^{+3})	ND
Manganese (Mn^{+2})	820
Iron (Fe^{+2})	710
Nickel (Ni^{+2})	ND
Copper (Cu^{+2})	2
Zinc (Zn^{+2})	300
Cadmium (Cd^{+2})	1
Barium (Ba^{+2})	170
Mercury (Hg^{+2})	ND
Lead (Pb^{+2})	70
Fluorine (F^-)	10
Chloride (Cl^-)	135,000
Silicon Dioxide (SiO_2)	430
Carbon Dioxide (CO_2)	1,450
Hydrogen Sulfide (H_2S)	8
Ammonia (NH_3)	30
Methane (CH_4)	6
Total Dissolved Solids (TDS)	224,200
Potential of Hydrogen (pH)	5.7

ND = not detected

Three production pipelines will connect the production wells to the PGF. These wells will be located within the 160-acre parcel in which the BRGP site will be located. The pipelines will have a 50-foot right-of-way (ROW) plus an additional 10% to accommodate several expansion loops required along the length of the pipelines. One or more pipelines would be constructed within each ROW.

The production well lines will have two parallel emergency shutdown valves (ESVs). Piping from the wellhead to the ESVs will be made of Inconel 625 or an equivalent corrosion-resistant alloy or functionally equivalent. The pipeline material from the ESVs to the HP separator located at the power plant will be made of 2507 super duplex stainless steel or an equivalent corrosion-resistant alloy or functionally equivalent.

The pipeline design is modeled using stress analysis software programs to determine the best location and spacing requirements of thermal expansion loops. For personnel protection and to prevent energy loss, the pipelines are insulated.

Pipeline construction would consist of various activities, including clearing and grubbing, excavation for pipeline supports, pipe handling, and welding. Site clearing and preparation (removing vegetation and minor leveling) would require the use of heavy diesel-powered earth-moving equipment, including bulldozers, scrapers, dump trucks, and front-end loaders. Site clearing and preparation would occur at all locations where equipment would be constructed or installed. The ROW would be prepared by removing debris and land leveling as each component is being constructed. Erosion control measures would include installing silt fencing. Surplus soils that cannot be used for restoration onsite would be sent to a soils broker or the local, state-approved landfill.

2.3.3.2.2 Fluid/Steam Handling System

Two-phase production fluid (steam and fluid) entering the power plant site will be separated in the HP separator. HP steam will be processed and introduced into the turbine. Remaining fluid will undergo further steam separation at successive lower pressures to produce SP and LP steam that will be conditioned prior to entering the steam turbine.

High Pressure Separator System

The production wells flow into a common collection pipeline that delivers the geothermal fluid to the HP separator. HP steam is discharged from the separator through a pipeline to the HP scrubber and HP demister, then into the HP inlets of the steam turbine.

Standard Pressure Crystallizer System

Fluid from the HP separator discharges into the SP crystallizer. This pressure vessel (crystallizer) also is injected with iron-silicate-laden slurry (known as seed material) that comes from the underflow of the primary clarifier to minimize the adhesion of iron-silicate scale to the walls of the vessels, pipelines, and tank. The SP crystallizer also separates SP steam and fluid. The SP steam is discharged from the crystallizer through a pipeline to the SP scrubber and SP demister, then into the SP inlets of the steam turbine.

Low Pressure Crystallizer System

The LP crystallizer operates in much the same way as the SP crystallizer in that it stabilizes the fluid and separates the steam and fluid for further processing, although at a lower pressure and temperature than the SP crystallizer. The geothermal fluid flows from the LP crystallizer to the atmospheric flash tank (AFT).

Atmospheric Flash System

The atmospheric flash system lowers the fluid pressure from the LP crystallizer to atmospheric pressure conditions. Fluid from the LP crystallizer discharges into the AFT. Fluid from the AFT flows by gravity to the primary clarifier. The steam from the AFT is discharged to the atmosphere.

Primary and Secondary Clarifiers

The heat-depleted, seeded fluid is directed to the fluid clarification system for solids separation and removal, also known as fluid clarification. This is the final stage of geothermal fluid processing prior to injection. The fluid clarification system consists of two clarifiers, the primary and secondary. Fluid from the LP crystallizers flows through the process AFT to ensure that any remaining pressure is released before entering the primary clarifier (tank). Flocculation assists in the settling of iron-silicate solids through amalgamation in the primary clarifier. A rake rotates within the tank to keep settled particles moving toward the underflow and launders allow for clarified fluid to overflow from the primary to the secondary clarifier to further remove solids from the geothermal fluid. The slurry that comes from the underflow within the primary clarifier is sent upstream as seed material and the remainder goes to the solids dewatering system. The secondary clarifier functions much the same as the primary clarifier with a rake, underflow, and overflow. The underflow slurry passes back to the primary clarifier for further particle amalgamation and the clarified fluid overflows and returns to the reservoir through injection wells. By removing the solids through clarifiers, frequent plugging of injection wells is avoided. Both the primary and secondary clarifiers are blanketed with steam to prevent oxygen intrusion and are designed to minimize corrosion. The primary and secondary clarifiers will each be equipped with emergency overflow. The overflow piping is routed to the Class II surface impoundment.

2.3.3.2.3 Solids Dewatering

A portion of the slurry from the underflow of the primary clarifier is directed to the solids dewatering system. Iron-silicate material is intentionally formed and separated through the process. The solids are removed in two stages: primary process removal in the form of slurry and secondary removal by dewatering of the slurry. The dewatered solids (filter cake) are loaded by covered conveyor belts directly into end-dump trailers. After loading, these trailers are covered to minimize fugitive dust emissions and for waste management best practices. These filled trailers are staged at the geothermal facility for up to five days while Total Threshold Limit Concentration and Soluble Threshold Limit Concentration analysis of the filter cake is performed to confirm the material will be nonhazardous. Infrequently, the filter cake exceeds hazardous thresholds and would be disposed of appropriately. Nonhazardous filter cake will be transferred to a Class II regulated landfill for disposal.

Plant sumps, fluids from the Class II surface impoundment, and similar aerated fluid streams will be directed to the thickener. The thickener is designed similarly to the clarifiers in function and receives oxygenated fluids from the geothermal process. By keeping these oxygenated fluids separate from the primary geothermal process fluids, excess solids, scaling, and corrosion is avoided. Slurry from the thickener underflow is directed to the solids dewatering system. Fluid from the thickener is directed to an aerated fluid injection well.

2.3.3.2.4 Fluid Injection System

The spent geothermal fluid from the secondary clarifier is pumped from the RPF to the remote injection well pads via aboveground pipelines. An injection pump system is designed with redundancy and spare capacity to ensure the delivery of spent geothermal fluid to the injection wells through injection pipelines. Each injection well is remotely monitored for temperature and flow rate.

Injection Pumping System

The pumping system will be sized for a targeted capacity of 50% above anticipated flow rates. The injection pumping system will include a local control panel. The main control for this pumping system will be included within a motor control center at the local power distribution and control (PDC) system. Additionally, there will be remote monitoring in the control room allowing operator control of the system.

Injection Wells

Seven injection wells will be located on four new injection well pads. The injection well pads will be located south and southeast of the RPF. Wells are expected to be drilled to reach an approximate depth of 7,500 feet. Injection wells will be cased to a depth where the subsurface formation is competent. The injection wells will be drilled using directional drilling technology.

Five injection wells will be dedicated to injection of spent geothermal fluid from the secondary clarifier overflow. One injection well will be dedicated to the condensate injection, and another injection well will be dedicated to aerated fluid. Anticipated spent geothermal fluid chemistry is summarized in Table 2-3.

Table 2-3. Condensate and Injected Geothermal Fluid Characterization

Constituent	Condensate (mg/L)	Spent Geothermal Fluid (mg/kg)	Aerated Fluid (mg/kg)
Ammonia	500	NA	NA
Sodium	NA	66,867	75,800
Magnesium	13	78	48
Potassium	NA	16,153	22,400
Calcium	69	32,314	41,500
Chromium	NA	0.5	NA
Manganese	NA	1,149	NA
Iron	0.3	1,096	NA
Nickel	NA	0.2	NA
Copper	NA	3.0	NA
Zinc	NA	387	437
Strontium	NA	556	NA
Silver	NA	0.8	0.03
Cadmium	NA	2	0.9
Barium	NA	233	109
Mercury	NA	NA	0.0004
Lead	NA	91	94
Nitrate (NO3)	313	NA	NA
Fluoride	NA	27.0	NA
Sulfate	708	124	NA
Chloride	323	177,836	213,600
Arsenic	NA	16	8
Selenium	NA	NA	0.03
Silica	NA	168	NA
Boron	NA	381	NA
Total Dissolved Solids	1,818	313,442	369,400
pH	6.5	4.9	4.6

Notes:

All numbers are approximate.
NA = not available

Injection Pipelines

A ROW for three injection lines will exit the southern border of the plant site and follow existing roads to the new injection wells. The pipelines would require a 50-foot ROW plus an additional 10% to accommodate several expansion loops required along the length of the pipelines. One or more pipelines would be constructed within each ROW. The aboveground injection distribution pipelines will be constructed of 2205 duplex stainless steel or an equivalent corrosion-resistant alloy (or functionally equivalent) for spent geothermal fluid. Appropriate materials of construction for condensate injection and aerated fluids include, for example, high-density polyethylene (HDPE), stainless steel, and carbon steel. The pipes are installed on supports and are elevated three to five feet above grade.

Class II Surface Impoundment

There will be a Class II surface impoundment (brine pond) within the Project site. The brine pond is a concrete-surfaced basin that is sized to accommodate draining of the primary and secondary clarifier, plus two feet of freeboard. The triple-lined brine pond will include a Leachate Collection and Removal System (LCRS) to detect any leaks in the primary liner. The LCRS will have an automated pump collection system that will discharge into a sufficiently sized containment system and is designed to overflow into the Class II surface impoundment. Monitoring wells will be adjacent to the brine pond to comply with Regional Water Quality Control Board (RWQCB) regulations.

During upset conditions, spent geothermal fluid that overflows from the clarifiers and the thickener would be directed to the brine pond for temporary storage, after which this fluid is pumped to the aerated fluid injection well. In addition to temporarily retaining spent geothermal fluid prior to injection, the brine pond temporarily stores solids that have either precipitated or settled out of the geothermal fluid during the power generation process. The brine pond also holds fluids generated during emergency situations, maintenance operations, and water from hydro blasting, safety showers and eye wash stations, vehicle wash station effluent, water from the plant conveyance system, and reject water from reverse osmosis (RO). The brine pond would collect fluid from the wells during flow-testing, after drilling, during maintenance, and from startup. This fluid would be discharged into an injection well after startup is complete.

2.3.3.3 Power Generation Facility

2.3.3.3.1 Turbine Generator System

The turbine generator system will consist of a condensing turbine and a generator set with three steam entry pressures (HP, SP, and LP). The 3,600-revolutions-per-minute turbine generator is a triple-pressure, double-exhaust flow condensing turbine. It will be rated at a maximum continuous rating of 77 MW (net). Nominal turbine inlet pressures are as follows:

- High pressure: 285 pounds per square inch gauge (psig)
- Standard pressure: 125 psig
- Low pressure: 16 psig

The turbine is directly coupled to a totally enclosed water and air-cooled (TEWAC) synchronous generator. The generator is anticipated to have a design rating of 97 megavolt-amperes (MVA) at a power factor of 0.85 lagging and leading. The turbine generator unit will be fully equipped with all the necessary auxiliary systems for turbine control and speed protection, lubricating oil, gland sealing, generator excitation, and cooling.

2.3.3.3.2 Heat Rejection System

The power cycle heat rejection system includes a stainless steel (or similar material) shell-and-tube type condenser, a counterflow cooling tower, an NCG removal system, and H_2S abatement system. Steam from the turbine exhaust is condensed in the shell-and-tube type condenser. Stainless steel piping will transfer condensate to the biological oxidizer unit located adjacent to the cooling tower, where soluble hydrogen sulfide is abated. Gases that accumulate in the condenser will be removed by the gas removal system (GRS) and transferred to the spargers located in the cooling tower basin. The GRS consists of multiple redundant trains of ejectors, and liquid ring vacuum pumps. Auxiliary steam for the ejectors will be supplied from the SP steam pipeline.

2.3.3.3.3 Cooling Tower

The cooling tower will have seven cells, each equipped with 480-volt motor-driven fans. Each cell will be partitioned from the adjacent cells, allowing maintenance during normal operation. The cooling tower basin will be equipped with vertical wet-pit circulating water pumps designed to circulate water between the cooling tower and the turbine condensers. The cooling tower also will be equipped with vertical, wet-pit auxiliary water pumps designed to move water between the cooling tower and the plant auxiliary cooling loads. The plant auxiliary cooling water loads will include the generator cooling system, NCG removal system, turbine and control oil cooling system, and solids dewatering system. The cooling tower will be equipped with drift eliminators that limit drift to no more than 0.0005% of the recirculating water flow rate.

2.3.3.4 Facility Support Systems

2.3.3.4.1 Major Electrical Equipment

Alternating Current Power Transmission

Electricity will be produced at the facility by the 13.8 kV TEWAC generator. The output of the steam turbine generator is connected by isolated phase bus to a two-winding, oil-filled (13.8 to 230 kV) steam turbine generator (STG) main step-up transformer with a load tap changer. Surge arrestors around the high-voltage bushings protect the transformer in the 230 kV system from lightning strikes or other disturbances. The transformer is set on a concrete pad with an oil containment system. The main transformers will be protected per the National Fire Protection Association (NFPA) by either maintaining adequate separation or providing sprinklers.

AC Power Distribution System

Plant power will be provided from the switchyard through the STG main step-up transformer and unit auxiliary transformers. The medium-voltage auxiliary load is supplied by two separate 4,160-volt switchgears, each with an incoming main circuit breaker supplied by a 13,800-4,160-volt auxiliary transformer. A 4,160-volt cable tie is connected to a 4,160-volt tie circuit breaker connected in each switchgear. One of the 4,160-volt tie circuit breakers is normally open, and each 13,800-4,160-volt auxiliary transformer is sized for the installed 4,160-volt station auxiliary load. Paralleling standby generators are connected through circuit breakers to one 4,160-volt switchgear. Medium-voltage motors will be supplied from the 4,160-volt system.

The load center transformers will provide power to the 480-volt Motor Control Centers (MCCs). The MCCs distribute power to all 480-volt motors, 480-volt power panels, and to other 480-volt loads. The neutral of the 480-volt system is grounded with individual feeder ground fault detection.

The 480-volt MCCs and 480-volt power panels provide power to 480-120/208-volt dry-type transformers.

Facility Startup Power

The BRGP is not black-start capable. Electric power from the utility system must be present to be able to bring the facility online. During normal startup, power required for auxiliaries will be provided from the utility (IID) through the STG main step-up transformer, then through the unit auxiliary transformers.

Standby Emergency Power

In case of a total loss of auxiliary power, or in a situation when the utility system is out of service, the emergency electrical power for the plant critical loads (fluid booster pumps; air compressor; turbine turning gear; emergency lighting; heating, ventilation, and air condition; injection pumps; and other vital loads) will be supplied by standby diesel engine driven emergency generators. Preliminary design identified a need for up to four generators. Three of the generators will have an output of up to 3.25 MW, 4,160 volts and one generator will have an output of up to 2.5 MW, 480 volts. These generators are sized to maintain operation of the RPF and critical loads associated with the PGF and common facilities.

Direct Current (DC) Power Supply

The direct current (DC) power supply system consists of a battery bank, with redundant 125 volts of direct current (VDC) full-capacity battery chargers, metering, ground detector, and distribution panel. The station 125 VDC system supplies control power to the generator circuit breakers, protection relay panels, switchgear, turbine generator DC lube oil pump, and to other critical control circuits. Under normal operating conditions, the battery chargers supply DC power to the DC loads. The battery chargers receive 480 V, 3-phase AC power from one of the MCCs and continuously charge the batteries while supplying power to the DC loads. The 125 VDC system is an ungrounded system, and a ground detector will monitor for grounds on the DC power supply system.

Essential Service AC

The facility essential service 120 volts of alternating current (VAC), single-phase, 60 hertz (Hz) power source will supply AC power to essential distributed control system (DCS) loads and to unit protection and safety systems that require uninterruptible AC power. The essential service AC system and its DC power supply system are both designed to supply critical safety and unit protection control circuits. The essential service AC system consists of an inverter, a solid-state transfer switch, a manual bypass switch, an alternate source transformer and voltage regulator, and AC panelboards.

If the normal 480-volt source of power to the system fails, the dedicated 125 VDC battery powers the inverter to the panel boards. The solid-state transfer switch continuously monitors both the inverter output and the alternate AC source. The transfer switch automatically transfers essential AC loads without interruption from the inverter output to the alternate source upon loss of the inverter output. A manual bypass switch isolates the inverter-static transfer switch for testing and maintenance without interruption to the essential service AC loads. Recharging of a battery occurs when 480-volt power returns from the AC power supply (480-volt) system. The rate of charge depends on the characteristics of the battery, battery charger, and the connected DC load during charging; however, the maximum recharge time is eight hours.

2.3.3.4.2 Water Supply and Treatment

The water source for the BRGP will be IID canal water. The delivery point for the IID canal water will be the Vail 4A Lateral, Gate 459 or 460, with a backup delivery point of Vail Lateral 4, Gate 417 or 418. Transfer to the service water pond will be from the Vail 4A Lateral at Boyle Road east of the site. The water will be used for cooling tower makeup, other process and maintenance uses, and for the RO potable water system.

Cooling Tower Makeup Water and Other Process Uses

Water for the facility is required for cooling tower makeup to offset water lost through evaporation. Cooling tower makeup water will be provided primarily by condensed geothermal steam from the main condenser. During high ambient conditions more supplemental water will be used from the service water pond. The BRGP also uses condensate for steam wash water, purge water for pump seals, and water for the solids dewatering system. By doing this, it is expected that approximately 20% of the process water needs on an annual average basis will be met from IID canal water supply.

IID canal water also will serve as the water source for maintenance activities, the fire protection system, and to fill the cooling tower prior to startup.

Reverse Osmosis Potable Water System

An RO potable water system will be used to supply drinking water, wash basin water, eyewash equipment water, water for showers and toilets in crew change quarters, and sink water in the sample laboratory.

Water Supply Requirements

The BRGP requires 1,125 acre-feet per year (afy) of water when operating at full plant load for uses including RO, plant wash down, and cooling tower makeup. The expected daily and annual water uses for the BRGP are shown in Table 2-4. Average annual supply requirements will vary, depending on the capacity factor of the overall facility.

Table 2-4. Estimated Daily and Annual Water Use for Operations

Water Use	Average Ambient Use Rate (gpm)	Peak Use Rate (gpm)	Average Annual Use[a] (acre-feet per year)
Plant Water	700	1,400	1,125

[a] Assumes 8,322 hours of operation

Water Balance

Figure 2-5 shows the water balance for the peak design conditions.

Approximately 80% of the water required by the BRGP will be generated by steam condensed in the main condenser. On an annual average basis during operation, water needs from the IID canal are approximately 1,125 afy at design conditions, which is less than approximately 20% of the total facility water needs.

Water Quality

The expected concentration of constituents in the IID canal water supply is listed in Table 2-5. With two exceptions, no constituents violate Maximum Contaminant Level (MCL) concentration levels. Specific conductance and TDS were detected above their respective Secondary MCLs in one well. Secondary MCLs are established for various compounds to protect against unpleasant aesthetic effects, such as taste and color. Exceeding Secondary MCLs for these compounds does not pose a health risk.

Table 2-5. Expected Supply Water Quality

Parameter	Units	MCL	Amount Detected
Aluminum	µg/L	200	160
Arsenic	µg/L	300	170
Fluoride	mg/L	2	0.37
Nitrate as Nitrite	mg/L	10	0.40
Chloride	mg/L	500	120
Color	color units	15	10
Odor	odor units	3	1
Sulfate	mg/L	500	260
Total Dissolved Solids	mg/L	1,000[f]	289
Turbidity	NTU	5	12
Boron	µg/L	Not Regulated	190
Calcium	mg/L	Not Regulated	93
Hardness, total	mg/L	Not Regulated	370
Magnesium	mg/L	Not Regulated	34
pH	pH units	Not Regulated	8.3
Sodium	mg/L	Not Regulated	120
Potassium	mg/L	Not Regulated	5.0

µg/L = microgram(s) per liter

µmho/cm = micromho(s) per centimeter

MCL = Maximum Contaminant Level

mg/L = milligram(s) per liter

NTU = nephelometric turbidity unit

2.3.3.4.3 Fluid Process Streams

The primary discharge will consist of spent geothermal fluid from the secondary clarifiers that is injected into the injection wells to replenish the geothermal resource. Process fluid characteristics are summarized in Table 2-3 and the annual average and maximum daily peak flows of waste to the brine pond (and ultimately to the injection wells) are shown in Table 2-6. In overflow conditions, this spent geothermal fluid would be directed to the Class II surface impoundment, after which it would be injected into a dedicated aerated fluid injection well. This injection well also would receive fluid from the thickener, which collects filter press filtrate, and fluid from the plant conveyance system around the plant equipment. The Class II surface impoundment also receives fluid generated during emergency situations, maintenance operations, spills and water from hydro blasting, portable shower effluent, vehicle wash station effluent, and reject water from the RO system. Monitoring wells would be provided adjacent to the Class II surface impoundment to comply with RWQCB groundwater regulations. Fluid injection will take place in accordance with CalGEM requirements.

Table 2-6. Estimated Daily and Annual Process Fluid Discharge to Brine Pond for Operations

Fluid Process Stream	Maximum Discharge Rate (gpm)	Average Annual Discharge[a] (acre-feet per year)
Normal Operations Process Fluid to Brine Pond	460	744.6

[a] Assumes 8,322 hours of operation at the average daily maximum temperature.

Another geothermal process fluid is blowdown from the cooling towers; blowdown originates as geothermal steam. This process stream will be returned to the reservoir through a dedicated condensate injection well.

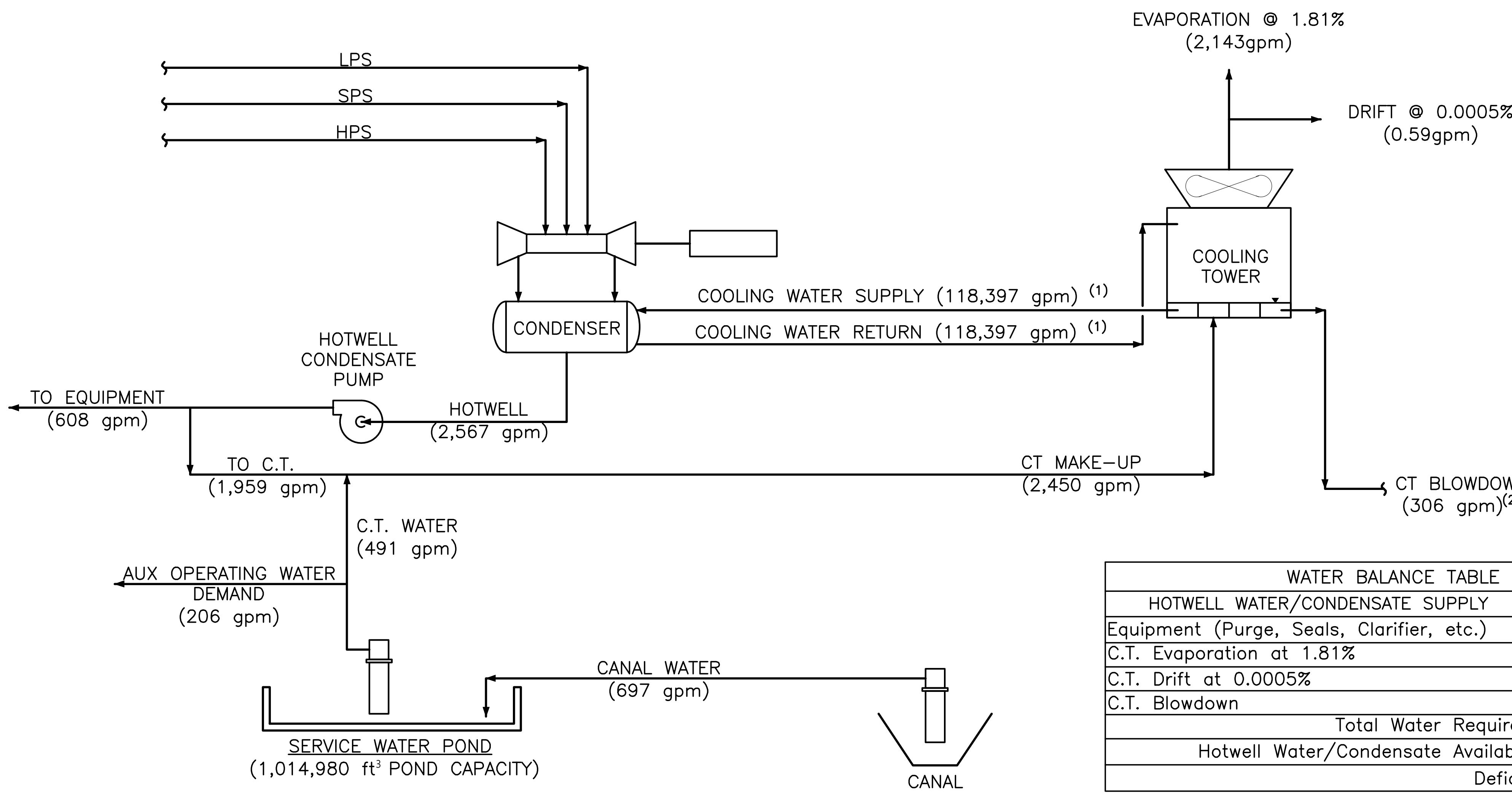
The sanitary drains will discharge to a septic tank. Waste from the septic tank will be pumped out periodically. The septic tank will outlet to the dispersal system, such as a leach field, evapotranspiration bed, or other approved disposal method based on site constraints. Storm drainage will be collected in the retention basin on the west side of the facility and either pumped to the brine pond or allowed to evaporate.

2.3.3.4.4 Nonhazardous Waste Management

The construction and operation of the BRGP will generate nonhazardous and hazardous waste. The hazardous materials and wastes expected to be used or generated by the facility are described in the following subsections. The largest nonhazardous waste stream will be filter cake, with approximately 46 tons per day to be generated during operations. The construction of the facility will generate various types of nonhazardous wastes, including debris and other materials requiring removal during site grading and excavation, excess concrete, lumber, scrap metal, and empty nonhazardous chemical containers.

Solid Waste Construction

Inert solid waste from construction activities may include lumber, excess concrete, metal, glass scrap, cardboard, general trash, and empty nonhazardous containers. Typical management practices required for nonhazardous waste management include recycling when possible, proper storage of waste and debris to prevent wind dispersion, and weekly pickup and disposal of wastes to local Class III landfills. The total amount of solid waste to be generated by construction activities has been estimated to be similar to that generated for normal commercial construction.



WATER BALANCE TABLE	
HOTWELL WATER/CONDENSATE SUPPLY	FLOW (GPM)
Equipment (Purge, Seals, Clarifier, etc.)	608
C.T. Evaporation at 1.81%	2,143
C.T. Drift at 0.0005%	0.59
C.T. Blowdown	306
Total Water Required	3,058
Hotwell Water/Condensate Available	2,567
Deficit	–491

TOTAL CANAL WATER DEMAND	FLOW (GPM)
Cooling Tower Water	491
Auxiliary Operating Water	206
Total Water Demand	697

NOTES:
1. INCLUDES AN ASSUMED 8,000gpm COMPONENT COOLING WATER.
2. BASED ON 8 CYCLES OF CONCENTRATION.

Figure 2-5
Peak Water Balance,
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-M0-202-1D, 4/5/2023.

Solid Waste Operations

Facility maintenance will include the removal of scale from the walls of piping and fluid handling equipment, and the removal of sludge from the primary and secondary clarifiers and the brine pond. All nonhazardous wastes will be recycled to the greatest extent practical and the remainder removed regularly by a certified waste handling contractor.

The primary source of solid waste will be the precipitated solids from the geothermal resource fluid. After the steam separation, the geothermal resource fluid will be treated through clarifiers where some of the silica, iron, and manganese contained in the fluid will be removed. Following this clarification process, the solids slurry discharging from the bottom of the clarifiers will be directed to a solids dewatering system. The slurry feed from the clarifiers to the dewatering system may be acidified to prevent heavy metal precipitation in the filtration system. Based on the proposed design of the facility, it is likely that, over the life of the Project, the BRGP can achieve a goal of generating 95% of the filter cake that will be characterized as nonhazardous. Five percent will likely be characterized as hazardous because of elevated concentrations of heavy metals. Fluids from the dewatering system will be routed to a thickener system for additional solids removal. Slurry discharged from the thickener will be discharged to the dewatering system. The filter cake will be disposed of at a suitable offsite landfill in accordance with applicable regulations.

In addition to temporarily retaining geothermal fluid prior to injection, the brine pond temporarily stores solids that have either precipitated or settled out of the geothermal fluid during the energy-generating process. Periodically, the brine pond solids are removed and disposed of at a proper disposal facility.

Office waste and general refuse will be removed by the local sanitation service.

2.3.3.4.5 Hazardous Waste Management

Small quantities of hazardous wastes will be generated over the course of construction. Table 2-7 presents the expected wastes and volumes that may be generated during construction. These may include waste paint, spent solvents, and spent welding materials. All hazardous wastes generated during facility construction and operation will be handled and disposed of in accordance with applicable laws, ordinances, regulations, and standards. Any hazardous wastes generated during construction will be collected in hazardous waste accumulation containers near the point of generation and moved to the contractor's 90-day hazardous waste storage area located onsite. The accumulated waste will subsequently be delivered to an authorized waste management facility. Hazardous wastes will be either recycled or disposed of in a licensed Class I disposal facility as appropriate. Managed and disposed of properly, these wastes will not cause significant environmental or health and safety impacts.

Some hazardous wastes will be recycled, including used oils from equipment maintenance, and oil-contaminated materials such as spent oil filters, rags, or other cleanup materials. Used oil will be recycled, and oil or heavy metal contaminated materials (for example, filters) requiring disposal will be disposed of in a Class I waste disposal facility. Scale from pipe and equipment cleaning operations, laboratory waste, cooling tower debris, and solids from the brine pond, will be disposed of in a similar manner.

The BRGP will generate hazardous solid waste from maintenance. The source of these solid wastes will be solid deposits in the clarifiers and other equipment and piping. These solid wastes will be disposed of at an appropriate landfill.

2.3.3.4.6 Hazardous Materials Management

Construction

A variety of chemicals will be stored and used during construction of the BRGP. Hazardous materials to be used during construction include unleaded gasoline, diesel fuel, oil, lubricants (for example, motor oil, transmission fluid, and hydraulic fluid), solvents, adhesives, and paint materials. There are no feasible alternatives to these materials for construction or operation of construction vehicles and equipment, or for painting and caulking buildings and equipment. The contractor will bear sole responsibility and liability for such hazardous materials brought onto or generated at the site by the construction contractor. A hazardous materials handling program will be implemented during construction in compliance with applicable laws, ordinances, regulations, and standards (LORS). Table 2-7 presents expected hazardous waste that may be generated during the BGRP construction.

Operation

Prior to operation, the BRGP will develop and implement a Hazardous Materials Business Plan (HMBP), which will include procedures for the following:

- Hazardous materials handling, use, and storage
- Emergency response
- Spill control and prevention
- Employee training
- Reporting and record keeping

The storage, containment, handling, and use of these chemicals will be managed in accordance with applicable LORS.

Table 2-7. Wastes Generated during Construction

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Scrap wood, glass, plastic, paper, calcium silicate insulation, and mineral wool insulation	Construction	Normal refuse	154,000 pounds per month (Dumpster)	Nonhazardous	Recycle or dispose of in a Class II or III landfill.
Scrap Metals	Construction	Parts, containers	66,000 pounds per month	Nonhazardous	Recycle or dispose of in a Class III landfill.
Concrete	Construction	Concrete	200 tons[a] during construction	Nonhazardous	Recycle or dispose of in a Class III landfill.
Empty liquid material containers	Construction	Drums, containers, totes	840 containers[b]	Nonhazardous solids	Containers <5 gallons will be disposed of as normal refuse. Containers >5 gallons will be returned to vendors for recycling or reconditioning.
Spent welding materials, i.e. welding rods	Construction	Solid	5 pounds per month	Nonhazardous	Recycle with vendors or dispose of at a Class I landfill if hazardous.
Solvents, paint, adhesives	Maintenance	Varies	10 pounds per month	Hazardous	Recycle at a permitted TSDF.
Steam turbine piping cleaning waste	Piping	Oily rags, misc.	110 gallons (2 55-gallon drums) before plant startup	Hazardous or nonhazardous liquid	Dispose at a permitted TSDF.

[a] 30 cubic yards

[b] Containers include <5-gallon containers and 55-gallon drums or totes

TSDF = treatment, storage, and disposal facility

Chemicals will be stored in chemical storage areas appropriately designed for their individual characteristics. Bulk chemicals will be stored outdoors on impervious surfaces in aboveground storage tanks with secondary containment. Secondary containment areas for bulk storage tanks will provide secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. Any chemical spills in these areas will be removed with portable equipment and reused or disposed of properly. Other chemicals will be stored and used in their delivery containers. A portable storage trailer may be onsite for storage of maintenance lube oils, chemicals, paints, and other construction materials, as needed. All drains and vent piping for volatile chemicals will be trapped and isolated from other drains to eliminate noxious vapors.

Safety showers and eyewash stations will be provided in or adjacent to chemical storage and use areas. Safety equipment will be provided for personnel use if required during chemical containment and cleanup activities. All personnel working with chemicals will be trained in proper handling and emergency response to chemical spills or accidental releases. Hose connections will be provided near chemical storage and feed areas to flush spills and leaks, and absorbent materials will be stored onsite for spill cleanup. Table 2-8 presents expected hazardous waste that may be generated during the BGRP operations.

2.3.3.4.7 Emissions Control Equipment

The BRGP does not use combustion to generate electricity. Therefore, there are only minimal emissions of criteria pollutants. The Applicant proposes to use best available control technology, management practices, and process monitoring equipment to minimize the air emissions from the Project. The pollutants that would have the potential of significant impacts to air quality if uncontrolled are particulate matter with an aerodynamic diameter or 10 microns or less (PM_{10}) and hydrogen sulfide (H_2S). This section describes the emissions controls.

The following subsections describe the emissions controls for these pollutants. Additional information on these pollutants and their controls is included in Section 5.1.

Particulate Emissions

The primary source of particulate emissions from the BRGP is the cooling towers. During normal operating condition, the BRGP is predicted to generate a minimal amount of particulate emissions. Particulate emissions from the cooling towers will be minimized by maintaining the TDS concentration in the circulating water and by controlling cooling tower drift losses to not more than 0.0005% of the total circulation rate. Particulate emissions from the filter cake handling equipment will be controlled by minimizing handling and keeping the filter cakes covered.

Hydrogen Sulfide Emissions

Low concentrations of H_2S are present in non-condensable gas and condensate in the main condenser. NCGs from the main condenser are pressurized and removed from the main condenser by the GRS and discharged through submerged water distribution sparger pipes located near the bottom of the cooling tower basin for H_2S abatement using the oxidizing biocide process (BIOX). The H_2S contained in the NCG is abated in the cooling water and converted to sulfate by reacting with oxidizing biocides and dissolved oxygen in the water. H_2S present in the condensate from the main condenser is routed to the bio-oxidation box (OxBox) adjacent to the cooling tower where naturally occurring bacteria present in geothermal cooling water abates H_2S present in the condensate. The OxBox includes a trickle block, splash fill, or equivalent packing that mixes cooling tower water with the condensate from the main condenser and drains into the cooling tower basin. The H_2S emissions compliance limit will be measured on the discharge of each cooling tower cell.

Table 2-8. Wastes Generated during Operations

Waste	Origin	Composition	Estimated Quantity (Lbs/yr)	Classification	Disposal
Petroleum Contaminated Solids, >51% Debris	Small leaks and spills from the turbine lubricating oil system	Hydrocarbons	95,027	Hazardous	Cleaned up using sorbent and rags – disposed of by certified oil recycler
Oil, water, sludge	Turbine lube oil console PAL units	Oily water	95,221	Hazardous	Recycle or dispose of offsite at a permitted TSDF
Used Oil	Turbine, valves, pumps, motor oil change out	Hydrocarbons	40,245	Hazardous	Recycled by certified oil recycler
Brine Pond Solids	Clarifier/Well maintenance/Plant conveyance/Atmospheric Flash Tank, scrubber drains	Geothermal fluid solids	13,691,020	Hazardous	Dispose of offsite at a permitted TSDF
Geothermal Scale	Hydro blasting scale debris from pipes, process valves, and vessels	Geothermal scale	6,077,787	Hazardous	Dispose of offsite at a permitted TSDF
Failed filter cake	Filter press solids	Filter cake not meeting BHER monofill nonhazardous requirements	973,347	Hazardous	Dispose of offsite at a permitted TSDF
Cooling tower debris and sludge	Cooling tower sludge	Solid debris, sludge containing mud and spent chemicals	397,593	Hazardous	Dispose of offsite at a permitted TSDF
Aerosol containers, solvents, paint, adhesives	Maintenance	Varies	715	Hazardous	Dispose of offsite at a permitted TSDF
Laboratory analysis waste	Process related	Waste reagents/ laboratory chemicals	2,641	Hazardous	Dispose of offsite at a permitted TSDF
Spent lead acid batteries	Electrical room, equipment	Metals	82	Hazardous	Store no more than 10 batteries (up to one year), then recycle offsite
Spent alkaline batteries	Equipment	Metals	37	Universal waste solids	Recycle or dispose of offsite at a Universal Waste Destination Facility
Fluorescent tubes	Lighting of maintenance areas	Metals	178	Universal waste solids	Recycle or dispose of offsite at a Universal Waste Destination Facility
Electronic Components	Distributed control system, plant computers, instruments	Metals	1,000	Universal waste solids	Recycle with an approved facility

2.3.3.4.8 Fire Protection and Safety Systems

The BRGP fire protection and safety systems are designed to limit personnel injury, property loss, and plant downtime caused by a fire or other event. The systems are designed in accordance with:

- Federal, state, and local fire codes, occupational health and safety regulations, and other jurisdictional requirements
- California Building Code (CBC)
- Applicable NFPA standards

The fire protection system will consist of an underground fire main and surface distribution equipment meeting NFPA standards such as yard hydrants, sprinkler systems for the maintenance building, turbine generator, lube oil modules, diesel driven fire pump, as well as a complete fire detection and alarm system. The main transformers will be protected per the NFPA by either maintaining adequate separation or providing sprinklers. The fire water supply and pumping system will provide an adequate quantity of firefighting water.

An underground fire main loop, in accordance with NFPA 24 standards, will supply water to the cooling tower area, crystallizer/clarifier area, and the turbine generator area. Buried and subsurface carbon steel pipe will be wrapped and coated externally for corrosion resistance. Nonmetallic pipe is permitted, but design considerations must account for surface loads on the aboveground area and settlement potential of the pipe. Several hydrants strategically located around the plant perimeter are connected to this fire main loop. Hydrant locations will permit full coverage of the protected areas with approximately 75-foot-long fire hoses.

Post indicator valves would be located at various points along the fire main loop to permit shutdown of one section of the fire main loop without shutting down the entire loop. The turbine generator lube oil system, including the turbine and generator bearings, will be protected with automatic sprinklers or water spray systems in accordance with NFPA 13 and NFPA 15. Electrical equipment buildings will be monitored with a smoke detection system.

A fire protection control panel will be provided and installed in the control room. The fire protection control panel will monitor and alarm the complete fire protection system. The fire detection and monitoring systems will be designed and installed in accordance with NFPA 72D and 72E. The fire protection system will include electrical and a diesel-fired fire water pumps with an output of up to 236 kW. This system will be skid mounted. The systems will be enclosed by a pump house with accessories, all conforming to NFPA 20. The pump house will include sprinkler system, louvers, engine heaters, lights, exhaust fans, and an electrical distribution panel, and will conform to all local and state building codes. Fire water storage will be included within the service water pond capacity, which will ensure an adequate water supply for fire protection.

In addition to the fixed fire protection system, portable carbon dioxide (CO_2) and dry chemical extinguishers will be located throughout the plant (including the switchgear rooms), with size, rating, and spacing in accordance with NFPA 10. Handcart CO_2 extinguishers also will be provided in the turbine area as necessary for specific hazards.

There are three PDCs designed for this site, and the control building also includes an electrical equipment room. Each of these PDCs will be provided with smoke detection and pull stations inside the enclosure. PDCs with battery rooms will have hydrogen sulfide detection and also be equipped with an exhaust system that runs continuously to mitigate any accumulation of hydrogen sulfide gas in the PDC. Both the hydrogen sulfide sensor and a fan failure alarm will be tied into the plant DCS system.

Local building fire alarms will be provided in accordance with NFPA 72. All materials will be free of asbestos and will meet the fire and smoke rating requirements of NFPA 255.

2.3.3.4.9 Plant Auxiliaries

Lighting

Lighting on the Project site will be limited to areas required for safety, will be directed onsite to avoid backscatter, and will be shielded from public view to the greatest extent practical.

All lighting that is not required to be on during nighttime hours will be controlled with sensors or switches operated such that the lighting will be on only when needed.

Lighting will be provided in the following areas:

- Building interior, office, control, and maintenance areas
- Building exterior entrances
- Outdoor equipment platforms and walkways
- Transformer areas
- Power island perimeter roads
- Parking areas
- Plant entrance

Emergency lighting from DC battery packs will be provided in areas of normal personnel traffic to permit egress from the area in case of failure of the normal lighting system. In major control equipment areas and electrical distribution equipment areas, emergency lighting permits equipment operation to allow auxiliary power to be reestablished.

Grounding

Safety is imperative for site personnel and electrical equipment. The electrical system is protected against ground faults that result in unit ground potential rises. The station grounding system provides a path to dissipate unsafe ground fault currents and reduces the ground potential rise. The grounding conductor will be sized for sufficient capacity to reduce the most severe fault conditions to within allowable limits by reducing voltage gradients to remote earth. The ground grid spacing will be assessed to provide sufficient step and touch potentials throughout the site. Bare conductors would be installed below grade in a grid pattern. Each junction of the grid will be bonded together by either an exothermic welding process or mechanical connectors.

Ground grid impedance performed as part of the grounding study would be used to determine the necessary number of grounding electrodes and grid spacing to ensure safe step and touch potentials under fault conditions. The grounding conductor will bond the ground grid to the building steel and nonenergized metallic parts of electrical equipment. Isolated grounding conductors to the ground grid will be provided for sensitive control systems.

Cathodic Protection and Lightning Protection

Cathodic protection for underground metallic piping and structures (except rebar) takes into account cathodic protection and grounding influences associated with any existing cathodic protection system to which the facility is adjacent and connected. Cathodic protection would be provided by an impressed current system, a sacrificial system, and protective coatings. Lightning protection would be furnished for buildings and structures in accordance with NFPA 78. Lightning protection for the switchyards would be in accordance with industry practice.

Distributed Control System

A DCS would provide modulating control, digital control, and monitoring and indicating functions for operation of the proposed plant power island and offsite systems. Plant operation would be controlled from the video display unit (VDU) type control consoles and the auxiliary control panels that would be located in the control room.

The DCS would provide coordinated control among the STG and balance-of-plant equipment. The STG control systems would interface with the DCS via a data link and/or hardwired input/output (I/O) devices. Limited monitoring and control will be available from the DCS for STGs. The balance-of-plant equipment will be monitored and controlled via the DCS. A sequence-of-events recorder will be an integral part of the DCS. Indication of process changes that warrant action (process alarms), or information that the operator in the control room should be made aware of (annunciation) will primarily be done by the DCS. Major packaged subsystems (for example, water treatment system, fire protection system) may have a local alarm system with a single trouble alarm to the control room.

2.3.3.4.10 Heating, Ventilation, and Air Conditioning

The HVAC system will provide an acceptable environment for personnel comfort and equipment operation within the plant buildings. The HVAC system will be designed in accordance with the Uniform Building Code (UBC) and the Uniform Mechanical Code (UMC) as prescribed by the California Code of Regulations (CCRs). The HVAC system will be designed to allow for compliance with Title 8, Section 3205, for COVID-19 prevention as required. Air conditioning in the control and administrative areas will maintain a suitable environment for plant personnel. If required for proper equipment operation, humidity control will be provided in the control room. Outside air ventilation systems will be provided for buildings where air conditioning is not required. Normally occupied plant areas, including toilet areas, will be supplied with fresh air in accordance with the Uniform Building Code, ASHRAE Standard 62, and the CCR.

2.3.3.4.11 Plumbing

The plumbing system will supply potable water to all fixtures and will collect and convey waste fluids to the waste collection system. Plant plumbing systems will be constructed in accordance with the Uniform Plumbing Code and local and state regulations. Potable water will be provided from IID with RO treatment. Potable water will be provided to restrooms and kitchen facilities in the control building. Drinking water will be provided in the control building. Safety showers, eyewash stations, and utility hose bibs will be provided at appropriate locations throughout the facility.

Restrooms, sinks, water coolers, and floor drains will flow to the onsite septic tank, advanced treatment system, and/or potentially leach fields pending adequacy of local soils.

2.3.3.4.12 Facility Civil/Structural Features

This section describes the buildings, structures, and other civil/structural features that will constitute the facility. The entire site will be protected from flooding by a berm approximately five feet above the finished grade surrounding the site of suitable height to provide flood protection up to an elevation of at least -223.80 mean sea level, in accordance with County flood control requirements and the request to Federal Emergency Management Agency (FEMA) to revise the 100-year flood zone in the Salton Sea area.

Power Generation Facility

The power generation facility will consist of the following major components:

- Condensing turbine with totally enclosed water and air-cooled synchronous-type generator and auxiliary systems (including lube oil skid)
- Non-condensable gas removal system
- Heat rejection system consisting of condenser and mechanical draft counterflow cooling tower
- H2S abatement systems
- Control building and power distribution centers, including MCCs and switchgear
- Generator step-up transformer

The civil/structural features related to these major components are described in the following subsections. Based on the geotechnical evaluation that was performed, most structures will likely require pile support. Pile requirements may change when detailed foundation designs are created.

Steam Turbine Generator and Condenser

The steam turbine generator will be mounted on a raised concrete pedestal supported by reinforced concrete mat foundation at grade. Concrete piles or a similar foundation support will be used for the mat foundation. The condenser will be located under the steam turbine and will be supported by the mat foundation. For operation and maintenance access, platforms are provided adjacent to the equipment.

Cooling Tower

The cooling tower will be supported and anchored to a reinforced mat foundation or equivalent foundation concrete basin coated with a waterproofing system. Piles will support the basin mat if necessary (as determined by detailed foundation design).

Non-condensable Gas Removal System

The non-condensable gas removal system will be installed adjacent to the main condenser.

Control Building and Power Distribution Center

The control building will be a reinforced concrete slab on grade single-story structure. The control building will be approximately 130 feet by 80 feet by 20 feet tall. The control building houses the facility control room, offices, kitchenette, electrical room, mechanical room, battery room, laboratory, and lavatory facilities.

The power distribution centers will be pre-engineered, single-story metal buildings supported above grade to provide cable access beneath the structures by reinforced concrete pier foundation. The power distribution centers will house electrical switchgear, MCCs, and DCS/SIS remote I/O cabinets. The control building and power distribution centers will be provided with HVAC equipment as required for equipment and personnel.

Lube Oil Skid

The lube oil skid will be supported on a reinforced concrete mat foundation.

Balance of Plant

Individual reinforced concrete foundations at grade will be used to support balance of plant (BOP) mechanical and electrical equipment. The BOP mechanical and electrical equipment includes common facilities and equipment not listed previously.

2.3.3.4.13 Resource Production Facility

The resource production facility consists of the following major components:

- Production and injection piping
- HP separator
- SP crystallizer
- LP crystallizer
- HP, SP, and LP scrubbers and demisters
- Primary, secondary, and thickener clarifiers
- Atmospheric flash tanks
- Emergency relief tanks
- Steam vent rock muffler

- Steam vent tanks
- Filter press
- Class II surface impoundment (brine pond)
- Service water pond
- Retention basin
- Yard tanks

Offsite Production and Injection Piping

Offsite production and injection piping will consist primarily of up to 36-inch piping made of corrosion-resistant alloy (or functionally equivalent) and 12-inch carbon steel well warmup piping. These will be supported on drilled pier cast-in-place foundations.

Separator, Crystallizers, Scrubbers, and Demisters

The separator, crystallizers, scrubbers, and demisters will be supported on reinforced concrete mats or pedestals as necessary.

Atmospheric Flash Tanks, Emergency Relief Tanks, and Steam Vent

The AFTs, emergency relief tanks, and steam vent tanks will each be supported by individual reinforced concrete or structural steel structures. These concrete structures will be supported on reinforced concrete mats with piles.

Primary and Secondary Clarifiers

The primary clarifier and secondary clarifier will be alloy or alloy lined carbon steel or partially alloy lined carbon steel tanks (or functionally equivalent) of approximately 125-feet and 115-feet in diameter, respectively. Mat base or ring wall base will support the clarifiers.

Solids Dewatering System

The solids dewatering system or systems will be supported on a structural steel reinforced concrete mat with containment for effluent.

Class II Surface Impoundment, Service Water Pond, Storm Water Retention Pond

One “U” shaped, approximately 750-foot by 200-foot Class II surface impoundment (brine pond) will be installed. The pond will be designed in accordance with Title 27, Division 2 of the CCR – Special Requirements for Surface Impoundment. The brine pond will be of earth construction and surfaced with concrete. Monitoring wells will be placed around the periphery of the pond. The center of the “U” allows for equipment access when the pond requires maintenance.

The service water pond (180,000 square feet) will be a lined earthen structure that would hold water for facility service water needs. The retention basin (127,500 square feet) will be a lined earthen structure.

2.3.3.4.14 Skids

Packaged skid-mounted equipment will be supported by a reinforced concrete mat foundation.

2.3.3.4.15 Yard Tanks

The major yard tanks will include the following:

- Condensate storage tank
- Spent condensate injection tank
- Thickener tank

- Thickener head tank/aerate fluid injection tank
- Excess condensate storage tank
- Various chemical holding tanks

The major yard tanks will be vertical, cylindrical, steel (or equivalent material) tanks supported on a suitable foundation consisting of either a reinforced concrete ring wall with an interior bearing layer of compacted sand for the tank bottom, or a reinforced concrete mat. Both types of tank bottoms may require piles. These tanks are protected from corrosion with internal and external coatings, as required.

All tanks will be securely anchored on a reinforced concrete foundation. Tanks, foundations, and piping connections will be designed to appropriate standards for the contents and seismic requirements. Pilings and anchor bolts will be used, as required.

2.3.3.4.16 Roads

The facility will be served by an existing road network. The main access to the facility will be from McKendry Road with secondary access from Boyle Road. The primary and secondary access roads will be improved. The control room parking lot and all in-plant roads will be surfaced with asphalt or concrete paving.

2.3.3.4.17 Perimeter Berm/Flood Protection

The *Imperial County General Plan* indicates that the Project site is in an area inside the 100-year floodplain. The site is within FEMA Zone A, which is considered an area within the 100-year floodplain, and Zone D, which is considered an undetermined, but possible, flood hazard zone (FEMA 1984). However, the Applicant is in the process of requesting a Letter of Map Revision (LOMR) to remap the area because of extensive changes in the Salton Sea elevation in recent years. The hydraulic modeling performed to support the remapping request shows that the BRGP site's impact is reduced to a 100-year flood depth of 1.61 feet with a perimeter berm. This request will be submitted to FEMA early in the second quarter of 2023 and, at the time of filing, a copy will be provided to CEC. To protect the site from flooding, the entire site would be enclosed by a berm. This berm would protect the plant from flooding and will be of adequate height to provide flood protection based on a separate LOMR request submitted to Imperial County and FEMA.

2.3.3.4.18 Site Grading and Drainage

The site is fairly level. The proposed drainage design in general will flow west toward the retention basin in the western portion of the site. Figures 2-6a and 2-6b show the pre- and post-construction site drainage.

Within the Project site, buildings and equipment are constructed on foundations with the overall site grading scheme designed to route surface water around and away from all equipment and buildings. The stormwater drainage system is sized to accommodate five inches of precipitation in a 24-hour period (100-year storm event) and to comply with applicable local codes and standards. Buildings and equipment are constructed in a manner that provides protection from the 100-year storm.

Stormwater flows will be directed to the retention basin via ditches, swales, and culverts.

Fluid handling equipment will be contained in curbed concrete aprons, with drainage directed to the thickeners and subsequently to the aerated fluid injection well.

NOTES:

1. THE BLACK ROCK SITE IS BORDERED BY IRRIGATION CANALS ON THE AST, WEST AND SOUTH SIDES OF THE SITE. THE EXISTING SLOPE DIRECTION OF THE SITE AND SURROUNDING FIELDS IS IN A GENERAL NORTH-WEST IRECTION. THUS THE IRRIGATION CANALS CREATE A BARRIER BLOCKING THE MAJORITY OF ANY OFF SITE STORM WATER FLOWS FROM MIGRATING ONTO THE SITE.
2. STORM WATER FLOWS ORIGINATING ON THE BLACK ROCK SITE DRAIN TO THE NORTH-WEST CORNER OF THE SITE.
3. AT NORTH EDGE OF THE SITE NEXT TO MCKENDRY ROAD THERE IS A 5-6 FOOT TALL SLOPE UP TO THE ROAD FROM THE FIELD. THIS SLOPE BLOCKS ANY STORMWATER FROM MIGRATING OFF THE SITE TO THE NORTH.
4. FENCE CORNER COORDINATES LISTED ARE IN CALIFORNIA STATE PLANE ZONE 6 NAD83 US FEET UNITS.
5. TOTAL AREA WITHIN FENCE LINE IS 61.61 ACRES.

LEGEND:

- –230 EXISTING MAJOR CONTOURS
- –229 EXISTING MINOR CONTOURS
- SITE PERIMETER FENCE
- SECTION QUARTER LINE
- VARIOUS EASEMENTS
- 0.25% EXISTING SLOPE AND DIRECTION

Figure 2-6a
Pre-Construction Drainage,
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-C3-200-3A, 2/16/2023.

Jacobs

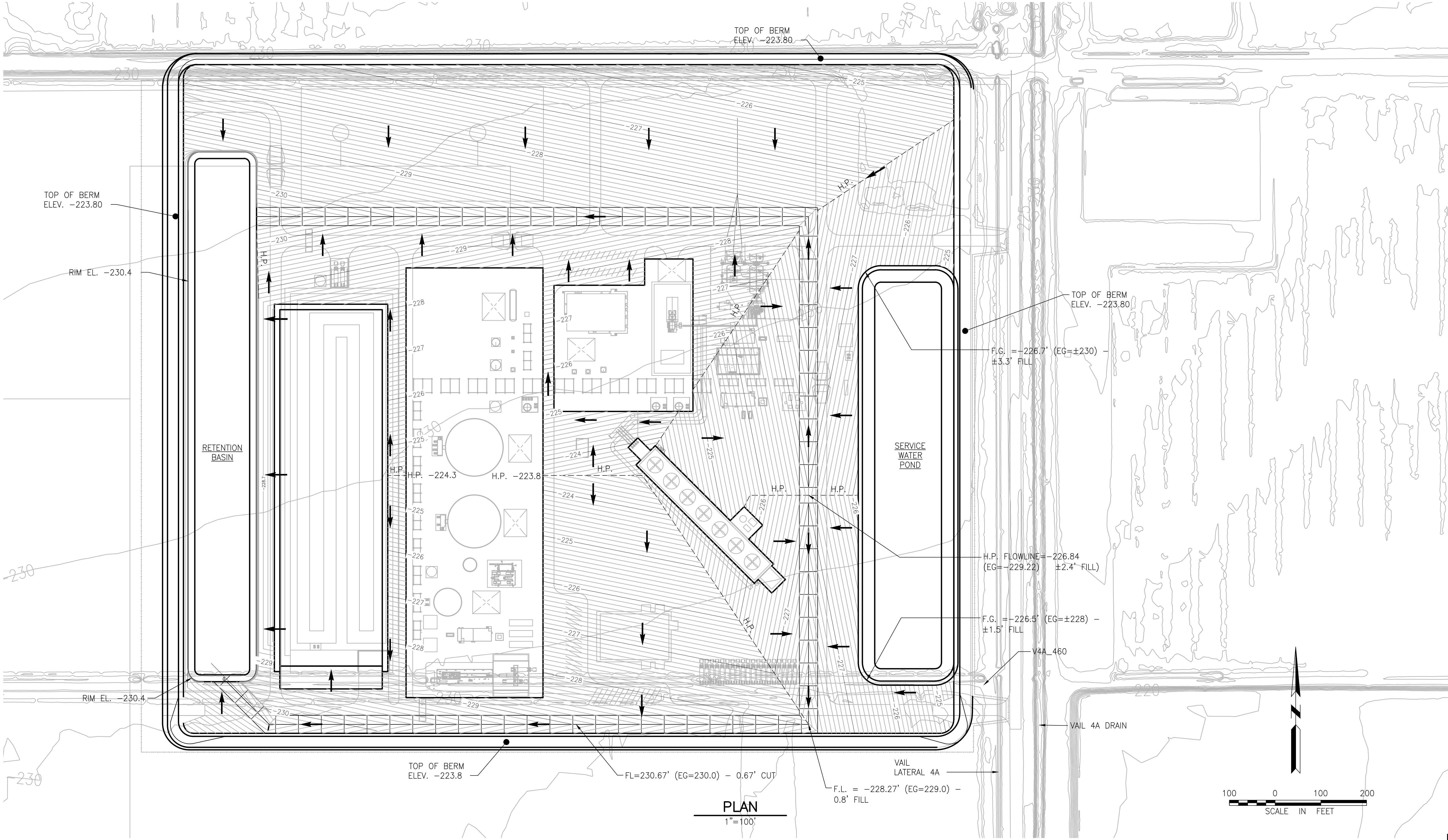


Figure 2-6b
Post-Construction Drainage,
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-C3-200-2B, 4/5/2023.

Earthwork

Excavation work will consist of the removal, storage, and disposal of earth, sand, gravel, vegetation, organic and deleterious material, loose rock, boulders, and debris to the lines and grades necessary for construction. Materials suitable for backfill will be stored in small stockpiles at designated locations using proper erosion protection methods. Excess materials will be removed from the site and disposed of at an acceptable location. Disposal of any contaminated material encountered during excavation will comply with applicable federal, state, and local regulations.

The existing site topography shown on Figure 2-6a will be graded to provide a level area for the Project site. Where practical, topsoil will be segregated and stockpiled for reuse in areas that will be converted back to agriculture. Most soils in the Project area are designated as Prime Farmland and Farmland of Statewide Importance soil types and will be reserved for reuse, as feasible. It is assumed that excavated materials will be suitable for backfill.

Graded areas will be smooth, compacted, free from irregular surface changes, and sloped to drain. Cut and fill slopes for permanent embankments will be designed to withstand horizontal ground accelerations consistent with the applicable building codes. Slopes for embankments will be no steeper than 2:1 (horizontal : vertical). Areas to be backfilled will be prepared by removing unsuitable materials and rocks. The bottom of an excavation will be examined for loose or soft areas. Such areas will be excavated fully and backfilled with compacted fill.

Backfilling will be done in layers of uniform, specified thickness. Soil in each layer will be properly moistened to facilitate compaction to achieve the specified density. To verify compaction, representative field density and moisture-content tests will be performed during compaction. All testing will be in accordance with ASTM International standards.

The depth of excavation is presented in Figures 2-7a and 2-7b.

2.3.3.4.19 Sanitary Sewer Systems

Sanitary waste will be conveyed via an underground sewer system to a buried septic tank. Waste from this tank will be pumped out periodically. The septic tank will outlet to the dispersal system, such as a leach field, evapotranspiration bed, or other approved disposal method based on site constraints. The system will be constructed in conformance with the state of California and Imperial County regulations.

2.3.4 Construction

The overall project schedule for the BRGP construction and commissioning is expected to take approximately 29 months, including four months of post-commercial operation wrap-up activities. The schedule and staffing requirements are described in the following sections by major project components.

2.3.4.1 Power Plant Facility

Construction is anticipated to begin in the second quarter 2024. The overall Project staffing schedule is displayed in Table 2-9 by month. The construction schedule is based on two shifts, 10 hours per day, six days per week. Facility startup schedules are based on a two-shift, 24 hours per day, seven days per week work week. Overtime and shift work for construction may be used to maintain or enhance the construction schedule.

Construction worker parking will be in one of up to nine parking and laydown areas identified within the Project vicinity, with the most likely parking areas nearest to the construction. Laydown and parking areas are shown on Figure 1-4.

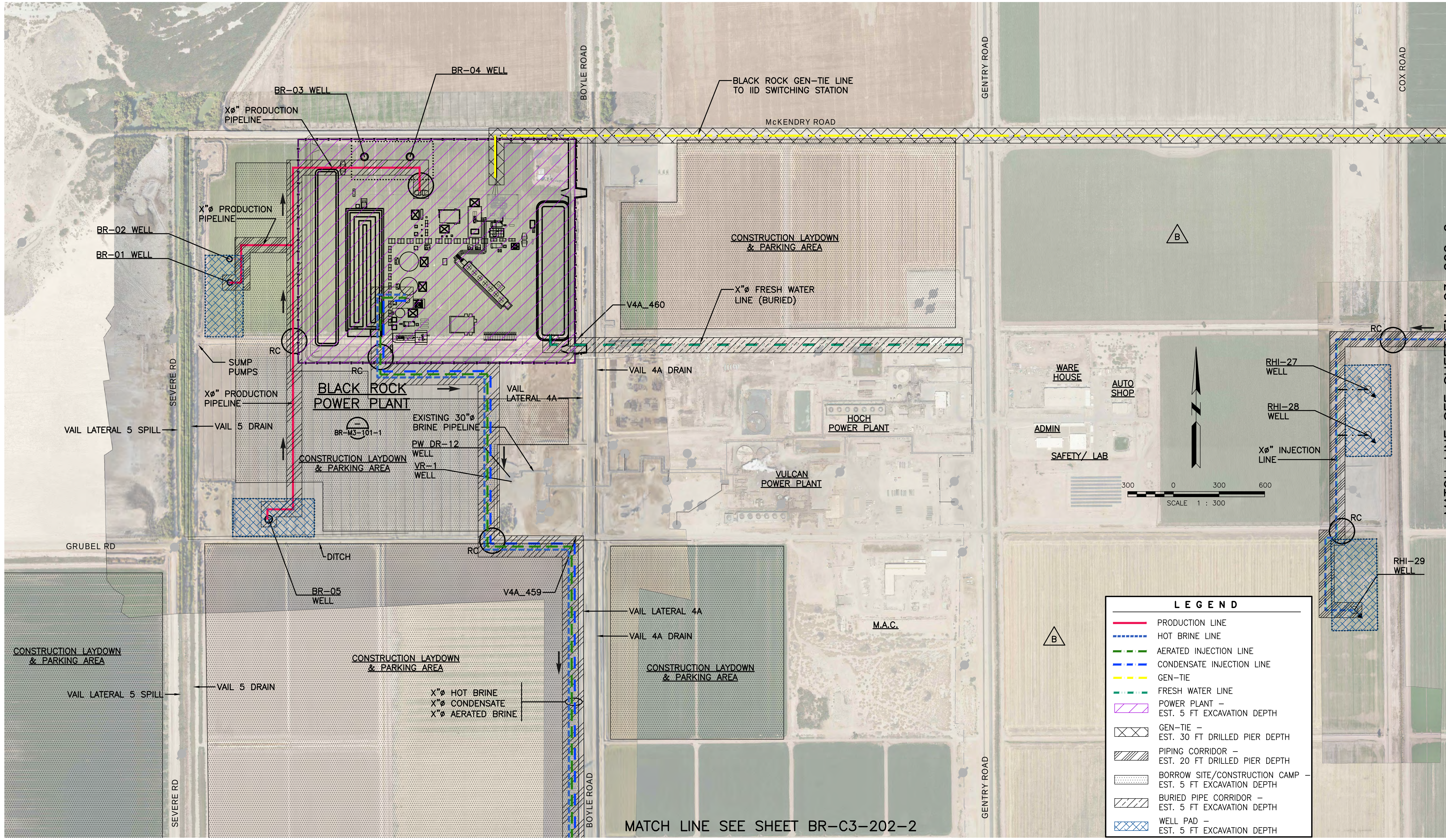


Figure 2-7a
Depth of Excavation,
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-C3-202-1A, 2/16/2023.

Jacobs

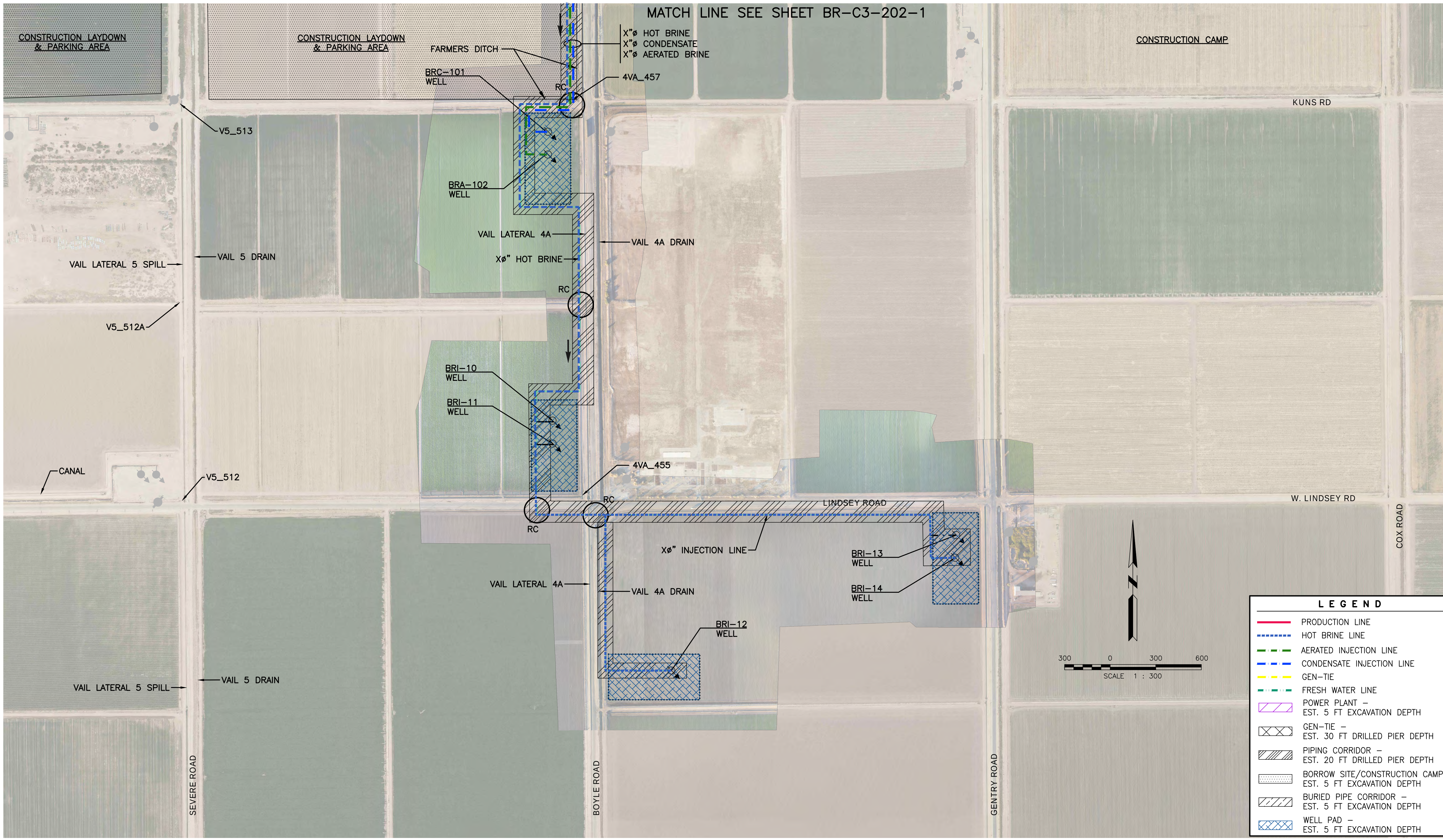


Figure 2-7b
Depth of Excavation,
Black Rock Geothermal Project
Imperial County, California

Source: Veizades & Associates, Drawing BR-C3-202-2A, 2/16/2023.

Jacobs

Table 2-9. Construction Workforce by Month

BHER Black Rock Project Construction Labor Estimate	2024												2025												2026											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Based on CEC certificate April 1, 2024																																				
No demolition anticipated																																				
Construction Craft Labor																																				
Piling (6 person Crew)						18	24	24	24																											
Carpenters							20	20	20	20	20	12	12	12	10	8	8	8	6	6	6	6	6	4	4	4				4	4					
Laborers					4	8	10	12	12	12	12	12	12	12	12	10	10	10	8	8	8	8	8	8	8	8				6	4	4				
Teamsters				2	4	7	7	7	8	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	6	6	6	6	6	12	12	8				
Electricians							4	4	4	4	4	24	24	24	24	40	40	40	40	40	40	40	40	40	40	40	10	10	10	4	4	6				
Ironworkers							10	10	10	10	10	10	10	10																						
Millwrights										6	6							12	16	24	24	24	24	24	18	18	6	6	6							
Boilermakers																																				
Plumbers															4	4					6	6														
Pipefitters									20	40	60	60	120	120	120	120	120	120	120	120	120	120	120	120	80	60										
Insulation workers											20	20	20	40	40	40	40	60	60	80	80	80	60	60	60	60	40									
Operating Engineers				6	6	12	12	12	12	12	14	14	14	14	16	16	16	16	16	16	18	18	18	18	12	12	6	6								
Oilers / Mechanics										2	2	2	2	2						4	4	4	4	2												
Cement Finishers							8	8	8	8	8	6	6	6	6	6	6	6	6	6																
Masons																																				
Sheetrockers																				10	10	12	12													
Roofers																	10																			
Sheetmetal Workers																				10	20	10														
Sprinkler Fitters																		8	8	10	10															
Painters																			6	6				6	6	6										
I&C - Control Room																				12	12	12	12	12	10	10	10	10								
Cooling Tower subcontract																				12	16	16	16	16												
Clarifier subcontract																		10	20	20	24	24	24	24												
Total craft LABOR	0	0	0	8	14	45	95	97	118	122	168	172	232	252	244	256	262	302	318	396	410	392	356	346	244	224	78	38	22	26	24	18	0	0	0	0
Total supervision	0	0	0	4	4	4	8	8	12	12	12	16	16	16	16	16	16	16	16	16	16	16	18	18	20	20	20	20	12	4	2	2	0	0	0	0
Total manpower	0	0	0	12	18	49	103	105	130	134	180	188	248	268	260	272	278	318	334	412	426	408	374	364	264	244	98	58	34	30	26	20	0	0	0	0

Construction Facilities

Mobile trailers or similar suitable facilities (modular offices) will be used as construction offices. These construction facilities will be located at one of the nearby construction laydown areas. Visitor parking will be available in an area adjacent to the construction offices.

2.3.4.2 Construction Camp

Affiliates of the Applicant anticipate constructing separate geothermal power plants (Elmore North Geothermal Project and Morton Bay Geothermal Project) concurrently with BRGP, which will increase regional peak workforce and may require temporary housing and facilities for construction workers affiliated with BRGP and the two other projects. These potential construction camps would be used by personnel working on the construction of the BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project. Two potential areas have been identified for use as construction camps, as shown on Figure 1-4. Because of the possible need, the temporary camp locations are included as part of the Project and may be located east of Gentry Road and south of Sinclair Road (APN 020-120-054), east of Gentry Road and north of Kuns Road (APN 020-120-056 and APN 020-120-057).

Construction Parking/Laydown/Storage

Construction worker parking, laydown, and storage will be in one of up to nine parking and laydown areas in the Project vicinity.

Several areas in the vicinity of the Project site will be available for equipment and materials laydown, storage, construction equipment parking, small fabrication areas, and office trailers. Layout of access roads and loading areas are important in the development of the laydown yard. Outdoor and weather-protected space is required, planned, and provided for turbine parts, structural steel, piping spools, electrical components, switchyard apparatus, well drilling equipment, and associated maintenance activities. Site access will be controlled for personnel and vehicles. Security fencing will be installed around the site boundary, including the laydown areas.

Emergency Facilities

Emergency services will be coordinated with the local fire department and hospital. First aid kits will be provided at the construction site and regularly maintained. As required by federal, state, and local requirements, first aid training will be provided to the appropriate staff.

Fire extinguishers will be placed throughout the Project area at strategic locations during construction.

Construction Utilities

Temporary utilities will be provided for the construction offices, laydown areas, construction camps, and the Project construction site. Temporary construction power at the site will be supplied by temporary generators and, as practical, utility-furnished power. Area lighting will be provided and strategically located for safety and security. Raw canal water will be used for construction water. Drinking water will be imported and distributed daily. Portable toilets will be provided throughout the site. During hydrotests, water usage will increase.

Construction Equipment and Materials Delivery

Equipment planned for use in the construction of the BRGP is provided in Table 2-10. Truck deliveries will occur primarily weekdays between 6:00 a.m. and 4:30 p.m. The estimated daily average of truck deliveries is shown in Table 2-11. Materials such as concrete, pipe, wire and cable, fuels, reinforcing steel, and small tools and consumables will be delivered to the site by truck.

2.3.4.3 Drilling Production/Injection Wells and Pipelines

Well-drilling operations are conducted 24 hours per day, seven days per week. Eight weeks is estimated to drill each well, and approximately 17 people will be working at each drilling site at any one time. A diesel/electric drilling rig would be used to construct the production and injection wells.

Drill rig assembly (rig mobilization) is anticipated to require approximately one week per well. Prior to drilling and rig mobilization, preparation of a drilling site requires grading (clearing and leveling) of approximately 2 to 4.5 acres per well pad. A well pad will contain typically one to three wells reducing the overall surface disturbance by hosting more than one well on a well pad. This cleared area includes an equipment staging and activity area, a drill pad, and mud tank storage area. Well-drilling operations and construction are regulated by CalGEM, which includes the well design and drilling program and inspection of blowout prevention equipment.

A system of aboveground pipelines will be constructed to connect the BRGP with the production and injection wells. Wherever possible, these pipelines will be placed next to the borders of fields or along access roads to minimize the amount of land affected.

2.3.4.4 Interconnection Transmission Lines

2.3.4.4.1 Project Schedule and Workforce

Construction of the new 230 kV electrical interconnection gen-tie line from BRGP to the first point of interconnection will include a new switching station, part of the IID transmission system. Construction of the gen-tie line is estimated to take up to 12 months.

2.3.4.4.2 Gen-tie Right-of-way

IID requirements, the National Electrical Safety Code (NESC), and operational considerations determine the width of the ROW. Specific ROW requirements depend on the structure type, height, span, and conductor configuration. IID generally requires ROWs that are the height of the structure on either side of the centerline to avoid issues associated with structure failure. The single steel pole structures for the BRGP lines would range from 100 to 125 feet in height, with an overall ROW width of 125 feet. The proposed BRGP interconnection gen-tie would be located immediately adjacent to existing Imperial County road ROWs where possible, which is 50 feet wide.

2.3.4.4.3 Construction Activities

Construction of an interconnection gen-tie includes structure site clearing; installing foundations; assembling and erecting the structures; clearing, pulling (stringing individual lines through conductors), tensioning, and splicing sites; installing ground wires and conductors; installing counterpoise/ground rods; and cleanup and site reclamation. Various phases of construction would occur at different locations throughout the construction process. This may require several construction crews operating simultaneously in different locations. Table 2-12 lists permanent disturbance for the Project.

Table 2-10. Construction Equipment

Construction	2024										2025												2026											
Description	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Excavators				1																														
Backhoe		2	2	2	2																													
10 Wheel Dump Truck		2	4	4	4																													
Dozer		1	1																															
Front End Loader				1	1																													
150 Ton Hydraulic Crane																		1	1	1	1	1												
75 Ton Hydraulic Crane									3	3	3	3	3	3	3	3	3	3	3	3	3	3												
35 Ton Hydraulic Crane				3	3	3	3	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6												
Pile Driver		3	4	4	4																													
Fork Lift						1	1	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3												
Grader		1	1																															
Drill Rigs (in separate count)																																		
Electrical Generators					3	3	3	3	3	3	6	6	6	6	6	6	6	6	6	6	6	6	3	3	3									
Concrete Pump Trucks					1								6																					
Diesel Welders							4	4	4	4	10	10	10	10	10	10	10	10	10	10	10	10	3	2	2	2								
Compactor					3	3	3	3	3	3	3	3	3	3	3	3	3	3																
Stake Truck		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
Water Truck (shared between 3 projects)		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
Pick-up Truck		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2							
Air Compressor								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
Light Towers																																		
Heavy Lift Lattice boom Main Crane																																		
Heavy Lift Lattice boom Tail Crain																																		
Heavy lift Gantry Crane																	1	1																

Table 2-11. Construction Truck Deliveries by month

	Months After Project Commencement																																			
Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Standard Truck Deliveries																																				
Fill Material																																				
Mechanical Equipment													1.5	1.5	1.5	2	4	4	4	4	4	4	3	2	2	2	2				2	2	1	1	0	0
Electrical Equip. & Materials					0.75	0.75	0.75	1.5	2	2	2	2	2	2	2	2	2	2	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1	1
Piping, Supports, & Valves							0.75	0.75	0.75	0.75	2	2	2	2	2	2	2	1	1	1	1	1												1	1	1
Concrete and Rebar			0.75	0.75	0.75	0.75	0.75	1.5	2	2	2	2	2	1	1	1																				
Steel/ Architectural					0.75	0.75	0.75	0.75	0.75	0.75	1	2	2	2	2	2	1	1	1	1	1	1									1	1	1	0	0	0
Consumables & Supplies	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1	1	1	1	1	1	1	1	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1	1	1	1	1	1
Contractor Mobilization	0	0.375	0.375	0.375	0.375	0.375	0	0	0	0	0	0	0	0	0																					
Contractor Demobilization																		0.2	0.2	0.2	0.2	0.2											0.2	0.2	0.2	0.2
Construction Equipment	0.4	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.5	0.5	0.5	0.5	0.5	0.5	0.5											0.5	0.5	0.5	0.5
Drilling and Well Development																																				
Heavy Haul Truck Deliveries																																				
Clarifier														1	1	1	1																			
Steam Turbine												0.5	0.5	0.5																						
Cooling Tower														0.5	0.5	0.5																				
Misc.													0.5	0.5	0.5																					
Main Transformers														0.1	0.5	0.1																				
Well Pipelines																																				
Total Truck Traffic at Site																																				
																																			0.0	
Trucks/Day/Month	0.4	0.6	1.4	2.1	3.6	3.6	4.0	5.5	6.5	6.5	8.3	9.8	11.8	12.4	12.3	12.1	11.5	9.7	8.7	8.7	8.2	8.2	3.8	2.8	2.8	2.8	2.8	0.8	0.8	0.8	5.0	5.0	4.7	4.7	3.7	3.7
Trucks/Month	9.2	14.4	31.6	48.9	83.4	83.4	92.0	126.5	149.5	149.5	189.8	224.3	270.3	284.1	281.8	278.3	264.5	223.1	200.1	200.1	188.6	188.6	86.3	63.3	63.3	63.3	63.3	17.3	17.3	17.3	115.0	115.0	108.1	108.1	85.1	85.1
Direct Delivery Traffic to Site																																				
Trucks/Day/Month	10	0.3	0.6	0.9	1.5	1.5	1.6	2.2	2.6	2.6	3.3	3.9	4.7	4.9	4.9	4.8	4.6	3.9	3.5	3.5	3.3	3.3	1.5	1.1	1.1	1.1	1.1	0.3	0.3	0.3	2.0	2.0	1.9	1.9	1.5	1.5
Trucks/Month	230	5.8	12.7	19.6	33.4	33.4	36.8	50.6	59.8	59.8	75.9	89.7	108.1	113.6	112.7	111.3	105.8	89.2	80.0	80.0	75.4	75.4	34.5	25.3	25.3	25.3	25.3	6.9	6.9	6.9	46.0	46.0	43.2	43.2	34.0	34.0
Total Traffic to Site																																				
Trucks/Day/Month	249.6	0.8	1.7	2.6	4.4	4.4	4.8	6.6	7.8	7.8	9.9	11.7	14.1	14.8	14.7	14.5	13.8	11.6	10.4	10.4	9.8	9.8	4.5	3.3	3.3	3.3	3.3	0.9	0.9	0.9	6.0	6.0	5.6	5.6		
Trucks/Month	5740.8	17.3	38.0	58.7	100.1	100.1	110.4	151.8	179.4	179.4	227.7	269.1	324.3	340.9	338.1	334.0	317.4	267.7	240.1	240.1	226.3	226.3	103.5	75.9	75.9	75.9	75.9	20.7	20.7	20.7	138.0	138.0	129.7	129.7		

Table 2-12. Project Features and Permanent Disturbances

Project Features	Approximate Dimensions
Project Site (Acres)	55
Production Well Pads (Acres)	9.2
Production Pipelines (Linear Feet)	7,137
Injection Well Pads (Acres)	16.5
Injection Pipelines (Linear Feet)	26,934
Gen-Tie Line (Linear Feet)	11,818
Laydown and Parking (Acres)	600
Borrow Pits (Acres)	460
Construction Camp (Acres)	206

Structure Sites

At each structure site, leveled areas (pads) would be needed to facilitate the safe operation of equipment, such as construction cranes. The leveled area required for the location and safe operation of large cranes would be approximately 30 feet by 40 feet. At each structure site, a work area of approximately 200 square feet would be required for the location of structure footings, assembly of the structure, and the necessary crane maneuvers. The work area would be cleared of vegetation only to the extent necessary. After line construction, all pads not needed for normal gen-tie maintenance would be restored to natural contours to the greatest extent possible and be revegetated where required.

Clearing and Grading within Right-of-way

Clearing and grading would be conducted only as necessary at construction areas for the safe movement of vehicles and construction activities.

Foundation Installation

Excavations for foundations would be made with power drilling equipment. A vehicle-mounted power auger or backhoe would be used to excavate for the structure foundations. In rocky areas, the foundation holes would be excavated by drilling. Footings would be installed by placing reinforcing steel and an anchor bolt cage into each foundation hole, positioning the bolt cage, and encasing it in concrete. Spoil material would be used for fill where suitable. Spoil materials that cannot be used for fill would be removed to a suitable location by the construction contractor for disposal. The foundation excavation and installation would require access to the site by a power auger or drill, a crane, material trucks, and ready-mix trucks.

Structure Assembly and Erection

Structural steel components and associated hardware would be shipped to each structure site by truck. Steel structure sections would be delivered to tower locations where they would be fastened together to form a complete structure and hoisted into place by a large crane.

Conductor Installation

After the structures are erected, insulators, hardware, and stringing sheaves would be delivered to each structure site. The structures would be rigged with insulator strings and stringing sheaves at each ground wire and conductor position.

Pilot lines would be pulled (strung) from structure to structure and threaded through the stringing sheaves at each structure. Following pilot lines, a larger diameter, stronger line would be attached to conductors to pull them onto structures. This process would be repeated until the ground wire or conductor is pulled through all sheaves.

The shield wire and conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment. Sites for tensioning equipment and pulling equipment would be up to two miles apart. This distance will be essentially doubled where it is prudent to do so by pulling in two sets of conductors back-to-back.

Each tensioning site would be an area approximately 200 feet by 200 feet. Tensioners, line trucks, wire trailers, and tractors needed for stringing and anchoring the ground wire or conductor would be necessary at each tensioning site. The tensioner in concert with the puller would maintain tension on the shield wires or conductors while they are fastened to the structures. The pulling site would require approximately half the area of the tension site. A puller, line trucks, and tractors needed for pulling and temporarily anchoring the shield wires and conductor would be necessary at each pulling site.

Ground Rod Installation

Part of standard construction practices prior to wire installation would involve measuring the resistance of structure footings. If the resistance to remote earth for each transmission structure is greater than 25 ohms, additional ground rods would be installed to lower the resistance below 25 ohms.

2.3.5 Facilities, Operations and Maintenance

2.3.5.1 Introduction

The BRGP is expected to have an operating life of 40 years. Reliability and availability are based on this projected operating life. The BRGP is a generating facility designed for the restructured California energy market. The Project design and operating philosophy will be based on operation as a merchant plant in the competitive California electricity market, with a high emphasis on efficiency and flexibility.

The BRGP is expected to be operated by a staff of approximately 61 full-time, onsite employees. The facility will be capable of operation seven days per week, 24 hours per day. Operations will be controlled from the operator's panel, which will be in the Control Room. A distributed control system will provide modulating control, digital control, and monitoring and indicating functions for operation of the resource production facility and power generation facility systems.

2.3.5.2 Power Plant Facility

2.3.5.2.1 Annual Operating Practices

Generally, the BRGP will be operated to provide its maximum electrical output throughout the year. To start the plant from a 0% dispatched operating mode, power will be back fed through the gen-tie to bring the facilities online. Auxiliary systems and the resource production facility will be started up first. After production of turbine-quality steam has been confirmed, steam will be directed to the turbine. After achieving full speed, the turbine generator will be synchronized with the transmission grid.

Planned maintenance will be addressed with safe operations as the primary priorities. Planned maintenance beyond these priorities will be coordinated to optimize availability and for scheduled power plant shutdowns for maintenance and overhauls. This work will be planned during seasonal periods when the need for electricity is reduced.

2.3.5.2.2 Operation with Daily and Seasonal Variation in Temperature and Demand

Output from the BRGP will be sensitive to the ambient wet bulb, which impacts the cooling capacity of the cooling tower and varies during the course of the year. The cooling tower will, therefore, be designed with an 80ºF wet bulb to provide sufficient capacity for ambient temperature during the summer peaks, when the electrical customers' usage is at its highest.

2.3.5.2.3 Startup and Shutdown

A cold start would occur when the BRGP is completely shut down and all fluid flow to the plant is isolated for an extended period.

A warm start would occur when the turbine is taken offline and the RPF continues to operate. A startup in this condition will require approximately 10 hours.

2.3.5.2.4 Control Philosophy

The control system will consist of an integrated, microprocessor-based DCS. The control system will provide for startup, shutdown, and control of plant operation limits, and will provide protection for the equipment. Interlock and logic systems will be provided with hardwired relays, the DCS, or PLCs. Process variables (pressure, temperature, level) used for protective functions will be connected directly to the DCS and the protective system.

2.3.5.2.5 Degree of Automation and Control Systems

The BRGP will be designed with a high degree of automation to reduce the required actions performed by operating personnel. Where it is not beneficial, systems will not be automated. Through subsystem automation and a DCS, the number of individual control variables and indicators that confront the operator will be greatly reduced. This will reduce the complexity and size of the main control room consoles and panels.

Most equipment required to support the operation of the plant will be remotely accessed in the control room. The control room contains the DCS VDU-type control consoles and the auxiliary control panels. Additionally, the control room contains the alarm, utility, and log printers.

Local control panels or stations will be furnished only where operator attention is required to set up a system for operation, or where the equipment requires intermittent attention during plant operation. Main control room indication and control will only be duplicated for those variables critical to plant availability.

Functionally distributed and redundant microprocessor-based subsystem controllers will communicate with the main control room via a redundant high-speed communications network. The communications network will provide unit-wide data access for centralized operation and engineering functions through VDUs. Remote I/O capability will be provided to allow the DCS to interface with remote equipment and to reduce the quantity of long cable runs.

The DCS will perform the following functions and miscellaneous tasks:

- Perform analog and digital plant control functions to accommodate a consistent operator interface for controlling the power plant equipment.
- Monitor both analog and digital signals to provide the operator/engineer with access to the data around the network.
- Perform alarm monitoring in the main control room for the entire plant.
- Provide graphic displays for all systems and equipment, including electrical systems and controller faceplates.
- Provide data logging and reporting via displays and printed reports.
- Provide long-term data storage of process history.

2.3.5.3 Interconnection Transmission System Operation and Maintenance

Operation of the transmission system is controlled by IID, the regional balancing authority and transmission owner. The first point of interconnection is at the proposed IID 230 kV switching station approximately 2.3 miles from BRGP. The Applicant will engineer, construct, own, operate, and maintain the approximately 2.3-mile interconnection gen-tie between the proposed BRGP GSU and the proposed IID 230 kV switching station. Anticipated maintenance activities for the interconnection transmission system are described as follows:

- Access ways to poles and structures will be provided, as required. All access ways will be maintained to minimize erosion and to allow access by the maintenance crew.
- Land use activities within and adjacent to the gen-tie ROW will be permitted within the terms of the easement. Incompatible uses of the ROW include buildings and tall trees that interfere with required line clearances, as well as storage of flammable materials, or other activities that compromise the safe operation of the interconnection gen-tie.
- The interconnection gen-tie would be inspected regularly by both ground patrol and possibly air patrols. Maintenance would be performed as needed.
- Emergency repairs will be made if the interconnection gen-tie is damaged and requires immediate attention. Maintenance crews will use tools and other such equipment, as necessary, for repairing and maintaining insulators, conductors, structures, and access ways. When access is required for nonemergency maintenance and repairs, the Applicant would adhere to the same precautions identified for original construction.
- The buildup of particulate matter on the ceramic insulators supporting the conductors on electrical lines increases the potential for flashovers, which affects the safe and reliable operation of the line. Structures with buildup of particulate matter are identified for washing during routine inspections of the lines. Washing operations consist of spraying insulators with deionized water or limestone powder through high-pressure equipment mounted on a truck.

2.3.5.4 Water Supply System Maintenance

Operation of the water supply pipeline will be in accordance with general industry standards. The pipeline will receive periodic inspection as part of the BRGP maintenance program.

2.3.6 Facility Closure

Facility closure can be either temporary or permanent. Facility closure can result from two circumstances: (1) the facility is closed suddenly and/or unexpectedly because of unplanned circumstances, such as a natural disaster or other unexpected event; or (2) the facility is closed in a planned manner, such as at the end of its useful economic or mechanical life or because of gradual obsolescence. The two types of closure are discussed in the following subsections.

2.3.6.1 Temporary Closure

Temporary or unplanned closure can result from numerous unforeseen circumstances, ranging from natural disaster to terrorist attack to economic forces. For a short-term unplanned closure, where there is no facility damage resulting in a hazardous substance release, the facility would be kept “as is,” ready to restart operations when the unplanned closure event is rectified or ceases to restrict operations. If there is a possibility of hazardous substances release, the Applicant will notify the appropriate agencies and follow emergency plans that are appropriate to the emergency. Depending on the expected duration of the shutdown, chemicals may be drained from the storage tanks and other equipment. All wastes (hazardous and nonhazardous) will be disposed of according to LORS in effect at the time of the closure. Facility security will be retained so that the BRGP is secure from trespassers.

Prior to the beginning of operations, the Applicant will develop a contingency plan to deal with unplanned or unexpected plant closure. This plan will include the following elements:

- Taking immediate steps to secure the facility from trespassing and encroachment
- Procedures for the safe shutdown and startup of equipment and procedures for dealing with hazardous materials, including draining of vessels and equipment and disposal of wastes
- Communication with CEC and local authorities regarding the facility damage and compliance with LORS

2.3.6.2 Permanent Closure

The planned economic life of the BRGP facility is 40 years. However, if the facility were economically viable at the end of the 40-year operating period, it could continue to operate for a much longer period. As power plant operators continuously maintain the equipment up to industry standards, there is every expectation that the generation facility will have value beyond 40 years. It is also possible that the facility could become economically noncompetitive earlier than the planned power plant's 40-year useful life. Decommissioning activities will follow a decommissioning plan that will be developed and submitted to the CEC for review at least 12 months prior to planned facility closure. The permanent closure plan will include the following elements:

- Activities required to permanently close the facility
- A listing of all applicable LORS and a plan to comply with them
- Coordination with CEC and interested local authorities, including workshops, to coordinate closure activities
- The maximization of recycling and other proper disposal methods
- The maintenance of site security, as required

In case of permanent closure, the facility will be cleaned and the facility components will be salvaged to the greatest extent possible. Cleaning will consist of removal of scale from piping and equipment walls (primarily fluid-handling piping and equipment) and the removal of sludge from the primary and secondary clarifiers and "clean closing" the brine pond and the cooling tower basin. All solids will be tested. Those found to be hazardous will be transferred to a permitted Class I landfill. Nonhazardous wastes will be transferred to a permitted Class II or Class III landfill as appropriate for each waste. These solids will be managed and disposed of properly so as not to cause significant environmental or health and safety impacts.

Under permanent closure, the wells will be abandoned with proper certification using CalGEM procedures and the brine pond will be "clean closed" in accordance with the RWQCB waste discharge requirements.

2.4 Facility Availability, Reliability, and Safety

2.4.1 Facility Availability

The BRGP will employ a geothermal condensing steam turbine. Generating plants employing geothermal steam turbines operating in continuous service have demonstrated operating availabilities above 95% over several years.

2.4.1.1 Range of Availability

Overall availability varies from year to year because of both unplanned causes and the structure of the overhaul cycle. Forced unavailability changes somewhat from year to year because the numbers and lengths of forced outages vary randomly. Planned outages also vary because the overhaul cycle requires different amounts of down time in different years. The geothermal steam turbine and fluid equipment for

BRGP is planned to be overhauled on a 3-year (triennial) cycle with a planned warranty outage in Year 1 and triennial outages starting in Year 3. Fluid equipment overhauls and turbine generator overhauls would occur simultaneously. All of the planned outage work for major overhauls will be performed in seasons when demand is relatively low. The expected service life of the facility is 40 years.

2.4.1.2 Basis for Forecasts of Availability

2.4.1.2.1 Resource Production Facility

Proper performance of the turbine, and of the overall facility, is dependent on the continuous supply of turbine-quality steam. The crystallizer/reactor clarifier process is a proven technology for producing turbine-quality steam and effectively processing the fluid. Commercial application employing this technology has been demonstrated in the Salton Sea KGRA. Design features that lead to this success are being incorporated in the design of this facility. These include a proven process design that effectively polishes the steam and removes solids from the fluid (thereby mitigating scale formation on facility internals and in the injection wells); use of corrosion-resistant alloy (or functionally equivalent) materials or cladding on vessels and tanks to mitigate corrosion and scale adhesion; equipment sufficiently sized to ensure performance; and use of redundant and standby equipment to ensure continued operation of the facility.

Although the crystallizer/reactor clarifier process effectively reduces solids in the fluid, periodic workovers of the injection wells will nonetheless be required. This is considered normal maintenance practice, and the workovers maintain the injectivity required to ensure long-term operation of the RPF.

2.4.1.2.2 Power Generation Facility

The risk of catastrophic failure for the geothermal condensing turbine is considered small. The design has been proven in the geothermal industry in similar commercial applications worldwide. The turbine manufacturers under consideration are reputable, and a review of turbines in geothermal service shows that catastrophic failures are extremely uncommon. Mitigation against failure or damage is achieved by proper design, operation, and maintenance, and by the incorporation of a spare rotor and stationary blades in the spare parts purchased with the machine.

Components of the heat rejection system, including the shell-and-tube type main condenser, the hybrid gas removal system comprised of steam ejector and liquid ring vacuum pump, and the counter flow cooling tower, have performed very reliably in geothermal applications such as this over many years.

2.4.1.2.3 Degradation in Output from Fouling and Wear

All steam turbines degrade in output from their new and clean condition because of fouling and wear. “Nonrecoverable” degradation from equipment wear increases rapidly in the first few thousand hours and then slows. Most of the degradation resulting from wear will be recovered during the major overhaul conducted on a planned 3-year interval.

2.4.1.2.4 Summary of Availability

The BRGP is expected to provide a high availability and be responsive to the needs of the system for power. Planned outages are anticipated to occur every three years in seasons when energy demand is relatively low.

2.4.2 Reliability

Critical functions and parameters will have redundant sensors, controls, indicators, and alarms. The system will be designed such that critical controls and indications do not fail because of a failure in the control system implementation of redundancy logic.

Control systems in general, and especially the protection systems, will be designed according to stringent failure criteria.

Measurement redundancy will be provided for all critical plant parameters. DCS microprocessors will be fully redundant with automatic tracking and switchover capability in case of primary microprocessor failure. Two fully redundant data communications networks will be provided. The system will permit either network to be disconnected and reconnected while the system remains online and in control. The control system will incorporate online self-diagnostic features to verify proper operation of system hardware, software, and related support functions such as control power, field contact interrogating power, and the system modules in position.

The following subsections identify equipment redundancy as it applies to project availability.

2.4.2.1 Resource Production Facility

Sufficient production and injection wells will be drilled to provide necessary capacity so that full plant output can be maintained while wells are being individually maintained.

2.4.2.2 Power Generation Facility

The turbine generator system includes an excitation system, lube oil system, and steam turbine control and instrumentation. Redundancy is provided in the steam turbine subsystems where practical. For example, the lube oil system consists of redundant pumps, filters, and coolers. The microprocessor-based control system consists of redundant microprocessors, as well as redundant sensors for critical measurements. Technological advancements, as well as redundancy as illustrated previously, have led to extremely high reliability for the steam turbines considered for this Project.

2.4.2.3 Balance of Plant Systems

BOP systems serve to enhance reliability. An instrument air system is incorporated in the design. The plant instrument air system provides a compressed, dry air for use in instruments and control devices. The system consists of a redundant capacity electric-driven air compressor, air dryer with pre-filter and post-filter, air receiver, instrument air headers, and distribution piping. A standby air compressor and standby ancillary equipment (regenerative air drier, receiver, and instrumentation) also will be provided for added reliability. The fire water system is to provide fire protection for all the plant personnel and equipment; it includes a primary fire water pump, a backup diesel-powered pump, and the fire water pipeline system.

2.4.2.4 Distributed Control System

The DCS will be a redundant microprocessor-based system that will provide control, monitoring, and alarm functions for plant systems and equipment. The following functions will be provided:

- Control the resource production facility and other systems in response to unit load demands (the steam turbine generator has its own control system).
- Provide control room operator interface.
- Monitor plant equipment and process parameters and provide this information to the plant operators in a meaningful format.
- Provide visual and audible alarms for abnormal events based on field signals or software-generated signals from plant systems, processes, or equipment.

The DCS will have functionally distributed architecture comprising a group of similar redundant processing units linked to a group of operator consoles and an engineering workstation by redundant data highways. Redundant processors will be identically programmed to perform the specific tasks for control information, data acquisition, annunciation, and historical purposes. Because of this redundancy, no single processor failure can cause or prevent a unit trip.

2.4.2.5 Power Plant Performance and Efficiency

Based on predicted power dispatching, the BRGP is expected to produce more than 8,000 hours per year. Under summer design conditions, the corresponding fluid production rate will be on average 6,601,437 pounds per hour.

2.4.2.6 Geothermal Fluid/Water Availability

The wellfield for the BRGP is in known productive resource areas with indicated and measured resources that are near active operational geothermal wells. This results in a high probability to classify the BRGP production wellfield as credible to proven production. The resource risk in this area is interference with the existing production wells, which has been minimized by well placement based on the use of reservoir modeling and forecasting. Redrilling of the open-hole section of the wells will be performed as required to maintain production. Use of pressure observation wells and ongoing reservoir modeling will be employed to manage the resource.

The source of water for the plant will be water from agricultural distribution canals. The water custody transfer point will be at the existing Vail 4A Lateral, water gate 459 or 460 (the IID is responsible for the operation and maintenance of the water supply system upstream of this point). Because this IID supply system is already in place, upgrades to the existing water supply system are expected to be minor. A buried pipeline will be installed to transfer the water either by gravity or via transfer pump system from the custody transfer point to the service water pond.

2.4.2.7 Operations Maintenance Plan

2.4.2.7.1 General Approach

During the operations phase, the Project Owner will perform all tasks necessary to operate and maintain the plant in accordance with an Operating Plan, approved procedures, and prudent, industry standards, including:

- Operations management
- Maintenance management
- Administrative support

Each of these are described in the following subsections.

Operations Management

Effective operations management provides the planning, scheduling, and training necessary for efficient and profitable plant operation. Table 2-13 presents the expected operational staffing for the project.

Table 2-13. Operating Employees

Classification	Number
Operations Manager	1
Control Operator	4
Shift Supervisor	2
Operators	11
Plant Operators	4
Project Analyst	4
Planner	1

Classification	Number
Process Engineer	1
Maintenance Technician III	3
Instrument & Electrical Technician	2
Maintenance Technician IV – Welder/Valve	2
Turbine	1
Resource Technician I	1
Resource Technician III	1
Resource Supervisor	1
Drilling Supervisor	1
DVC Support	2
Lab Tech I	1
Lab Tech II	1
Lab Tech III	1
Potable Water	1
Lab Supervisor	1
Project Engineer	1
Sr Project Engineer	1
NDE Tech	1
NDE Supervisor	1
Drafting	1
Lab and Engineering Manager	1
Environmental Engineer	1
Environmental Coordinator	1
Sr. Environmental Coordinator	1
Hazard Waste Coordinator	1
90 Day Crew	1
Health and Safety Specialist	1
Warehouse Staff	1
Procurement Specialist	1
Total	61

Staffing

Staffing plans are designed for the ongoing operational and maintenance requirements of the facility. All periodic testing, inspections, and maintenance activities will be identified, as well as those operational and maintenance requirements that require specialized and extra assistance at specific times during the maintenance cycle of the plant.

The staffing plan includes permanent facility staff who will be fully responsive to all electrical load demands and will be responsible for the performance of all preventive maintenance and routine repairs. The Applicant will strive to hire and train Project staff as much as possible from Imperial County residents consistent with Project needs and any applicable labor agreements. To that end, the Applicant has initiated efforts to develop training programs within local schools and other institutions.

The onsite operations and maintenance staff will be supported by the home office, the engineering procurement contractors, and subcontractors for nonroutine functions. Associated technical and specialized vendor support will be subcontracted as needed during planned outages, inspections, and overhauls.

Plant Operations and Supervision

The Operational Plan will require the following:

1. Operate the facility in accordance with the Operating Plan, Operations and Maintenance Manual, all applicable LORS and permits, and an approved annual budget and prudent industry standards.
2. Perform and record periodic operational checks and tests of equipment in accordance with approved maintenance procedures, the equipment manufacturer's specifications, and applicable laws and regulations.
3. Maintain operating logs, records, and reports for operation of the facility.
4. Coordinate scheduled shutdowns or other modifications in basic plant operations.

Ongoing Operations Training

The Project Owner will establish, implement, and conduct an ongoing operations training program. The plant staff will continue to receive training to maintain or improve plant reliability, availability, and capacity following Project startup.

Manufacturers' representatives and other sources of operations, maintenance, and overhaul literature will provide up-to-date information and techniques to the plant staff. Key staff members also will attend industry conferences and seminars to exchange information with other operators.

Maintenance Management Program

The Project will use a computerized maintenance/inventory management (CMIM) system. The key elements of the Project's maintenance/inventory systems will include:

- Preventive maintenance
- Predictive maintenance
- Corrective maintenance
- Outage management
- Spare parts inventory control

The control system will use a computerized maintenance management program to provide plant personnel with equipment histories, work orders, maintenance schedules, outage scheduling, inventory control, and equipment and man-hour costs.

Preventive Maintenance

Project preventive maintenance will consist of periodic equipment inspections and adjustments that will help avoid deterioration of plant performance. Preventive maintenance schedules will be included in the computerized plant monitoring program and will be calibrated to an overall plant schedule. This schedule will provide daily, weekly, monthly, and annual scheduling of necessary preventive maintenance activities and will include spare parts management.

Preventive maintenance schedules will be developed for particular pieces of equipment. The preventive maintenance schedules will be updated to reflect actual plant operating conditions, with adjustments made based on changes in key plant parameters. The equipment testing and monitoring will provide key data for the predictive maintenance component of the overall maintenance management program.

An integrated work order system will be used to schedule work and integrate the preventive maintenance into the overall maintenance management program.

Predictive Maintenance

Predictive maintenance generally improves the reliability/cost ratio and, subsequently, increases plant profitability by monitoring, recording, and evaluating plant performance systematically to develop a documented equipment and plant history. This history allows maintenance scheduling around critical plant components in the plant system. Sensitive areas will receive extra attention from preventive maintenance personnel.

Corrective Maintenance

Corrective maintenance activities will return the equipment quickly to operating order. At regular discussion meetings, plant maintenance personnel will review and evaluate failures to avoid repeat failures. Review of the events preceding the failure allows determination of the exact causes; these findings will be fed back into the predictive maintenance model to determine whether additional or different maintenance procedures are warranted for the key components responsible for the failure.

Outage Management

Outages for overhaul will be managed to minimize downtime through advanced planning, work packages, outage schedules, and other project management methods to allocate plant resources efficiently. Prior to each outage, the plant staff and the equipment manufacturers will conduct planned inspections beginning from three months to a year before the outage, depending on the need for and availability of major equipment components. Plant staff will work with vendor representatives to verify that the proper parts and tools are available, help coordinate inspections, and schedule work to be performed in the vendor repair shop.

A scheduling program using the critical path method will itemize various work packages, organize them, and calculate the affect any work package has on the overall outage length. The program will provide a reporting tool that allows the plant staff to create easy-to-understand outage schedules and reports showing manpower needs, equipment resources, and usage profiles. The program also will identify potential problems that could lead to schedule slippage.

Safety Program

To ensure the safety of all employees and personnel working in or near the BRGP, the Applicant will establish a safety plan that conforms to federal, state, and local regulations. Key components of the plan will include:

- Plant Familiarity: Employees are to be thoroughly familiar with Project operations and procedures, as well as the equipment being operated.
- Clearances: Written clearance procedures will be followed before working on or entering any equipment. No employee will work on any equipment that has been cleared for work unless the employee holds a clearance, or is reporting to another employee who holds such clearance.
- Proper Equipment Designation: Equipment to be operated or worked on will be properly designated, by name and number.
- Responsibility: Operations and duties are performed only by duly authorized employees, who are held responsible for their actions.
- Monitoring: Employees will be required to maintain a continuing check on operating conditions to prevent a potential hazard to personnel and equipment. These include items such as: high or low oil or water level, excessive temperatures and pressures, over speeding of rotating equipment, abnormal noises, unusual vibration, malfunctioning of auxiliaries.
- Records: Employees who are required to keep logs and records will keep them current and maintain a high level of accuracy. Abnormal or special conditions will be called promptly to the attention of the proper supervisors and logged. Shift employees will familiarize themselves with all activities within their jurisdiction that have taken place during the preceding shift.

Plant Security

The Applicant will develop and implement a formal, written security plan and staff will be trained in its requirements. Staff and all visitors will be required to adhere to the plan to ensure power plant security under all conditions.

2.4.3 Safety

2.4.3.1 Geothermal Power Facility

2.4.3.1.1 Seismic

The BRGP is situated within the south-central portion of the Salton Trough, a topographic and structural depression bounded to the north by the Coachella Valley and to the south by the Gulf of California. The primary geologic hazards at the site include strong ground motion from a seismic event centered on one of several nearby active faults. The site is within the Brawley Seismic Zone, which is a zone of transition between the northwest end of the Imperial Fault and the southwest end of the San Andreas Fault. The potential for ground rupture resulting from faulting is believed to be low. Potential impacts of the geologic hazards on the plant and ancillary facility operations include liquefaction, seismic shaking, post-liquefaction settlement, seismically induced flooding, settlement, and subsidence. With implementation of the measures outlined in Section 5.2.4, impacts to plant operations from geologic hazards will be reduced to a less-than-significant level.

Design and construction of the generating plant will be in conformance with the current California Building Code Seismic requirements.

2.4.3.1.2 Flooding

The facility is near the Salton Sea and is, therefore, in the special flood hazard area as defined by Imperial County, Title 9, Land Use Ordinance # 1203, Division 16. To mitigate the flood hazard, a berm will be constructed around the entire generating facility. The Applicant is preparing a LOMR to be submitted to Imperial County and FEMA in second quarter 2023. The LOMR is requesting a revision to the 100-year flood zone based on hydraulic modeling. The results of this modeling were used in the design of the flood protection berms.

During the construction phase of the Project, erosion and sediment control measures will be temporarily installed as required under the Project's National Pollutant Discharge Elimination System (NPDES) General Permit for stormwater discharge associated with construction activity. The permanent stormwater management system will consist of ditches/swales in general areas and culverts under roadways draining to the retention basin. These measures will minimize the possibility of appreciable erosion and resulting sedimentation occurring on the site.

The drainage plan for the plant site will be designed to prevent flooding of permanent facilities by a 100-year, 24-hour storm event. Drainage design will be designed in accordance with Imperial County requirements. Figures 2-6a and 2-6b provide pre- and post-drainage drawings for the Project site.

2.4.3.2 Pipeline Safety

The production and injection pipelines would have several design and operation features related to assuring the safety and reliability of these system components. During commissioning of the pipeline, plant startups, and following work on the production wells, great care is taken to ensure gradual heatup and controlled thermal expansion of the pipelines. Operational procedures would be used to control the warmup rate of the pipelines to 50°F per hour. The warmup system includes regulation valves that control flow. Steam and fluid are recirculated from the plant back to the production well, slowly warming and pressurizing the pipeline prior to placing the well in service.

Pipelines would be inspected regularly to monitor for leakage. Plant operators would drive the pipeline routes daily and visually inspect the pipelines for leaks (the pipelines are installed on elevated supports above grade for inspection purposes). Additionally, the site staff includes a nondestructive examination group that inspects pipelines semiannually in accordance with a preventive maintenance program and schedule.

Each production well would be equipped with two parallel electrically operated isolation valves. The valves are powered and wired to the plant control room. These valves are stroked shut and open regularly to remove accumulated scale and ensure the valves will operate when required. If a leak in the pipeline is detected, the plant operator can shut these valves either manually or remotely. The pipeline also would be equipped with isolation valves at the plant site that will be shut by operational staff in case of a leak.

A fluid release to the ground of 200 to 400 gallons typically would remain within a 20- to 30-foot radius of the leak location. Cleanup involves removing all soil and gravel that has been in contact with geothermal fluid. The cleanup is verified by soils sampling after the contaminated material is removed. The material removed would likely be nonhazardous and disposed of in accordance with applicable regulations.

2.4.3.3 Safety Precautions and Emergency Systems

Safety precautions and emergency systems will be included in the design and construction of the BRGP to ensure safe and reliable operation of project facilities. Monitoring systems and a well-planned maintenance program will enhance safety and reliability.

Safety, auxiliary, and emergency systems consist of required lighting; battery backup for controls, fire, and hazardous materials safety systems; steam utilities; and chemical safety systems. The plant will include its own utilities and services such as plant air, instrument air, fire-suppression water, and potable water.

2.4.3.3.1 Safety Precautions

Worker Safety

Programs will be in place to assure, at a minimum, compliance with federal and state occupational safety and health program requirements. In addition to compliance with these programs, ongoing implementation of a program that effectively self-assesses potential hazards and mitigates them routinely will minimize the Project’s effects on employee safety.

Hazardous Materials Handling

Hazardous materials will be stored and used during construction and operation. Design and construction of hazardous materials storage and dispensing systems will be in accordance with applicable codes, regulations, and standards. Hazardous materials storage areas will be curbed or bermed to contain spills or leaks. Potential hazards associated with hazardous materials will be further mitigated by implementing a hazard communication program and thorough training of employees, including proper handling and emergency response to spills or accidental releases. Emergency eyewashes and showers will be provided at appropriate locations. Appropriate personal protective equipment also will be provided.

Security

Operating staff will provide security as they make their normal operating rounds. The facility will be staffed 24 hours per day. At each well pad, the high temperature well head valve area (commonly called the cellar) will be fenced. Firefighters and police will have access to the facility at all times. Additionally, the onsite substation and transformer area will be fenced with access gates.

Public Health and Safety

The programs implemented to protect worker health and safety also will benefit public health and safety. Facility design will include controls and monitoring systems to minimize the potential for upset conditions that may result in public exposure to hazardous materials. Potential public health impacts associated with operation of the BRGP will be mitigated by development and implementation of an Emergency Response Plan, an employee hazards communication program, a Spill Prevention, Countermeasures, and Control Plan, safety programs, and employee training. Coordination will be made with local emergency responders by providing them with copies of the plant site Emergency Response Plan (ERP), conducting plant site tours to point out the location of hazardous materials and safety equipment, and encouraging these providers to participate in annual emergency response drills.

2.4.3.3.2 Auxiliary Systems

The BRGP will include centralized control and monitoring systems that will help ensure safe operation of the Project facilities. Protection relays, alarms, and control logic will be implemented to protect equipment and minimize risk to the plant equipment.

2.4.3.3.3 Emergency Systems

Fire Protection Systems

The BRGP will have onsite fire protection systems and will be supported by local fire protection services. Portable and fixed fire suppression equipment and systems will be included in the BRGP. Portable fire extinguishers will be located at strategic locations throughout the Project site. Smoke detectors, sprinkler systems, and fire hydrants with hoses will be used.

Employees will be provided fire safety training, including instruction in fire prevention, use of portable fire extinguishers, and reporting fires to the local fire department. Employees will only suppress fires in an incipient stage. Fire drills will be conducted at least twice each year.

The Calipatria Fire Department in Calipatria will provide the primary fire protection, inspections, and firefighting services for the BRGP.

The Imperial County Fire Chief will perform a final fire safety inspection upon completion of construction and, thereafter, will conduct fire safety inspections. It is expected that, prior to startup, the County Fire Chief will visit the BRGP site to become familiar with the site and with the plant's emergency response procedures.

Medical Services and Emergency Response

The BRGP will have an ERP that will address potential emergencies, including chemical releases, fires, and injuries, and will describe emergency response equipment and its location, evacuation routes, reporting to local emergency response agencies, responsibilities for emergency response, and other actions to be taken in case of an emergency.

Employee response to an emergency will be limited to the awareness and first responder levels to minimize the risk of escalation of the accident or injury. Training consistent with these response levels will be provided to employees. A first aid station with adequate first aid supplies and personnel qualified in first aid treatment will be provided onsite.

The Calipatria Fire Department has the primary responsibility for dispatching emergency medical technicians (EMTs). Backup EMT units are available from Niland. They will respond to medical emergencies at the plant based on availability. Ambulances will be dispatched from Imperial by the Calipatria emergency response team. The nearest hospital is in Imperial; however, burn patients would be transported to the University of California, San Diego burn center via helicopter.

2.4.3.3.4 Aviation Safety – AFT Stacks

The closest airport (Cliff Hatfield Memorial Airport) to the Project site is approximately six miles southeast in Calipatria. This airport is classified as an airstrip. Currently, the only traffic allowed at this field is crop dusters and light private planes. There is no runway lighting, refueling, or control tower service.

Commercial air flights in the region are handled by Imperial County Airport. All commercial traffic is routed south and east of the Project by approximately 23 miles.

2.5 Applicable Laws, Ordinances, Regulations, and Standards

Refer to Appendix 2B for a detailed discussion of applicable LORS for engineering design criteria.

2.6 References

Landmark. 2022. *Preliminary Geotechnical Investigation, Proposed 81 MW Black Rock Geothermal Power Plant, Calipatria, California, LCI Report No. LE22199*. October 20.

Office of Energy Efficiency and Renewable Energy. 2023. Capacity Factor by Energy Source. Available at: https://www.energy.gov/ne/downloads/infographic-capacity-factor-energy-source-2019.

University of Utah. 2002. The Energy and Geoscience Institute.

Imperial County Planning/Building Department. 2015. *Imperial County General Plan*. Renewable Energy and Transmission Element. October 6.

Imperial Irrigation District (IID). 2022. *BHE Cluster – 357 MW (IPP-150, IPP-151, IPP-152) System Impact Study*. November 7.

Salton Sea Authority, Frequently Asked Questions (accessed 1/10/2023) https://saltonsea.com/about/faq/

3 Electrical Transmission Line

IID will construct, own, operate, and maintain the network transmission line required for BRGP to deliver through IID's balancing authority to the California Independent System Operator (CAISO). The Applicant plans to own and maintain the generation interconnection gen-tie line to route from BRGP to the first point of interconnection within IID's balancing authority. The first point of interconnection will be a new switching station near Garst and Sinclair roads in Calipatria, California. This switching station is approximately 2.3 miles from BRGP. The Applicant plans to engineer, construct, own, operate, and maintain the gen-tie line between the proposed BRGP GSU and the first point of interconnection at the proposed IID 230 kV switching station.

3.1 Gen-Tie Line Specifications

The gen-tie line from the BRGP to the first point of interconnection will be designed and constructed in accordance with Rules for Overhead Line Construction and other applicable state and local codes. General Order 95 (GO-95) describes a minimum conductor distance from the ground of 30 feet at 60°F, and 27 feet at maximum operating temperature. The proposed transmission conductor heights would be consistent with GO-95.

Gen-tie conductors would consist of one 3-phase AC circuit consisting of one or two 1-inch Aluminum Conductor Steel Reinforced (ACSR) conductors per phase. One shield wire with an integrated fiber optic cable will be installed with any new gen-tie line associated with the Project. The fiber optic cable will be used for any necessary communications within IID's transmission system.

Part of standard construction prior to conductor installation involves measuring the resistance of the structure footings. If the resistance to the remote earth for each structure is greater than 25 ohms, additional ground rods are installed as necessary to lower the resistance below 25 ohms.

3.2 Gen-Tie Transmission Structures

The gen-tie will be installed on single-pole steel structures ranging from 100 feet to 125 feet high spaced approximately 600 feet apart depending on final design. The phase conductors will be arranged vertically on three side arms for each circuit. Figure 3-1 provides an example of a typical tower design.

All steel pole towers will have concrete foundations designed to support the imposed loads. The diameter and the depth of each foundation will be determined during the design phase of construction, and will be based on soil conditions and actual tower loads. The maximum anticipated size of the foundation is 10 feet in diameter by 30 feet deep. Excavations for foundations would be made with drilling equipment. A vehicle-mounted power auger or backhoe would be used to excavate for the structure foundations.

Footings will be installed by placing reinforcing steel and an anchor bolt cage into each foundation hole, positioning the bolt cage, and encasing it in concrete. Spoil material would be used for fill where suitable. Spoil materials that cannot be used for fill would be removed to a suitable location by the construction contractor for disposal. The foundation excavation and installation would require access to the site by a power auger or drill, a crane, material trucks, and ready-mix trucks.

3.2.1 Access to Structures

The construction, operation, and maintenance of the proposed gen-tie line to the first point of interconnection will require that heavy vehicles access structure sites along the ROW. Use of existing public roads and maintenance roads within existing ROW, to the greatest extent possible, is planned to minimize potential impacts associated with new construction. Where necessary, certain road improvements would be made to allow passage of construction vehicles. Some permanent road improvements may be left in place where necessary for operation or maintenance, or where the property owner requires. Road standards will be addressed specifically in the construction, operations, and maintenance plan that will be prepared during the engineering phase of this Project.

3.2.2 BRGP Transmission System Evaluation

The Applicant applied to IID to interconnect the proposed generating plant to the IID transmission system. IID performed a cluster System Impact Study (SIS) to examine the impact from BRGP, along with 280 MW of geothermal energy from nearby proposed projects, in the Salton Sea region near Calipatria, California. The SIS used power flows on the existing transmission lines, transformers, short circuit duties of the existing transmission facilities, substations, and stability of the interconnected system, considering various contingencies and fault conditions, which determined the proposed plant and the collective 357 MW (interconnection delivery) creates system impacts and stability problems. The SIS identified necessary mitigation measures (IID system upgrades) required to be in place prior to BRGP connecting into the IID transmission system. The required mitigation plan upgrades are described in the SIS and provided as a confidential filing. When the mitigation plan is implemented, the addition of BRGP and related gen-tie will increase operator flexibility for maintaining the transmission system during steady state and contingency conditions. The single-line drawing for the project is provided as Figures 3-2a and 3-2b.

3.2.3 Transmission System Reliability Criteria

The North American Electric Reliability Council, the Western Electricity Coordinating Council, and the IID Reliability Criteria for Transmission System Planning were used in the evaluation of the transmission system.

3.2.4 Transmission System Interconnection Study

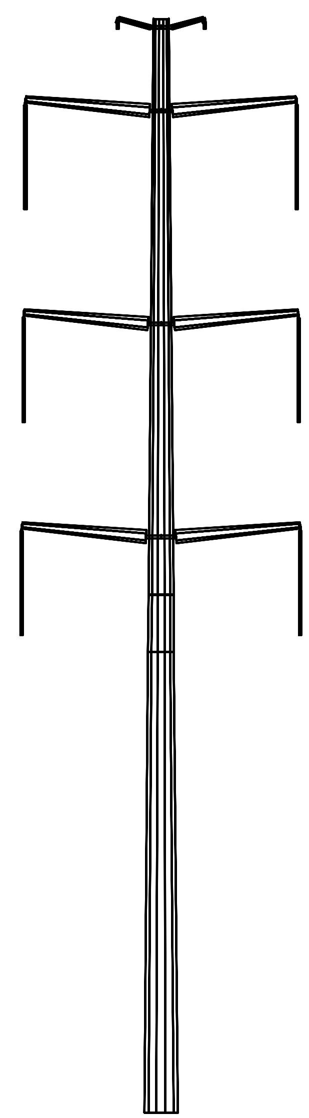
The SIS analysis indicates that the proposed Project can be connected to the IID transmission system at the proposed IID 230 kV switching station to be constructed as part of the IID system upgrades. A redacted version of the SIS analysis is provided as Appendix 3A.

3.3 Audible Noise and Radio and TV Interference

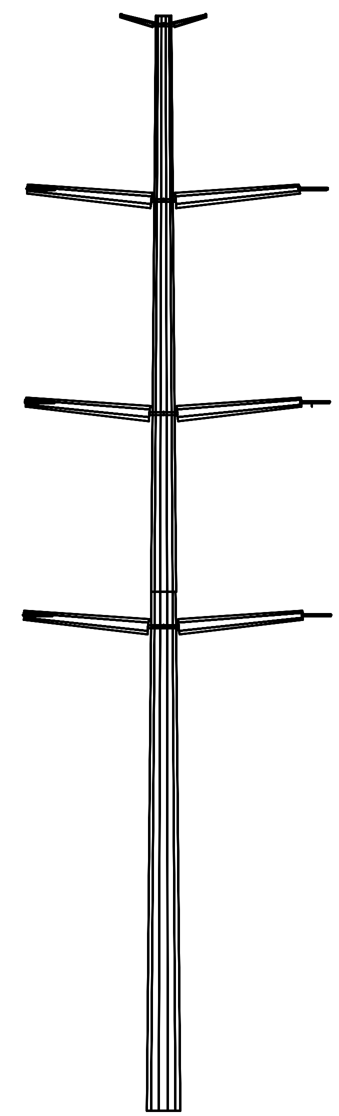
An electric field is generated in the air surrounding a transmission line conductor when the transmission line is in operation. A corona discharge occurs at the conductor surface when the intensity of the electric field at the conductor surface exceeds the breakdown strength of the surrounding air. The electrical energy released from the conductors during this process is known as corona loss and is manifested as audible noise and radio/television interference.

Energized electric transmission lines also can generate audible noise by a process called corona discharge, most often perceived as a buzz or hum. This condition is usually worse when the conductors are wet. The Electric Power Research Institute (EPRI) has conducted several transmission line tests and studies that measured sound levels for several power line sizes with wet conductors (Transmission Line Reference Book, 345 kV and Above, EPRI, 1975,1982). The Transmission Line Reference Book, 345 kV and Above, also notes that the noise produced by a conductor attenuates (decreases) by two to three decibels for each doubling of the distance from the source.

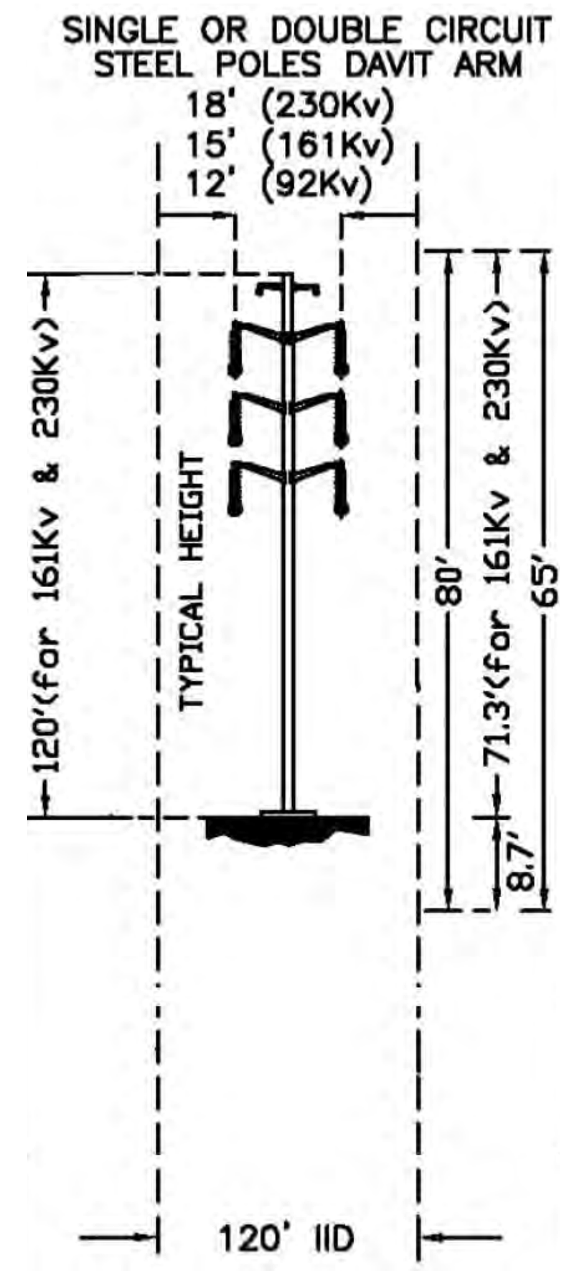
Radio and TV interference, known as gap-type noise, is caused by a film on the surface of two hardware pieces that are in contact. The film acts as an insulator between the surfaces. This results in small electric arcs that produce noise and interference. This type of noise is not a problem in well-maintained transmission lines.



TANGENT STRUCTURE



DEAD END STRUCTURE



230kV Steel Pole
Typical Right of Way

Figure 3-1
Typical Transmission Tower Design,
Black Rock Geothermal Project
Imperial County, California

Source: Z Global Engineering, 11/30/2022.

Jacobs

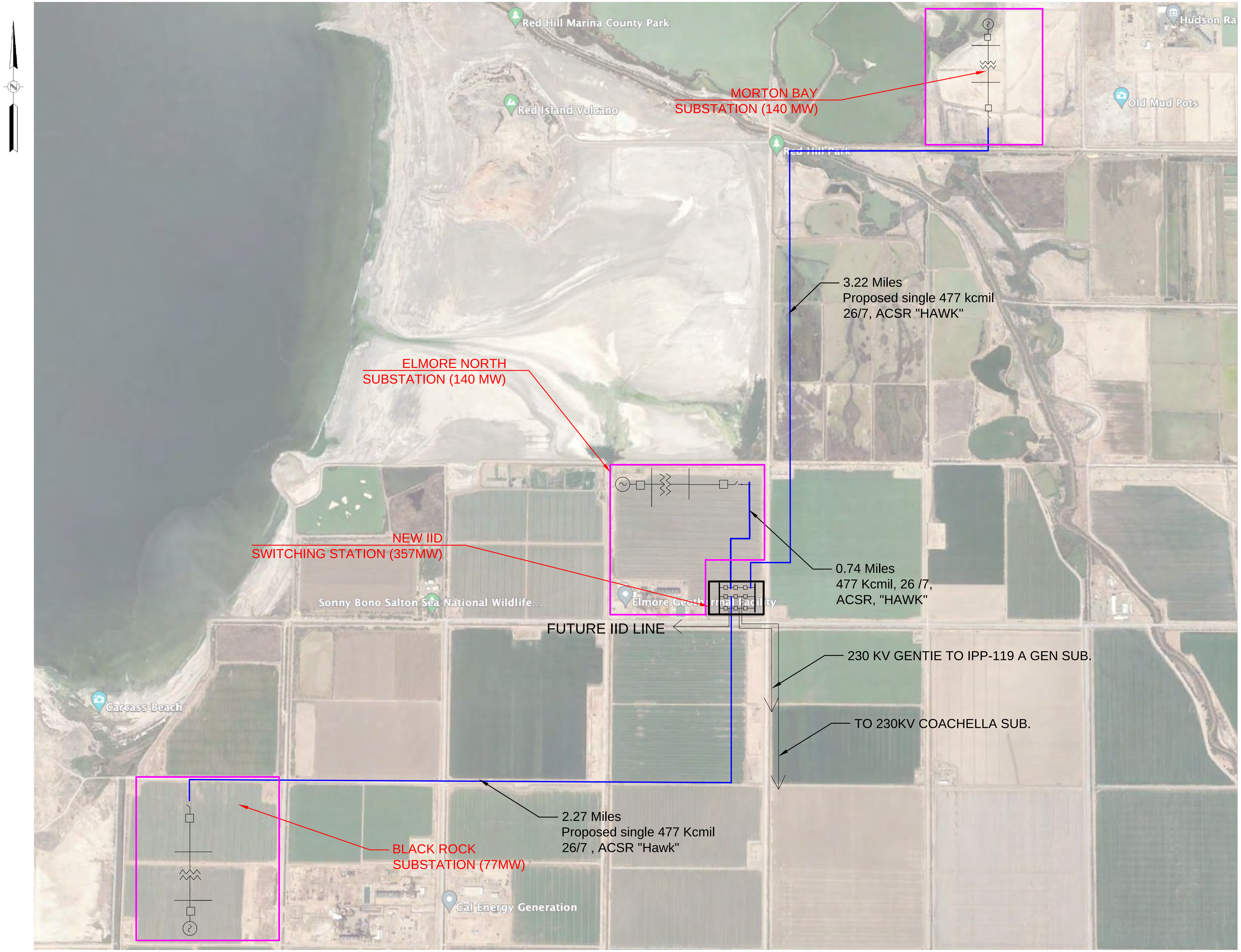
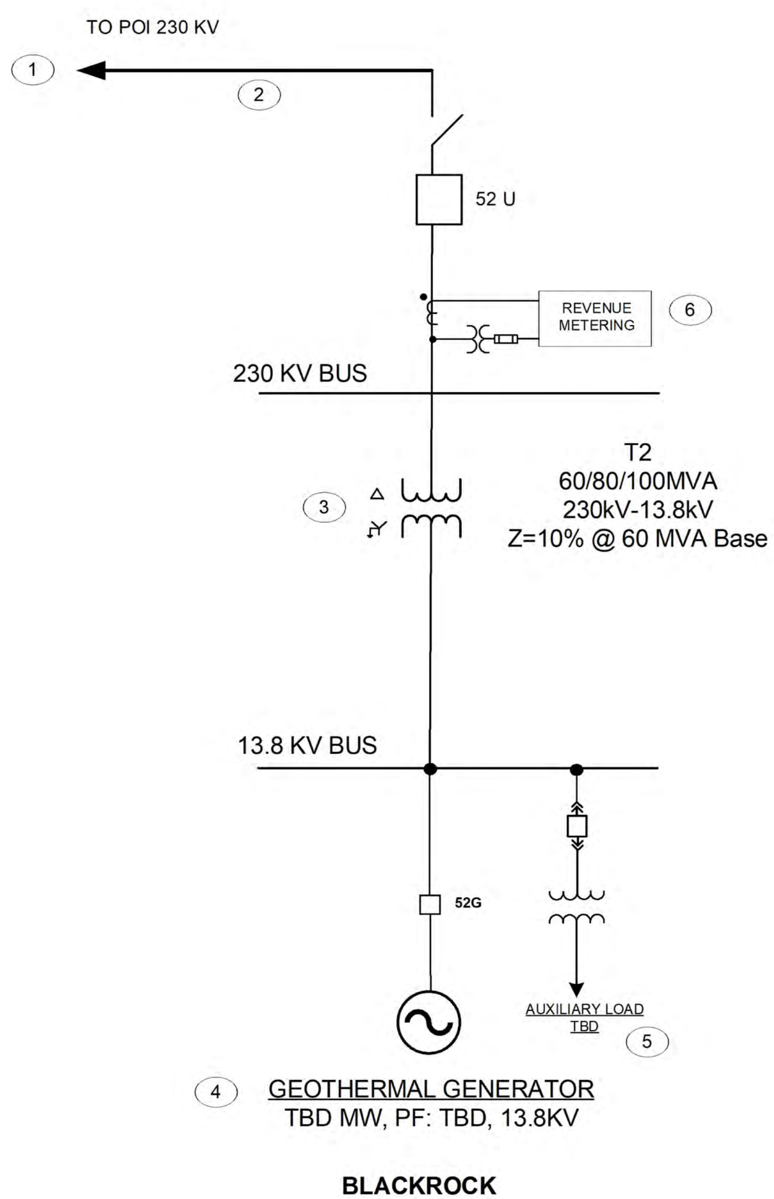


Figure 3-2a
One-Line Drawing,
Black Rock Geothermal Project
Imperial County, California

Source: Z Global Engineering, Drawing C-000.

Jacobs



ONE-LINE DIAGRAM NOTES:

1. POINT OF INTERCONNECTION: POI 230KV, 77MW NET TO GRID
2. GENTIE LENGTH ESTIMATED 2.27 MILES
3. TRANSFORMER RATED AT 60/80/100 MVA ON 60 MVA BASE, Z=10% 230/13.8KV
4. GENERATOR TBD MVA, PF=TBD, 13.8KV
5. AUX LOAD TBD
6. REVENUE METER MAXIMUM LOAD 193.3 AMPS AT 77 MW +/-0.85PF. MAXIMUM 77 MW DELIVERED AT POI

THE PROJECT SHALL INCLUDE A CONTROL SCHEME SPECIFICALLY DESIGNED TO PRESENT POWER INJECTIONS INTO THE IID SYSTEM ABOVE 77 MW AT ANY TIME

Figure 3-2b
One-Line Drawing,
Black Rock Geothermal Project
Imperial County, California

Source: Z Global Engineering, Drawing C-000.

Jacobs

There are many factors contributing to the pre-Project ambient noise levels in the plant area. The Project gen-tie will be designed such that noise from the line will continue to be well below undesirable levels. Any noise or radio/TV interference complaints will be logged, investigated, and, to the degree possible, mitigated.

3.4 Induced Currents and Hazardous Shocks

3.4.1 Induction

Touching metallic objects near a transmission line can cause hazardous or nuisance shocks if the line is improperly constructed. Because the electric fields of the gen-tie are negligible above ground, and the line would be built consistent with GO-95 requirements and Title 8 CCR 2700 requirements, hazardous shocks are highly unlikely to occur as a result of the Project construction and operation.

3.5 Electric and Magnetic Fields

Electric and magnetic fields (EMFs) occur independently of one another as electric and magnetic fields at the 60-Hz frequency used in transmission lines, and both are created by electric charges. Electric fields exist when these charges are not moving. Magnetic fields are created when the electric charges are moving. The magnitude of both electric and magnetic fields fall off rapidly as the distance from the source increases (proportional to the inverse of the square of distance). Power lines, electrical wiring, electrical machinery, and appliances produce EMFs.

Transmission lines generate electric fields because of unbalanced electrical charge on unshielded energized conductors. Electric field strengths are expressed in volts per meter (V/m) or kilovolts (thousands of volts) per meter (kV/m). When electric currents are in motion, they create magnetic fields. The strength of the magnetic field is proportional to the magnitude of the current in the circuit. Magnetic fields can be characterized by the force they exert on a moving charge or on an electrical current. A magnetic field is a vector quantity that is characterized by both magnitude and direction. Electric currents are sources of magnetic fields. Magnetic field strengths are measured in milligauss (mG).

In January 1991, the CPUC issued an Order Instituting Investigation (I.91-01-012, CPUC 1991) into the potential health effects from electric and magnetic fields emitted by electric power and cellular telephone facilities. In September 1991, the assigned CPUC Administrative Law judge issued a ruling that created the California EMF Consensus Group. This group of representatives from utilities, industry, government, private and public research, and labor organizations submitted a document titled *Issues and Recommendations for Interim Response and Policy Regarding Power Frequency EMFs* on March 20, 1992 (California EMF Consensus Group 1992). Regarding the relevant policy consensus recommendation titled Facility Siting, the group stated that the CPUC should recommend that utilities take public concern about electromagnetic fields into account when sitting new electric facilities. Although this group could not conclude that there is a relationship between EMF and human health effects, they also could not conclude that this relationship does not exist to any extent; therefore, they recommended that the CPUC authorize further research.

California does not currently have a regulatory level for magnetic fields. However, the values estimated for the Project are well below those established by states that do have limits. Other states have established regulations for magnetic field strengths that have limits ranging from 150 to 250 mG at the edge of the ROW, depending on voltage. The CEC does not currently specify limits.

3.5.1 Calculation Methods

The EMF effects were calculated at multiple points within the ROW of each transmission configuration using CDEGS software engineering module SES Enviro plus, environmental impact analysis tool version 17.1.9978 by Safe Eng Services & Technologies Ltd. Transmission line configurations that would be installed as part of the BRGP were evaluated and provided under a request for confidentiality as Appendix 3B.

All calculations were performed at midspan locations (points of greatest line sag), one meter above ground level, and in the line's center passing through the tower center, and four meters off the tower center below the phase wires, based on the line geometries, conductor type, phasing, nominal voltage, and maximum expected current loading.

3.6 References

California EMF Consensus Group. 1992. Issues and Recommendations for Interim Response and Policy Addressing Power Frequency Electric and Magnetic Fields (EMFs). March.

Electric Power Research Institute. 1982. Transmission Line Reference Book, 345 kV and Above.

4. Demand Conformance

The Black Rock Geothermal Project (BRGP or Project) is an eligible renewable energy resource as defined by California Public Utilities Commission (CPUC) Section 399.11 and a renewable electrical generation facility as defined by Public Resources Code (PRC) Section 25741(a)(1). Therefore, the BRGP is well positioned to assist California's load-serving entities (LSEs) to meet California's Renewable Portfolio Standard (RPS) requirements.

The BRGP also is an eligible long-lead-time resource as defined by CPUC Decision 21-06-035 (Mid-Term Reliability Decision). The Mid-Term Reliability Decision orders LSEs subject to CPUC's integrated resource planning authority to procure 1,000 megawatts, collectively, of RPS resources, excluding storage, with a capacity factor of at least 80% (firm) and without use limitations or weather dependence. Beyond the Mid-Term Reliability Decision, non-CPUC jurisdictional LSEs and state agencies are seeking firm RPS-eligible resources to meet future energy and resource adequacy needs.

BRGP plans to generate geothermal energy 24 hours per day, 365 days per year (except during major maintenance years), and has a designed capacity factor of 95% or higher, compared to 48% for coal and 94% for nuclear power plants (Office of Energy Efficiency and Renewable Energy 2023). By providing clean, efficient power using renewable geothermal, the BRGP helps fulfill the long-term energy needs of California and goals of Senate Bill (SB) 100.

Prior to January 1, 2000, the PRC directed the California Energy Commission (CEC) to perform an integrated assessment of need, taking into account five- and 12-year forecasts of electricity supply and demand, as well as various competing interests, and to adopt the assessment in a biennial electricity report. In certification decisions, the CEC was required to find that a proposed power plant conformed to the CEC's integrated assessment of need for new resource additions (PRC Sections 25523[f] and 25524[a]).

Effective January 1, 2000, SB 110 (Stats, 1999, Ch. 581) repealed Sections 25523(f) and 25524(a) of the PRC and amended other provisions related to assessment of need for new resources. Specifically, it removed the requirement that the CEC make a finding of need conformance in certification decisions. SB 110 states in a pertinent part:

> Before the California electricity industry was restructured, the regulated cost recovery framework for power plants justified requiring the commission to determine the need for new generation and site only power plants for which need was established. Now that power plant owners are at risk to recover their investments, it is no longer appropriate to make this determination (Pub. Resources Code Section 25009, added by Stats. 1999, Ch. 581).

Because of this legislation, an Application for Certification that reaches final CEC decision after January 1, 2000, is not subject to a determination of need conformance.

4.1 Reference

Office of Energy Efficiency and Renewable Energy. 2023. Capacity Factor by Energy Source. https://www.energy.gov/ne/downloads/infographic-capacity-factor-energy-source-2019.

5. Environmental Analysis

This chapter contains 16 individual sections. The sections represent the standard environmental, public health and safety, and local impact assessment disciplines for which the California Energy Commission (CEC) Energy Facilities Siting Regulations (Title 20, California Code of Regulations, Section 1704, Appendix B) require information in an Application for Certification. Most of the sections use a standardized format containing the following headings and associated content:

- **Affected Environment** includes relevant background information about the Project's environmental, social, and regulatory settings.
- **Environmental Analysis** addresses the potential environmental consequences of the construction and operation of the Black Rock Geothermal LLC, a wholly owned subsidiary of BHE Renewables LLC, Black Rock Geothermal Project (BRGP or Project). The section begins with a list of the criteria used to determine whether environmental effects of the Project qualify as significant adverse environmental impacts.
- **Cumulative Effects** discusses potential effects of the Project that are not significant adverse impacts individually, but which could reach significance cumulatively in combination with other projects in the area.
- **Mitigation Measures** describes any mitigation measures necessary to reduce potential impacts to a level less than the level of significance.
- **Laws, Ordinances, Regulations, and Standards (LORS)** lists those items that pertain to the Project for a given discipline and includes a demonstration that the Project, as designed, would comply with all applicable LORS.
- **Agencies and Agency Contacts** is a list of federal agencies with permitting authority over the Project, and state and local regulatory agencies that would have such permitting authority, except for the exclusive purview of the CEC to license thermal power plants with a capacity of 50 megawatts or more in California. This section also contains a list of regulatory agency staff and their locations.
- **Permits and Permit Schedules** identifies applicable permits and their schedules.

5.1 Air Quality

This section presents the methodology and results of an analysis performed to assess the potential impacts of airborne emissions from the construction and operation of the Black Rock Geothermal Project (BRGP or "Project") and the Project's compliance with applicable air quality requirements. Section 5.1.1 presents an overview of the Project as it relates to air quality. Imperial County Air Pollution Control District (ICAPCD or "District") rules applicable to the Project, particularly as related to New Source Review (NSR), are summarized in Section 5.1.2. Section 5.1.3 provides a more detailed description of the Project. Section 5.1.4 presents the existing site conditions including geography, topography, climate, and meteorology. Section 5.1.5 summarizes the air quality standards for criteria pollutants. Section 5.1.6 summarizes the existing air quality at the Project site. Section 5.1.7 presents the Project's criteria pollutant and greenhouse gas (GHG) emissions estimates. Section 5.1.8 presents the best available control technology (BACT) evaluation for the Project. Section 5.1.9 presents the air quality impact analysis methodology; the air quality impact analysis results are presented in Section 5.1.10. Section 5.1.11 presents applicable federal, state, and local laws, ordinances, regulations, and standards (LORS). Section 5.1.12 presents agency contacts. Section 5.1.13 presents permit requirements and schedules. Section 5.1.14 contains references cited or consulted in preparing this section. Appendix 5.1A contains the support data for the operational emissions calculations. Appendix 5.1B presents the operational air quality impact analysis support data. Appendix 5.1C presents the approved dispersion modeling protocol. Appendix 5.1D contains the support data for the construction emissions calculations and accompanying air quality impact analysis. Appendix 5.1E presents the BACT determination support data. Potential public health risks posed by emissions of toxic air contaminants (TACs) are addressed in Section 5.9.

5.1.1 Project Overview as it Relates to Air Quality

The Project consists of a proposed geothermal Resource Production Facility (RPF), a geothermal-powered Power Generation Facility (PGF), and associated facilities in Imperial County, California. Figure 1-1 shows the Project regionally, and Figure 1-4 depicts the Project area, including proposed interconnection transmission lines (Gen-Tie), production/injection well pads, and pipelines. The Project will be owned by Black Rock Geothermal, LLC (Project owner or "Applicant").

The RPF includes geothermal fluids extraction (production) wells, pipelines, fluid and steam handling facilities, a solid handling system, a Class II surface impoundment, a service water pond, a stormwater retention basin, process fluid injection pumps, one power distribution center, and injection wells (Figure 1-4). It also includes steam-polishing equipment designed to provide turbine-quality steam to the PGF. The PGF consists of one geothermal power block. This geothermal power block includes a condensing turbine/generator set with a surface condenser, a non-condensable gas (NCG) removal system, an NCG sparger abatement system (located within the cooling tower basin), condensate bio-oxidation abatement systems attached to the cooling tower, a heat rejection system cooling tower, and a generator step-up transformer (GSU). The condensing turbine/generator set includes a multi-casing, triple pressure, exhaust flow condensing turbine and a steam turbine generator (STG) rated at 87 megawatts (MW) gross. Geothermal steam from the RPF will be the only source of thermal energy used by the STG. Heat rejection for the steam turbines will be accomplished with a mechanical draft counterflow wet cooling tower. In addition, the PGF also includes a 230 kilovolt (kV) substation, three power distribution centers, and four emergency standby diesel-fueled engines (three generators and one fire pump). Common facilities include a control building, a service water pond, and other ancillary facilities. The net output of the facility will be 77 MW.

Geothermal fluid will be produced from five production wells located on three well pads near the PGF (Figure 1-4). The fluid will flow, without pumping, to and through aboveground production pipelines to the steam-handling system adjacent to the PGF. At the steam-handling system, the geothermal fluid will be separated from the steam phase (flashed) at successively lower pressures to produce high-pressure (HP), standard-pressure (SP), and low-pressure (LP) steam for use in the STG. Chemically stabilized geothermal fluid flows from the steam-handling system into the solid handling system where solids are removed, after which the geothermal fluid is suitable for injection. The spent geothermal fluid is then pumped through the injection pipelines to seven injection wells located on four well pads. All production and injection wells will be operated in accordance with California Department of Conservation, Geologic Energy Management Division (CalGEM) and Colorado River Basin Regional Water Quality Control Board regulations.

Steam from the RPF will have impurities removed, after which it will be delivered to a multi-casing, triple-pressure, exhaust flow condensing turbine and STG. NCGs will be extracted from the main condenser by the gas removal system and then directed to the cooling tower basin for abatement.

Electricity generated by the Project will be delivered to a substation near the northeast corner of the site. This substation will have an interconnection into the Imperial Irrigation District (IID) transmission system at a new switching station near the intersection of Garst Road and West Sinclair Road.

The Project will supply capacity and energy to California's electric market. The location and the configuration of the plant have been selected to best match operating needs and the available geothermal resource. A System Impact Study (IID 2022) concluded a new transmission line is needed; this new transmission line will be completed to IID specifications prior to beginning Project operations.

5.1.2 Regulatory Items Affecting New Source Review

This air quality impact analysis was prepared pursuant to ICAPCD Rule 207(D)(4). The analysis includes discussions of emissions calculations, control technology assessments, regulatory review and modeling analysis, which include impact evaluations for criteria pollutants and TACs.

Project operations are not expected to result in emissions that will exceed ICAPCD Rule 207(B) "major stationary source" thresholds, nor is the facility expected to have emissions which would exceed Rule 207(C)(2)(a) offset threshold values. BACT will be implemented for particulate matter, and hydrogen sulfide (H_2S).

The emissions impacts associated with the Project were analyzed pursuant to ICAPCD and California Energy Commission (CEC) modeling requirements. The air quality analysis was conducted to demonstrate that impacts from nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter with an aerodynamic diameter less than 10 micrometers (PM_{10}), particulate matter with an aerodynamic diameter less than 2.5 micrometers ($PM_{2.5}$), and H_2S will comply with the California and National Ambient Air Quality Standards (CAAQS and NAAQS, respectively) for the applicable averaging periods. Impacts from nearby sources (cumulative sources located within six miles of the Project site with emissions greater than five tons per year [tpy]) will be assessed for criteria pollutants under separate cover following consultation with the ICAPCD and CEC and completion of the CEC's data adequacy review.

Project operations are also not expected to trigger the Prevention of Significant Deterioration (PSD) permitting requirements outlined in Code of Federal Regulations (CFR), Title 40, Section 51.166(b)(1)(i)(b) because facility-wide emissions will not equal or exceed 250 tpy for any criteria pollutant. Worst-case hourly and annual Potential to Emit (PTE) emissions are summarized in Table 5.1-1.

Table 5.1-1. Facility PTE Summary

	Facility PTE [a]		ICAPCD Rule 207 Major Polluting Facility Thresholds	ICAPCD Rule 207 Offset Thresholds	EPA Major PSD Source Thresholds [b]
Pollutant	(tpy)	(lbs/day)	(tpy)	(lbs/day)	(tpy)
NO_x	0.53	40.7	100	137	250
CO	2.55	108 [c]	--	137	250
VOC	0.93	15.8	100	137	250
SO_x	<0.01	<0.01	100	137	250

Pollutant	Facility PTE [a] (tpy)	(lbs/day)	ICAPCD Rule 207 Major Polluting Facility Thresholds (tpy)	ICAPCD Rule 207 Offset Thresholds (lbs/day)	EPA Major PSD Source Thresholds [b] (tpy)
PM_{10}	7.97	45.3	70	137	250
$PM_{2.5}$	4.79	27.9	100	--	250
CO_2e	50,861	341,272	--	--	75,000

[a] Emissions represent the maximum emissions of either the commissioning year or a subsequent operating year, including operation of the diesel-fueled emergency generators and fire pump, but do not include operations and maintenance activities which are not subject to permitting.

[b] PSD major source review would be triggered for criteria pollutant emissions greater than 250 tpy, from which the major modification thresholds are then used for the remaining pollutants. PSD review is not triggered solely based on greenhouse gas (GHG) emissions. If the Project triggered PSD for any non-GHG pollutant, then PSD would be triggered if the carbon dioxide equivalent (CO_2e) emissions were equal or greater than 75,000 tpy.

[c] CO daily emission estimates assume a maximum of two diesel-fired emergency generators would operate up to two hours per day for maintenance and testing.

Notes:

-- = Not applicable and/or no standard

EPA = U.S. Environmental Protection Agency

lbs/day = pound(s) per day

SO_X = sulfur oxides

VOC = volatile organic compound

A regulatory compliance analysis is presented in Sections 5.1.11 and 5.1.13, which will discuss in detail the applicable ICAPCD regulations that directly affect the Project's permitting application and review process. These regulations include the following:

- ICAPCD NSR Rule 207(C)(1) requires that BACT be applied to all proposed new or modified sources which will result in any emissions increase equal or greater than the following:
  - CO: 550 pounds per day (lbs/day)
  - Lead: 3.3 lbs/day
  - Fluorides: 16 lbs/day
  - Sulfuric Acid Mist: 38 lbs/day
  - H_2S: 55 lbs/day
  - Total Reduced Sulfur Compounds: 55 lbs/day
  - Ozone Precursors
    - NO_X: 25 lbs/day
    - VOC: 25 lbs/day
  - PM_{10}: 25 lbs/day
- The Project will implement BACT for PM10 and H2S, as described in Section 5.1.8.
- ICAPCD Rule 207(D)(3)(c) provides that all emission reduction credits proposed for use by the new source must be evaluated and approved prior to the issuance of the ICAPCD Authority to Construct (ATC). The Project is not expected to trigger the offset requirements, as shown in Table 5.1-1.
- ICAPCD Rule 207(F) requires that an air impact analysis be prepared to insure the protection of state and federal ambient air quality standards. This analysis is presented in Sections 5.1.9 and 5.1.10.
- ICAPCD Rule 207(C)(5)(c) also requires that, prior to the issuance of the ATC, all major stationary sources owned or operated by the Project applicant, which are subject to emissions limitations, are either in compliance or on a schedule for compliance with all applicable emissions limitations under the Clean Air Act (CAA).

- The Project will not require a PSD permit, per ICAPCD Rule 904 or the federal PSD regulations, as shown in Table 5.1-1.

5.1.3 Project Description

5.1.3.1 Project Site Location

The Project site is located in a region of the Imperial Valley, southeast of the Salton Sea, characterized mostly by agriculture and geothermal power production, with more recent additions of utility scale solar power plants. The area surrounding the site is primarily agricultural land. The Imperial Valley is the southwest part of the Colorado Desert that merges northwestward into the Coachella Valley near the northern shore of the Salton Sea.

The PGF will be located on approximately 60 acres (plant site) of a 160-acre parcel (APN 020-110-008) (Township 11 South, Range 13 East, Section 33, NE 1/4 of SW 1/4) within the unincorporated area of Imperial County, California. The production wells will be located on the plant site and the injection wells will be located offsite (see Figure 1-4). The plant site will include onsite and offsite laydown/parking areas in addition to borrow pits. These construction laydown/parking areas and borrow pits also will be used by other Applicant-owned projects currently before the CEC (the Elmore North Geothermal Plant and Morton Bay Geothermal Plant). The plant site is located northwest of the existing Vulcan Power Plant and the Hoch (Del Ranch) Power Plant.

The Project site is bounded by McKendry Road to the north, Boyle Road to the east, and Severe Road to the west. The town of Niland is approximately 8 miles northeast of the plant site, and the town of Calipatria is approximately 6 miles southeast of the plant site. The Red Hill Marina County Park is approximately 2 miles east of the PGF. The Sonny Bono Wildlife Refuge Headquarters is approximately 0.75 mile northeast of the PGF. The Alamo River is approximately 3.5 miles southwest of the plant site and the New River is approximately 5 miles southwest of the plant site.

5.1.3.2 Project Equipment Specifications

The layout of the proposed facility is illustrated in Section 2 including site cross sections, a plant site rendering, an isometric view of the facility, and a before and after plant visual rendering.

Approximately 60 acres of land will be required to accommodate the plant facilities (all areas approximate), and is comprised of the following:

- Turbine/generator
- Cooling tower (7-cells)
- Gas removal system
- Switchyard
- Control room and laboratory
- Maintenance building
- Horizontal belt filter
- Thickener clarifier
- Flash/drain atmospheric flash tank (AFT)
- Head tank
- Secondary clarifier
- Primary clarifier
- Rock muffler
- Production AFT
- Purge water system
- HP separator
- HP/SP/LP scrubbers
- SP/LP crystallizers
- HP/SP/LP demisters

- Emergency diesel generators
- Power distribution centers
- Auxiliary transformers (4,160 volts [V])
- Fire water pumps (electric and diesel fired)
- Domestic water pumps
- Service water and stormwater ponds
- Warm up AFT
- Hydro blast pad
- Auxiliary transformers (480 V)
- Aerated fluid injection pumps
- Class II surface impoundment
- Generator circuit breaker
- Isolated phase bus duct
- Instrument and service air system
- Naturally Occurring Radioactive Material (NORM) inhibitor chemical storage and injection system
- Polymer storage and injection system
- Cooling tower chemicals storage and feed system
- Steam turbine lube oil system
- Condensate storage tank
- Excess condensate storage tank
- Potable water system
- Process fluid injection pumps
- Biological oxidation box

A complete description of the Project is presented in Section 2.

5.1.4 Existing Site Conditions

The Project site is currently vacant. There are no current air pollution sources on the proposed site, and there are no facilities currently on the site that are permitted by the ICAPCD. Figure 1-2 shows the Project site and immediate vicinity.

5.1.4.1 Geography and Topography

The Project will be located in a flat lot located less than a mile from the Salton Sea coastline near Carcass Beach. The site topography is flat with an average elevation of 230 feet below average mean sea level. The nearest complex terrain (terrain exceeding Project stack heights) in relation to the Project is a string of mountainous terrain running from the southwest to the northwest approximately 17 miles northeast of the Project. Red Island Volcano is located less than two miles from the Project but is not considered to be complex terrain as it is a single piece of terrain less than a quarter-mile wide and gradually sloped no more than 100 feet tall. The nearest Class I area is Joshua Tree National Park located 35 miles to the north of the Project.

5.1.4.2 Climate and Meteorology

Climatic conditions in Imperial County are governed by the large-scale sinking and warming of air in the semi-permanent tropical high-pressure center of the Pacific Ocean. The high-pressure ridge blocks out most mid-latitude storms except in winter when it is weakest and farthest south. The coastal mountains prevent the intrusion of any cool, damp air found in California coastal environs. Because of the barrier and weakened storms, Imperial County experiences clear skies, extremely hot summers, mild winters, and little rainfall. On average, the sun shines more in Imperial County than anywhere else in the United States. (ICAPCD 2018)

Winters are mild and dry with daily average temperatures ranging between 65 and 75 degrees Fahrenheit (°F) (18-24 degrees Celsius [°C]). During winter months, it is not uncommon to record maximum temperatures of up to 80°F. Summers are extremely hot with daily average temperatures ranging between 104 and 115°F (40-46°C). It is not uncommon to record maximum temperatures of 120°F during summer months (ICAPCD 2018).

The flat terrain of the valley and the strong temperature differentials created by intense solar heating produce moderate winds and deep thermal convection. The combination of subsiding air, protective mountains, and distance from the ocean severely limits precipitation. Rainfall is highly variable with precipitation from a single heavy storm able to exceed the entire annual total during a later drought condition. The average annual rainfall is just over three inches (7.5 centimeters) with most of it occurring in late summer or mid-winter (ICAPCD 2018).

Humidity is low throughout the year, ranging from an average of 28 percent in summer to 52 percent in winter. The large daily oscillation of temperature produces a corresponding large variation in the relative humidity. Nocturnal humidity rises to 50 to 60 percent but drops to about 10 percent during the day (ICAPCD 2018).

The wind in Imperial County follows two general patterns. Wind statistics indicate prevailing winds are from the west-northwest through southwest; a secondary flow maximum from the southeast is also evident. The prevailing winds from the west and northwest occur seasonally from fall through spring and are known to be from the Los Angeles area. Occasionally, Imperial County experiences periods of extremely high wind speeds wherein wind speeds can exceed 31 miles per hour (mph). This occurs most frequently during the months of April and May. However, speeds of less than 6.8 mph account for more than one-half of the observed wind measurements (ICAPCD 2018).

5.1.5 Overview of Air Quality Standards

In 1970, the U.S. Congress instructed the EPA to establish standards for air pollutants, which were of nationwide concern. This directive resulted from the concern of the potential impacts of air pollutants on the health and welfare of the public. The resulting CAA set forth air quality standards to protect the health and welfare of the public. Two levels of standards were promulgated—primary standards and secondary standards. Primary NAAQS are “those which, in the judgment of the administrator [of EPA], based on air quality criteria and allowing an adequate margin of safety, are requisite to protect the public health (state of general health of community or population).” The secondary NAAQS are “those which, in the judgment of the administrator [of EPA], based on air quality criteria, are requisite to protect the public welfare and ecosystems associated with the presence of air pollutants in the ambient air.” To date, NAAQS have been established for the following seven criteria pollutants: SO_2, CO, ozone, nitrogen dioxide (NO_2), PM_{10}, $PM_{2.5}$, and lead.

Criteria pollutants are those pollutants that have been demonstrated historically to be widespread and have a potential to cause adverse health effects. EPA developed comprehensive documents detailing the basis of, or criteria for, the standards that limit the ambient concentrations of these pollutants. The State of California has also established ambient air quality standards (CAAQS) that further limit the allowable concentrations of certain criteria pollutants. Review of the established air quality standards is undertaken by both EPA and the State of California on a periodic basis. As a result of the periodic reviews, the standards have been updated and amended over the years following adoption.

Each federal or state standard is comprised of two basic elements: a numerical limit expressed as an allowable concentration, and an averaging time that specifies the period over which the concentration value is to be measured. Table 5.1-2 presents the current federal and state ambient air quality standards.

Table 5.1-2. State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS	NAAQS
Ozone	1-hour	0.09 ppm (180 µg/m^3)	--
	8-hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3) (3-year average of annual 4th-highest daily maximum)
CO	1-hour	20 ppm (23,000 µg/m^3)	35 ppm (40,000 µg/m^3)
	8-hour	9.0 ppm (10,000 µg/m^3)	9 ppm (10,000 µg/m^3)
NO_2	1-hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3) (3-year average of annual 98th percentile daily maxima)
	Annual average	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)
SO_2	1-hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3) (3-year average of annual 99th percentile daily maxima)
	3-hour	--	0.5 ppm (1,300 µg/m^3) [a]
	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3) [b]
	Annual Average	--	0.030 ppm (80 µg/m^3) [b]
PM_{10}	24-hour	50 µg/m^3	150 µg/m^3
	Annual arithmetic mean	20 µg/m^3	--
$PM_{2.5}$	24-hour	--	35 µg/m^3 (3-year average of annual 98th percentiles)
	Annual arithmetic mean	12 µg/m^3	12 µg/m^3 (3-year average)
Sulfates	24-hour	25 µg/m^3	--
Visibility Reducing Particles	8-hour	Extinction of 0.23 per kilometer	--
H_2S	1-hour	0.03 ppm (42 µg/m^3)	--
Vinyl Chloride	24-hour	0.01 ppm (26 µg/m^3)	--
Lead	30-day	1.5 µg/m^3	--
	3-month rolling average	--	0.15 µg/m^3

Source: CARB 2016

[a] The 3-hour SO_2 NAAQS is a secondary standard

[b] The 24-hour and annual 1971 SO_2 NAAQS remain in effect until 1 year after the attainment status is designated by EPA for the 2010 NAAQS (the Project area is still undesignated for the 2010 NAAQS, but presumed to be in attainment).

Notes:

-- = Not applicable and/or no standard

µg/m^3 = microgram(s) per cubic meter

ppm = part(s) per million

Brief descriptions of health effects for the main criteria pollutants are as follows:

- **Ozone**—Ozone is a reactive pollutant that is not emitted directly into the atmosphere, but rather is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving VOC and NO_x. VOC and NO_x are therefore known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of VOC and NO_x under the influence of wind and sunlight. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. In addition to causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

- **Carbon Monoxide—**CO is a non-reactive pollutant that is a product of incomplete combustion. Ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic and are also influenced by meteorological factors such as wind speed and atmospheric mixing. Under inversion conditions, CO concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses.
- **Particulate Matter (PM_{10} and $PM_{2.5}$)—**Both PM_{10} and $PM_{2.5}$ represent fractions of particulate matter, which can be inhaled into the air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, combustion, and atmospheric photochemical reactions. Some of these operations, such as demolition and construction activities, contribute to increases in local PM_{10} concentrations, while others, such as vehicular traffic, affect regional PM_{10} concentrations.

  Several studies that EPA has relied on have shown an association between exposure to particulate matter, both PM_{10} and $PM_{2.5}$, and respiratory ailments or cardiovascular disease. Other studies have related particulate matter to increases in asthma attacks. In general, these studies have shown that short-term and long-term exposure to particulate matter can cause acute and chronic health effects. $PM_{2.5}$, which can penetrate deep into the lungs, causes more serious respiratory ailments.
- **Nitrogen Dioxide and Sulfur Dioxide—**NO_2 and SO_2 are two gaseous compounds within a larger group of compounds, NO_x and sulfur oxides (SO_x), respectively, which are products of the combustion of fuel. NO_x and SO_x emission sources can elevate local NO_2 and SO_2 concentrations, and both are regional precursor compounds to particulate matter. As described above, NO_x is also an ozone precursor compound and can affect regional visibility. (NO_2 is the "whiskey brown-colored" gas readily visible during periods of heavy air pollution.) Elevated concentrations of these compounds are associated with increased risk of acute and chronic respiratory disease.

  SO_2 and NO_2 emissions can be oxidized in the atmosphere to eventually form sulfates and nitrates, which contribute to acid rain. Large power facilities with high emissions of these substances from the use of coal or oil are subject to emissions reductions under the Phase I Acid Rain Program of Title IV of the 1990 CAA Amendments. Power facilities with individual equipment capacity of 25 MW or greater that use natural gas or other fuels with low sulfur content are subject to the Phase II Acid Rain Program of Title IV. The Phase II program requires facilities to install continuous emissions monitoring systems (CEMS) in accordance with 40 CFR Part 75 and report annual emissions of SO_x and NO_x. The Acid Rain Program provisions do not apply to the Project as it will not use fossil fuels as the energy source for the PGF operations.
- **Lead—**Gasoline-powered automobile engines used to be the major source of airborne lead in urban areas. Excessive exposure to lead concentrations can result in gastrointestinal disturbances, anemia, and kidney disease, and, in severe cases, neuromuscular and neurological dysfunction. The use of lead additives in motor vehicle fuel has been eliminated in California and lead concentrations have declined substantially as a result.

In addition to the above criteria pollutants, greenhouse gas (GHG) emissions are of global concern. Although there are no ambient air quality standards for GHGs, they are regulated by both the California Air Resources Board (CARB) and the EPA.

GHGs include the following pollutants:

- **Carbon Dioxide—**Carbon dioxide (CO_2) is a naturally occurring gas, as well as a by-product of burning fossil fuels and biomass, land-use changes, and other industrial processes. It is the principal anthropogenic GHG that affects the Earth's radiative balance.

- **Methane—**Methane (CH_4) is a GHG with a global warming potential (GWP) most recently estimated at 25 times that of CO_2.[1] CH_4 is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
- **Nitrous Oxide—**Nitrous oxide (N_2O) is a GHG with a GWP most recently estimated at 298 times that of CO_2. Major sources of N_2O include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
- **Hydrofluorocarbons—**Hydrofluorocarbons (HFCs) are compounds containing only hydrogen, fluorine, chlorine, and carbon. HFCs have been introduced as a replacement for the chlorofluorocarbons identified as ozone-depleting substances.
- **Perfluorocarbons—**Perfluorocarbons (PFCs) are compounds containing only fluorine and carbon. Similar to HFCs, PFCs have been introduced as a replacement for chlorofluorocarbons. PFCs are also used in manufacturing and are emitted as by-products of industrial processes. PFCs are powerful GHGs.
- **Sulfur Hexafluoride—**Sulfur hexafluoride (SF_6) is a colorless gas soluble in alcohol and ether, and is slightly soluble in water. It is a very powerful GHG used primarily in electrical transmission and distribution systems, as well as dielectrics in electronics.

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth.

Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e., fuels containing carbon) in conjunction with other human activities, appears to be closely associated with global warming. According to the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment, it is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations.

Emissions of HFCs or PFCs are not expected for the Project. Therefore, the Project impact assessment is focused only on the potential impacts from emissions of CO_2, CH_4, N_2O, and SF_6, reported as carbon dioxide equivalent (CO_2e) emissions.

5.1.6 Existing Air Quality

The NAAQS and CAAQS, as previously described, establish the level for which air pollution is considered detrimental to public health or welfare. If a pollutant concentration in an area is lower than the established standard, the area is classified as being in "attainment" for that pollutant. If the pollutant concentration meets or exceeds the standard (depending on the specific standard for the individual pollutants), the area is classified as a "nonattainment" area. If there is not enough data available to determine whether the standard is exceeded in an area, the area is designated as "unclassified." Table 5.1-3 presents the ICAPCD attainment/nonattainment status with respect to both the CAAQS and NAAQS.

[1] GWP is a measure of how much a given mass of GHG is estimated to contribute to global warming and is a relative scale that compares the mass of one GHG to that same mass of CO_2.

Table 5.1-3. ICAPCD Attainment Status

Pollutant	Averaging Time	Federal Status	State Status
Ozone	1-hour	Unclassified/Attainment	Nonattainment
	8-hour	Nonattainment (Marginal)	Nonattainment
CO	All	Unclassified/Attainment	Unclassified/Attainment
NO_2	All	Unclassified/Attainment	Unclassified/Attainment
SO_2	All	Unclassified/Attainment	Unclassified/Attainment
PM_{10}	All	Attainment (Maintenance)	Nonattainment
$PM_{2.5}$	All	Unclassified/Attainment	Unclassified/Attainment
Sulfates	24-hour	No NAAQS	Unclassified/Attainment
Lead	All	Unclassified/Attainment	Unclassified/Attainment
H_2S	1-hour	No NAAQS	Unclassified/Attainment
Vinyl Chloride	24-hour	No NAAQS	Unclassified/Attainment
Visibility Reducing Particles	8-hour	No NAAQS	Unclassified/Attainment

Sources: ICAPCD 2023, EPA 2023f, CARB 2023f

The closest and most representative monitoring data to the Project site are from the following monitoring stations, as shown in Figure 5.1-1:

- Niland-English Road (AQS ID: 60254004) [7.6 miles from Project]: 24-hour PM10 concentrations (2019-2021) and ozone concentrations (2019)
- Brawley-220 Main Street (AQS ID: 60250007) [13.8 miles from Project]: 24-hour PM2.5 concentrations (2019-2021), and annual PM2.5 concentrations (2019-2020)
- El Centro-9th Street (AQS ID: 60251003) [26.1 miles from Project]: annual PM2.5 concentrations (2021), ozone concentrations (2020-2021), 1-hour NO2 concentrations (2019-2021), and annual NO2 concentrations (2020-2021)
- Calexico-Ethel Street (AQS ID: 60250005) [34.6 miles from Project]: annual NO2 concentrations (2019), 1-hour SO2 concentrations (2019-2021), 24-hour SO2 concentrations (2019-2021), 1-hour CO concentrations (2019-2021), and 8-hour CO concentrations (2019-2021).

Table 5.1-4 provides a summary of measured ambient air quality concentrations by year and site for the period 2019-2021, based on the above delineation. Data from these sites are a reasonable representation of background air quality for the Project area.

Figure 5.1-1
Nearby Ambient Air Monitoring Stations
Black Rock Geothermal Project
Imperial County, California

Jacobs

Table 5.1-4. Measured Ambient Air Quality Concentrations by Year

Pollutant	Units	Averaging Time	Basis	Site	2019	2020	2021
Ozone	ppm	1-hour	CAAQS-1st High	Niland	0.06	0.054	0.065
		8-hour	CAAQS-1st High	Niland	0.055	0.046	0.055
			NAAQS-4th High	Niland (2019) and Calexico (2020-2021)	0.054	0.078	0.080
NO_2	ppb	1-hour	CAAQS-1st High	El Centro	37	45	56
			NAAQS-98th percentiles	El Centro	30	36	38
		Annual	CAAQS/NAAQS-AAM	El Centro (202-2021) and Calexico (2019)	9.26	7.93	6.73
CO	ppm	1-hour	CAAQS/NAAQS-2nd High	Calexico	4.30	4.60	3.80
		8-hour	CAAQS/NAAQS-2nd High	Calexico	3.10	2.70	2.90
SO_2	ppb	1-hour	CAAQS/NAAQS-1st High	Calexico	7.5	7.1	8.6
		24-hour	CAAQS/NAAQS-1st High	Calexico	1.6	1.9	2.7
		Annual	CAAQS/NAAQS-AAM	Calexico	0.31	0.4	0.42
PM_{10}	µg/m^3	24-hour	CAAQS-1st High	Niland	156.3	241.3	218.2
			NAAQS-2nd High	Niland	124	142	156
		Annual	CAAQS-AAM	Niland	32.7	35.9	39.8
$PM_{2.5}$	µg/m^3	24-hour	NAAQS-98th percentiles	Brawley	21.0	21.0	21.0
		Annual	CAAQS/NAAQS-AAM	Brawley (2019-2020) and El Centro (2021)	8.30	9.40	8.30

Sources: CARB 2023d and EPA 2023d

Notes:

AAM = annual arithmetic mean

ppb = part(s) per billion

The maximum representative background concentrations for the most recent 3-year period (2019-2021) are summarized in Table 5.1-5. These background values represent the highest values reported for the most representative air quality monitoring site during any single year of the most recent 3-year period for the CAAQS assessments. These CAAQS maxima are conservatively used for some of the NAAQS modeling assessments (CO and SO_2). The appropriate values for the NAAQS, according to the format of the standard, are used for the remainder of the NAAQS modeling assessments (NO_2, PM_{10}, and PM_{25}), and also summarized in Table 5.1-5.

Table 5.1-5. Background Air Quality Data

Pollutant and Averaging Time	Background Value (µg/m^3) [a]
Ozone – 1-hour Maximum CAAQS	128
Ozone – 8-hour Maximum CAAQS/NAAQS	108
PM_{10} – 24-hour Maximum CAAQS	241.3
PM_{10} – 24-hour High, 2nd High NAAQS [b]	142
PM_{10} – Annual Maximum CAAQS	39.8
$PM_{2.5}$ – 3-Year Average of Annual 24-hour 98th Percentiles NAAQS	21.0
$PM_{2.5}$ – Annual Maximum CAAQS	9.40
$PM_{2.5}$ – 3-Year Average of Annual Values NAAQS	8.67
CO – 1-hour Maximum CAAQS/NAAQS	5,266
CO – 8-hour Maximum CAAQS/NAAQS	3,549
NO_2 – 1-hour Maximum CAAQS	105
NO_2 – 3-Year Average of Max Daily Annual 1-hour 98th Percentiles NAAQS	65.2
NO_2 – Annual Maximum CAAQS/NAAQS	17.4
SO_2 – 1-hour Maximum CAAQS/NAAQS	22.5
SO_2 – 3-hour Maximum NAAQS [c]	22.5
SO_2 – 24-hour Maximum CAAQS/NAAQS	7.10
SO_2 – Annual Maximum NAAQS	1.10

[a] Where applicable, monitored concentrations were converted from ppm/ppb to µg/m^3 using the standard molar volume of air at normal temperature and pressure conditions (NTP) of 24.45 liters per mole.

[b] 24-hour PM_{10} background value assumes one exceedance may occur per year on average. Over the 3-year period, two of the maximum three concentrations occur in 2021. Therefore, the design value is the high, 2nd high for 2020.

[c] The 3-hour SO_2 background value conservatively uses the 1-hour SO_2 background value.

5.1.7 Environmental Analysis – Emissions Evaluation

5.1.7.1 Project Operation

Criteria pollutant emissions from the Project are delineated in the following sections, while emissions of TACs are delineated in Section 5.9. Backup data for both the criteria pollutant and TAC operational emission calculations are provided in Appendix 5.1A.

As shown, installation and operation of the Project will not result in emissions greater than the NSR or PSD thresholds for any criteria pollutants and, as such, the Project will be considered a minor NSR source for NO_x, CO, VOC, and PM_{10}/$PM_{2.5}$ under federal and ICAPCD rules. The Project will not trigger the requirements of the federal PSD program since the emissions of one or more criteria pollutants will not exceed the 250 tpy PSD major source applicability thresholds. The applicability determination for PSD is based on the worst-case annual emissions, including commissioning.

5.1.7.1.1 Facility Operational Profile

The emissions calculations presented in this analysis represent the highest potential emissions based on the proposed operational scenarios. The hourly, daily and annual emissions for all criteria pollutants are based upon a series of worst-case assumptions for each pollutant. The intent is to envelop the Project emissions based upon all possible operating profiles provided in Appendix 5.1A and summarized below.

Throughout a typical year, the facility may operate in one of the following PGF-related operating scenarios:

- Commissioning (Only during the first production year)
- Flow Back and Testing Activities

- Cold Startup
- Warm Startup
- Shutdown
- Routine Power Generation Operation (With or without emission control downtime)

The PGF steam-related emissions will be emitted through one or more sources, depending on the operation type of the power generation system. Emission points for this system include a mobile testing unit (MTU) that is temporarily deployed at each well head, a production testing unit (PTU) which is located on top of the warm-up AFT, a rock muffler (RM), and the cooling tower cells (seven total). Details of where the emissions occur from each operation are provided in Section 5.1.7.1.2.

In addition to the PGF operations, air emissions will occur through the operations of one diesel fire water pump, one 2.7 MW diesel-fired emergency generator, three 3.49 MW diesel-fired emergency generators, gas-insulated equipment, and operations and maintenance (O&M) equipment and vehicles, which may travel both on and offsite.

A summary of each operating condition and the associated annual hours of operation is included in Table 5.1-6 below.

Table 5.1-6. Facility Operating Summary

Project Operations		First Production Year	Subsequent Production Year with Startups, Shutdowns and Emission Control Downtime	Subsequent Production Year without Startups, Shutdowns and Emission Control Downtime
Production Well Flow Back		120	120	0
Production Well Testing		1,200	0	0
Injection Well Flow Back		168	168	0
Injection Well Testing		1,680	0	0
Commissioning	Well Warm-up	120	0	0
	Production Line and Equipment Warm-up	48	0	0
	Steam Blow	240	0	0
	Turbine Preheat and Auxiliary Loop	48	0	0
	Turbine Load Test	72	0	0
	Turbine Performance Test	48	0	0
Cold Startup	Well Warm-up	120	120	0
	Production Line and Equipment Warm-up	32	32	0
	Turbine Preheat and Auxiliary Loop	24	24	0
	Auxiliary Equipment Startup	12	12	0
	Functional Trip Test	6	6	0
	Gradual Steam Delivery to Turbine	6	6	0
Warm Startup	Step 1 (Geothermal Steam sent to RM)	200	200	0
	Step 2 (Gradual Diversion of Steam from RM to Turbine)	200	200	0

Project Operations		First Production Year	Subsequent Production Year with Startups, Shutdowns and Emission Control Downtime	Subsequent Production Year without Startups, Shutdowns and Emission Control Downtime
Shutdowns		200	200	0
Routine Power Generation Operation	With Controls	3,816	7,272	8,760
	Sparger Bypass	200	200	0
	Biological Oxidation Box Bypass	200	200	0
Total Operating Hours		8,760	8,760	8,760

The goal of this air quality analysis is to present a worst-case operating condition for the Project, but there could be other scenarios with different numbers of starts and run-time hours. Thus, the Project proposes that the facility-wide limits be based on total short-term and annual emissions rather than operational hours as the worst-case operating scenario per pollutant can vary based upon the type of plant operations. Operational monitoring along with analytical and periodic source testing requirements will establish a compliance method to allow for monthly tracking, at a minimum, of all emissions at the Project. Specifically, the following operations will be monitored:

- Hours of operation for each operating condition, including:
  - Warm startup
  - Cold startup
  - Shutdown
  - Commissioning
  - Routine operations
  - Biological oxidation box bypass
  - Sparger bypass
  - Flow back and testing operations
  - Generator and fire pump operation
- Total steam flows through each of the operational systems

Analytical data from testing performed at the facility will be used to speciate the emissions of NCGs and cooling tower discharge to develop emissions from the respective hours of operation from those sources. Engine emissions from the emergency generators and fire pump would be tracked through run logs for compliance with the ICAPCD-issued operating permit(s).

For example, the maximum annual emissions of NO_x at 0.53 tpy would establish the facility's PTE. The Project would propose and accept hourly, daily and annual emission limits for this pollutant, but would propose that the permit not contain any limit on the number of hours of operation as the established emission limits would be monitored monthly. In this way, the facility operational profiles would be solely based on PTE rather than hours which would allow for a flexible response to changing power market conditions. Thus, the short-term and annual emissions limits would establish the facility PTE rather than the individual operational profiles. This type of emissions and compliance strategy is not new and has been implemented on numerous projects to which the CEC has issued Licenses, as well as District permits.

The maximum hourly emissions are based upon the worst-case hourly emissions expected from any source at the facility during any operating profile, considering both controlled and uncontrolled profiles. The maximum daily emissions assume 24 hours of operation of the worst-case hourly emissions scenario with the exception of the fire pump and emergency generators. The fire pump and emergency generators are assumed to operate no more than one and two hours per day, respectively, for maintenance and testing purposes. Additionally, maintenance and testing operations of the emergency generators would be limited to no more than two units per day.

The worst-case annual emissions are presented in Table 5.1-7. With the exception of H_2S, these emissions are based upon the highest emissions for each pollutant as derived from the operating scenarios presented above for both the first year of operation, including commissioning, and subsequent years of operation that do not include commissioning activities. For H_2S, only the worst-case subsequent year of operation was considered.

Table 5.1-7. Significant Emissions Threshold Summary

Pollutant	Project Cumulative Increase (tpy) [a]	Attainment Status		Major Source Thresholds (tpy)			Exceeds Major Source Thresholds?		
		Federal	State	PSD [b]	NSR [b]	Title V [c]	PSD	NSR	Title V
NO_x	0.53	Y	Y	250	100	100	N	N	N
SO_2	<0.01	Y	Y	250	--	100	N	--	N
CO	2.55	Y	Y	250	--	100	N	--	N
PM_{10}	7.97	Y	N	250	--	70	N	--	N
$PM_{2.5}$	4.79	Y	Y	250	100	100	N	N	N
VOC (ozone)	0.93	N	N	250	100	100	N	N	N
H_2S	33.3 [d]	--	Y	--	--	100	--	--	N
HAPs	2.52 [e]	--	--	--	--	25	--	--	N
CO_2	50,861	--	--	75,000	--	--	N	--	--

[a] Unless otherwise noted, emissions represent the maximum emissions of either the commissioning year or a subsequent operating year, including operation of the diesel-fueled emergency generators and fire pump, but do not include O&M activities which are not subject to permitting.

[b] These thresholds are specified both by the EPA and in ICAPCD Rule 207.

[c] These thresholds are specified in ICAPCD Rule 900.

[d] H_2S emissions represent the maximum emissions of a non-commissioning year.

[e] Only combined hazardous air pollutant (HAP) emissions are presented as they are already less than the single HAP Title V major source threshold of 10 tpy.

Note:

-- = Not applicable and/or no standard

Based on the emissions presented in Table 5.1-7, the Project will be a minor NSR source as defined by ICAPCD Rule 207(D)(4) and will not be subject to ICAPCD requirements for emission offsets for criteria pollutants and toxics. The Project owner has prepared an air quality emissions and impact analysis in Section 5.1.10 for the pollutants shown in Table 5.1-7 to comply with the requirements of the ICAPCD and CEC.

Based on the emissions presented in Table 5.1-7, the Project will not itself trigger Title V permitting requirements. However, if the proposed Project is later connected to the existing Applicant-owned geothermal plants to share geothermal fluid and steam, Title V applicability will be reassessed. Operating air permits for the Project will be applied for and obtained through ICAPCD in accordance with all applicable federal, state, and local regulations.

5.1.7.1.2 Emission Estimates

Operation of the proposed process and equipment systems will result in emissions to the atmosphere of criteria pollutants, GHGs, and TACs.[2] Criteria pollutant emissions will consist primarily of NO_x, CO, VOCs, SO_x, PM_{10}, $PM_{2.5}$, and H_2S. GHG emissions may include CO_2, CH_4, N_2O, and SF_6, all presented as CO_2e

[2] Note that the EPA designates a subset of TACs as hazardous air pollutants (HAPs).

emissions based on their GWP. TACs will consist of a combination of toxic gases and toxic particulate matter species. Table 5.1-8 lists the pollutants that may potentially be emitted from Project operations.

Table 5.1-8. Potentially Emitted Pollutants

Criteria Pollutants	GHGs	Toxic Air Contaminants [b]		
NO_x CO VOC SO_x $PM_{10}/_{2.5}$ H_2S [a] Lead [a]	CO_2e [a]	Ammonia Arsenic Mercury Aluminum Antimony Barium Beryllium Cadmium Chromium Cobalt Zinc	DPM Radon Copper Manganese Nickel Selenium Silica Silver Vanadium PAHs (excluding naphthalene)	1,3-Butadiene Acetaldehyde Acrolein Benzene Ethylbenzene Formaldehyde Naphthalene Propylene Toluene Xylene

[a] H_2S, lead, and some GHGs are also classified as TACs.

[b] Although the Project is also expected to emit argon, hydrogen, lithium, nitrogen, and strontium, they are not classified as TACs by the Office of Environmental Health Hazard Assessment and CARB and have not been included in this analysis.

Notes:

DPM = diesel particulate matter

PAHs = polynuclear (or polycyclic) aromatic hydrocarbons

The operational emissions estimation methodology for the Project was developed in coordination with the latest available data and engineering design. Details of the specific methodology for each of the operational sources are included below:

- **Steam and NCG-related Processes**: Emissions were estimated based upon analytical data from other geothermal power plants in the area. The analytical data used in the analysis consists of a speciated breakdown of concentrations from a NCG sample, and system inlet and outlet operations from the geothermal system's geothermal steam flows. The Project's geothermal steam flows vary in pressure and are categorized as high, standard, and low pressure, each of which has an assumed NCG concentration. The NCG and system inlet/outlet analytical data are applied to production well estimated steam flows for the Project to determine a total mass of species through the geothermal system. During processing and condensing of the geothermal steam, a portion of the species remain in gas phase and are routed through the sparger installed inside the cooling tower basin; the remaining condensed fluid portion of the species are routed through the biological oxidation box and then overflows to the cooling tower. The mass throughputs of these species are used in coordination with estimated control efficiencies and process-specific correction factors to estimate emissions. The methodology is applied to emissions of criteria pollutants, GHGs, and TACs.
- **Cooling Towers**: Criteria pollutant, GHG, and TAC emissions were estimated based upon two input streams: the NCG condensate/fluid within the cooling towers and the gaseous NCG vented into the cooling towers from the PGF steam. The gaseous NCG stream was characterized using analytical data from other geothermal power plants in the area. All constituents except mercury, arsenic, and H_2S are assumed to directly pass through in the gas phase as emissions on a mass basis. It is assumed that mercury and arsenic are not emitted through the cooling towers in the gaseous NCG because they are expected to cool into either liquid or solid form and remain in the cooling tower basin, where they are then incorporated into the cooling tower condensate/fluid emissions calculations. H_2S emissions from the NCG stream are assumed to split between the gas phase and the condensate/fluid phase prior to reaching the cooling towers at a ratio of 60 to 40 percent, respectively.

  Liquid-based emissions are the result of NCG condensate and make-up water input into the cooling towers for circulation. Particulate matter emissions from the circulating water were estimated using predicted permit limits of total dissolved solids (TDS). A particle size distribution was applied to TDS emissions to determine PM_{10} and $PM_{2.5}$ emissions. As outlined in the CARB California Emissions Inventory Data and Reporting System database, 70 percent of total particulate matter was assumed to be PM_{10} and 42 percent of total particulate matter was assumed to be $PM_{2.5}$ (SCAQMD 2006). With the exception of ammonia, TAC and VOC emissions were calculated using the cooling tower circulating water and make-up water flow rates. Specifically, VOC emissions were developed by applying hot well analytical data from other geothermal power plants in the area to the Project's estimated hot well flow rates. One-hundred percent of the VOC emissions in the hot well condensate are assumed to be emitted through the cooling towers. Non-volatile TAC emissions were developed by applying blowdown analytical data from other geothermal power plants in the area to the Project's cooling tower circulating water flow rates and emitted in the form of drift. Ammonia emissions from the fluid portion of the cooling towers were developed assuming a mass balance between the ammonia entering the cooling towers (in the form of hot well condensate) and leaving the cooling towers (in the form of blowdown). Specifically, hot well and blowdown analytical data from other geothermal power plants in the area were used with Project-specific hot well and blowdown flow rates to determine the amount of ammonia remaining in the cooling towers after blowdown, which is assumed to be emitted through the cooling tower shrouds.

- **Diesel Fire Pump**: Criteria pollutant emissions from the diesel fire pump engine were estimated based upon vendor-provided data for a Tier 2-certified unit, with the exception of SO_2. SO_2 emissions were estimated based upon a mass balance wherein all sulfur in the fuel (assumed as ultra-low sulfur diesel) is assumed to be emitted as SO_2. GHG emissions from the engine were calculated consistent with 40 CFR Part 98 methodology. TAC emissions were estimated based upon *AP-42* methodology (EPA 1996).
- **Diesel-fired Emergency Generators**: Criteria pollutant emissions from the four diesel-fired emergency generators were estimated based upon vendor-provided data, with the exception of SO_2. SO_2 emissions were estimated based upon a mass balance wherein all sulfur in the fuel (assumed as ultra-low sulfur diesel) is assumed to be emitted as SO_2. GHG emissions from the generators were calculated consistent with 40 CFR Part 98 methodology. TAC emissions were estimated based upon *AP-42* methodology (EPA 1996). The vendor-provided data indicate that the engines will be compliant with Tier-4 emission rates through the use of a selective catalytic reduction (SCR) control device, diesel particulate filter, and diesel oxidation catalyst. As such, TAC emissions were assumed to be controlled by up to 80 percent. Ammonia slip from the SCR is assumed to have a 5 parts per million (ppm) slip through the exhaust.
- **Insulating Gas Emissions:** Emissions from the selected insulating gas were estimated based upon California's *Regulation for Reducing Greenhouse Gas Emissions from Gas-Insulated Equipment* (California Code of Regulations [CCR], Title 17, Section 95353, Tables 4 and 5) for data years through 2034.
- **O&M Equipment**: Emissions were estimated using construction equipment emission factors, horsepower, and load factors from the *CalEEMod User's Guide* (ICF 2022).
- **O&M Vehicles:** Emissions from vehicle exhaust and idling were calculated using emission factors from EMFAC2021.
- **Criteria Pollutant Emissions.** Tables 5.1-9 through 5.1-16 present data on the criteria pollutant emissions expected from the facility equipment and systems under worst-case operating scenarios.

For each pollutant, the maximum hourly and annual PTE is presented in Appendix 5.1A and in the tables below. The presented maximum hourly PTE does not occur during the entire duration of the event. Additional details of the hour breakdown for each event are included in Appendix 5.1A.

Table 5.1-9. Maximum Emissions – Well Testing and Commissioning

Pollutant	Production Flow Back Testing [a]		Production Well Testing [b]		Injection Flow Back Testing [c]		Injection Well Testing [b]		Commissioning [d]	
	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)
NO_x	--	--	--	--	--	--	--	--	--	--
CO	--	--	--	--	--	--	--	--	--	--
VOC	0.02	<0.01	0.10	0.06	0.02	<0.01	0.10	0.08	0.18	0.05
$PM_{10}/PM_{2.5}$	--	--	--	--	--	--	--	--	--	--
SO_x	--	--	--	--	--	--	--	--	--	--
H_2S	7.72	0.46	31.3	18.8	7.72	0.65	31.3	26.3	56.1	10.8
HAPs	0.08	<0.01	0.33	0.20	0.08	0.01	0.33	0.27	0.58	0.16
Ammonia	0.34	0.02	1.37	0.82	0.34	0.03	1.37	1.15	136	12.1
CO_2e	1,580	94.8	6,412	3,847	1,580	133	6,412	5,386	11,489	3,132

[a] Emissions emitted from the MTU during commissioning and the PTU during non-commissioning operations.

[b] Emissions emitted from the MTU.

[c] Emissions emitted from the PTU.

[d] Emissions emitted at varying rates between the PTU, RM, and cooling towers.

Notes:

-- = Pollutant not emitted

< = less than

Table 5.1-10. Maximum Emissions – Startup and Shutdown

Pollutant	Cold Startup [a]		Warm Startup [b]		Shutdown [c]	
	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)
NO_x	--	--	--	--	--	--
CO	--	--	--	--	--	--
VOC	0.18	0.01	0.18	0.03	0.20	0.02
$PM_{10}/PM_{2.5}$	--	--	--	--	--	--
SO_x	--	--	--	--	--	--
H_2S	56.1	3.27	56.1	8.50	61.7	6.17
HAPs	0.58	0.04	0.58	0.10	0.64	0.06

Pollutant	Cold Startup [a]		Warm Startup [b]		Shutdown [c]	
	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)
Ammonia	136	3.01	136	7.20	2.71	0.27
CO_2e	11,489	765	11,489	1,969	12,633	1,263

[a] Emissions emitted at varying rates between the PTU, RM, and cooling towers.

[b] Emissions emitted at varying rates between the RM and cooling towers.

[c] Emissions emitted from the RM.

Note:

-- = Pollutant not emitted

Table 5.1-11. Maximum Emissions – Power Generation Operation

Pollutant	Routine Operations [a]		Sparger Bypass [b]		Biological Oxidation Box Bypass [b]	
	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)
NO_x	--	--	--	--	--	--
CO	--	--	--	--	--	--
VOC	0.18	0.79	0.18	0.02	0.18	0.02
PM_{10}	1.81	7.94	1.81	0.18	1.81	0.18
$PM_{2.5}$	1.09	4.77	1.09	0.11	1.09	0.11
SO_x	--	--	--	--	--	--
H_2S	2.30	10.1	34.8	3.48	23.6	2.36
HAPs	0.58	2.52	0.58	0.06	0.58	0.06
Ammonia	138	605	138	13.8	138	13.8
CO_2e	11,489	50,320	11,489	1,149	11,489	1,149

[a] Annual emissions for routine power generation operations conservatively assume an estimated 8,760 hours of operation without any startups, shutdowns, or emission control downtime. These emissions are emitted from the cooling towers.

[b] Emissions emitted from the cooling towers. Sparger bypass emissions include emissions from normal cooling tower operation and biological oxidation box bypass emissions include emissions from normal sparger operation, as both the sparger and biological oxidation box systems operate independently and emit through the cooling towers.

Note:

-- = Pollutant not emitted

Table 5.1-12. Maximum Emissions – Ancillary Operations

Pollutant	Fire Pump [a]		2.7 MW Emergency Generator [a]		3.49 MW Emergency Generator [a]		O&M Equipment and Vehicles [b]		Gas-Insulated Equipment [c]	
	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)	(lbs/hr)	(tpy)
NO_x	1.78	0.04	3.99	0.10	5.15	0.13	3.74	0.66	--	--
CO	0.42	0.01	20.8	0.52	26.9	0.67	4.17	1.14	--	--
VOC	0.05	<0.01	1.13	0.03	1.46	0.04	0.46	0.09	--	--
PM_{10}	0.06	<0.01	0.18	<0.01	0.23	0.01	0.14	0.03	--	--
$PM_{2.5}$	0.06	<0.01	0.18	<0.01	0.23	0.01	0.12	0.02	--	--
SO_x	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	--	--
H_2S	--	--	--	--	--	--	--	--	--	--
HAPs	<0.01	<0.01	0.01	<0.01	0.01	<0.01	0.14 [d]	0.03 [d]	--	--
Ammonia	--	--	0.28	0.01	0.34	0.01	--	--	--	--
CO_2e	131	3.27	3,942	98.6	4,949	124	1,322	258	15.6	68.4

[a] Emissions emitted from source-specific locations.

[b] Emissions emitted from mobile sources including roadway fugitive dust.

[c] Emissions emitted as fugitives.

[d] HAPs conservatively assumed to be equal to PM_{10} with DPM considered a surrogate for HAPs.

Note:

-- = Pollutant not emitted

< = less than

Table 5.1-13. Summary – Project Operation Hourly Emissions

Pollutant	Hourly Emissions (lbs/hr) Steam System [a]	Fire Pump	Emergency Generators [b]	O&M [c]
NO_x	--	1.78	19.5	3.74
CO	--	0.42	102	4.17
VOC	0.20	0.05	5.52	0.46
PM_{10}	1.81	0.06	0.87	0.14
$PM_{2.5}$	1.09	0.06	0.87	0.12
SO_x	--	<0.01	<0.01	0.01
H_2S	61.7	--	--	--
HAPs	0.64	<0.01	0.04	0.14 [d]
Ammonia	138	--	1.29	--
CO_2e	12,633	131	18,790	1,338

[a] Steam system emissions during routine operation (i.e., excluding commissioning) are emitted from the PTU, RM, or cooling towers.

[b] Emissions include those from one 2.7 MW generator and three 3.49 MW generators.

[c] Emissions include those associated with gas-insulated equipment and O&M equipment and vehicles.

[d] HAPs conservatively assumed to be equal to PM_{10} with DPM considered a surrogate for HAPs.

Note:

-- = Pollutant not emitted

Table 5.1-14. Summary – Project Operation Annual Emissions

Pollutant	First Year Annual Emissions (tpy) [c]				Subsequent Year Annual Emissions with Startups, Shutdowns and Emission Control Downtime (tpy)				Subsequent Year Annual Emissions without Startups, Shutdowns and Emission Control Downtime (tpy)			
	Steam System[a]	Fire Pump	Emergency Generators[b]	O&M[d]	Steam System[a]	Fire Pump	Emergency Generators[b]	O&M[d]	Steam System[a]	Fire Pump	Emergency Generators[b]	O&M[d]
NO_x	--	0.04	0.49	0.66	--	0.04	0.49	0.66	--	0.04	0.49	0.66
CO	--	0.01	2.54	1.14	--	0.01	2.54	1.14	--	0.01	2.54	1.14
VOC	0.64	<0.01	0.14	0.09	0.76	<0.01	0.14	0.09	0.79	<0.01	0.14	0.09
PM_{10}	3.82	<0.01	0.02	0.03	6.96	<0.01	0.02	0.03	7.94	<0.01	0.02	0.03
$PM_{2.5}$	2.29	<0.01	0.02	0.02	4.17	<0.01	0.02	0.02	4.77	<0.01	0.02	0.02
SO_x	--	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01
H_2S	85.2	--	--	--	33.3	--	--	--	10.1	--	--	--
HAPs	2.06	<0.01	<0.01	0.03 [e]	2.42	<0.01	<0.01	0.03 [e]	2.52	<0.01	<0.01	0.03 [e]
Ammonia	316	--	0.03	--	540	--	0.03	--	605	--	0.03	--
CO_2e	40,808	3.27	470	326	48,295	3.27	470	326	50,320	3.27	470	326

[a] Steam system emissions are emitted from the PTU, RM, or cooling towers.

[b] Emissions include those from one 2.7 MW generator and three 3.49 MW generators.

[c] First year annual emissions include commissioning activities with the remaining year routine operations.

[d] Emissions include those associated with gas-insulated equipment and O&M equipment and vehicles.

[e] HAPs conservatively assumed to be equal to PM_{10} with DPM considered a surrogate for HAPs.

Note:

-- = Pollutant not emitted

< = less than

Tables 5.1-15 and 5.1-16 present a summary of the hourly emissions for the worst-case operational scenario for each of the Project's emission sources and a summary of the facility-wide PTE, respectively.

Table 5.1-15. Worst-Case Hourly Emissions by Source or Point of Release

	Maximum Hourly Emissions (lbs/hr)						
Pollutant	PTU	MTU	RM	Cooling Tower & Sparger	Fire Pump	Emergency Generators [a]	O&M [b]
NO_x	--	--	--	--	1.78	19.5	3.74
CO	--	--	--	--	0.42	102	4.17
VOC	0.06	0.10	0.20	0.18	0.05	5.52	0.46
SO_x	--	--	--	--	<0.01	<0.01	0.01
PM_{10}	--	--	--	1.81	0.06	0.87	0.14
$PM_{2.5}$	--	--	--	1.09	0.06	0.87	0.12
H_2S	19.3	31.3	61.7	58.4	--	--	--
HAPs	0.20	0.33	0.64	0.58	<0.01	0.04	0.14 [c]
Ammonia	0.85	1.37	2.71	138	--	1.29	--
CO_2e	3,944	6,412	12,633	11,489	131	18,790	1,338

[a] Emissions include those from one 2.7 MW generator and three 3.49 MW generators.

[b] Emissions include those associated with gas-insulated equipment and O&M equipment and vehicles.

[c] HAPs conservatively assumed to be equal to PM_{10} with DPM considered a surrogate for HAPs.

Note:

-- = Pollutant not emitted

Table 5.1-16. Facility-wide Potential to Emit

Pollutant	Hourly Operation (lbs/hr)	First Year of Operation (tpy)	Subsequent Year of Operation with Startups, Shutdowns and Emission Control Downtime (tpy)	Subsequent Year of Operation without Startups, Shutdowns and Emission Control Downtime (tpy)
CO	106	3.69	3.69	3.69
NO_x	25.0	1.19	1.19	1.19
VOC	6.22	0.86	0.98	1.01
PM_{10}	2.89	3.87	7.01	7.99
$PM_{2.5}$	2.14	2.34	4.22	4.81
SO_x	0.01	<0.01	<0.01	<0.01
H_2S	61.7	85.2	33.3	10.1
HAPs	0.82	2.06	2.42	2.52
Ammonia	139	316	540	605
CO_2e	32,891	41,608	49,095	51,119

The operational profiles presented above include scenarios for the first operating year, including plant commissioning and testing activities; a subsequent operating year without commissioning and testing activities but with all proposed startups, shutdowns, and emission control downtime; and a subsequent operating year assuming 8,760 hours of routine power generation operation (i.e., without any startups, shutdowns, or emission control downtime). The commissioning and testing activities are included in the facility-wide PTE to conservatively capture the Project's worst-case air quality impacts and emissions for permitting purposes.

GHG Emissions. Operational emissions of CO_2e will be primarily from the geothermal fluid in the RPF, onsite diesel combustion from emergency generators and the fire water pump, and insulating gas emissions from the high voltage circuit breaker. The worst-case annual estimate of CO_2e emissions from operation of the Project is 51,119 tpy (45,642 metric tons [MT] per year), with specific source details provided in Tables 5.1-9 through 5.1-16. These estimates were calculated using the emission factors, GWPs, and methodology previously specified. Additional detail is provided in Appendix 5.1A.

TAC Emissions. Operational emissions of TACs will result from multiple Project sources, including geothermal fluid in the RPF and mobile/stationary combustion activities. Combined HAP emission estimates are summarized in Tables 5.1-9 through 5.1-16, with individual TAC estimates included in Section 5.9. Section 5.9 also provides a detailed discussion and quantification of TAC emissions from Project operation, as well as the results of the health risk assessment (HRA).

5.1.7.1.3 Significance Criteria for Operation

Table 5.1-17 presents the Project emissions for comparison to ICAPCD's regional air quality significance thresholds for operation, as derived from the ICAPCD California Environmental Quality Act (CEQA) guidance (ICAPCD 2017). In the absence of a GHG operational threshold of significance, South Coast Air Quality Management District's (SCAQMD) *Interim CEQA Significance Threshold for Stationary Sources, Rules and Plans* was used for this analysis (SCAQMD 2008).

Table 5.1-17. ICAPCD CEQA Significance Thresholds for Operation

Pollutant	Project Operational Emissions [b]	Operational Thresholds
NO_x	70.6 lbs/day	137 lbs/day
VOC	19.4 lbs/day	137 lbs/day
PM_{10}	46.5 lbs/day	150 lbs/day
$PM_{2.5}$	28.9 lbs/day	550 lbs/day
SO_x	0.10 lbs/day	150 lbs/day
CO	237 lbs/day	550 lbs/day
Odors	--	Project creates an odor nuisance at a distance greater than 1 mile from the facility
CO_2e	45,642 MT/year [a]	10,000 MT/year

Source: ICAPCD 2017, SCAQMD 2008

[a] Over 98 percent of the Project's total CO_2e emissions result from the processing of geothermal fluid.

[b] Emissions include those associated with gas-insulated equipment and O&M equipment and vehicles.

Note:

-- = Not applicable and/or no standard

As shown, operational emissions from all Project activities are not expected to exceed the daily threshold values of significance for criteria pollutants. Although the Project's operational emissions do exceed the annual significance threshold for GHG emissions, the Project's GHG emissions are the direct result of geothermal steam processing for electricity generation, which is an activity encouraged in the Imperial County Regional Climate Action Plan (Ascent 2021). Additionally, the GHG emissions from the non-geothermal processing activities, including stationary combustion, would be only 714 MT CO_2e per year, which is less than the threshold. Therefore, the Project would likely result in less-than-significant impacts with respect to operational emissions.

5.1.7.2 Project Construction

The construction phase of the Project is expected to take approximately 29 months, with a few months on both ends for equipment delivery and demobilization. Construction is anticipated to begin in second quarter 2024. The overall Project staffing schedule is displayed in Table 2-9. The construction schedule is based on two, 10-hour shifts per day, during which construction equipment may operate up to 10 hours per shift, and a 7 days-per-week work week.[3] Separate contractors working in parallel with the Project's construction and startup schedule will construct offsite utilities.

Several areas in the vicinity of the Project site will be available for equipment and materials laydown, storage, construction equipment parking, small fabrication areas, and office trailers. The proposed construction laydown areas are outlined in Section 2. Layout of access roads and loading areas is important in the development of the laydown yard. Space is required for large turbine parts, structural steel, well piping, spools, electrical components, switchyard apparatus, and building parts. Sufficient space is provided to accommodate equipment preventive and in-storage maintenance activities such as moving, shaft rotation, connecting, lubricating, and heating. Site access will be controlled for personnel and vehicles. A security fence will be installed around the site boundary, including the laydown areas. Security personnel will be onsite.

Construction-related issues and emissions at the Project site are consistent with issues and emissions encountered at any construction site. Compliance with the provisions of the following permits and plans will generally result in minimal site emissions:

- Grading permit
- Construction site provisions of the site's Storm Water Pollution Prevention Plan (SWPPP)
- ICAPCD-issued ATC, which will require compliance with the provisions of all applicable fugitive dust rules that pertain to the Project's construction phase

5.1.7.2.1 Emission Estimates

The construction emissions estimation methodology for the Project were developed in coordination with the latest available data and engineering design. Details of the specific methodology for each of the construction emissions sources are included below:

- **Construction Equipment**: Emissions were estimated using construction equipment emission factors, horsepower, and load factors from the *CalEEMod User's Guide* (ICF 2022). Default CalEEMOD emission factors were assumed for off-highway trucks and small equipment (i.e., equipment with a power rating of less than 25 horsepower); Tier 4 final emission factors were assumed for all other construction equipment.

- **On-Road Vehicles:** Emissions from vehicle exhaust and idling were calculated using emission factors from EMFAC2021.

- **Fugitive Dust Emissions:** Emissions from fugitive dust activities including grading, truck dumping/loading, and travel on paved and unpaved roadways were estimated based upon factors developed using methodology from the *CalEEMod User's Guide* (ICF 2022). As appropriate, fugitive dust emissions will be mitigated up to 74 percent by watering every 2.1 hours, per the *CalEEMod User's Guide* (ICF 2022).[4]

- **Paving Emissions:** Emissions from paving activities were estimated based upon factors developed using methodology from the *CalEEMod User's Guide* (ICF 2022).

  Emissions will occur from both onsite and offsite activities during the construction phase of the Project. Onsite emissions will include operations of construction-related equipment, pickup trucks, fugitive dust, and paving. Emissions occurring offsite will include construction equipment for the drilling and

[3] Although staffing assumes a 7 day-per-week work week, the construction emissions assume a more typical schedule of up to 23 work days per month.

[4] The control efficiency established by the *CalEEMod User's Guide* is based on watering three times per 8-hour shift, or every 2.1 hours (ICF 2022).

construction of offsite wells and well pads, on-road vehicles for worker commutes and material/equipment deliveries, fugitive dust from road dust, and paving emissions associated with the paving of roadways to the Project.

Onsite and offsite Project emissions from construction have been divided into two categories: (1) vehicle and construction equipment exhaust; and (2) fugitive dust from vehicle and construction equipment, including grading and truck loading/dumping during Project construction.

- **Criteria Pollutant Emissions.** The following criteria pollutant emissions have been calculated: NO_X, SO_2, VOC, CO, PM_{10}, and $PM_{2.5}$. It is expected that large stockpiles of earthen materials would not be present during Project construction; therefore, wind-blown fugitive dust emissions from earthen stockpiles were assumed to be negligible.

Daily and annual construction emissions were estimated based on the number and type of construction equipment, the number of heavy-duty trucks, and the workforce projected for each month of construction. It was conservatively assumed that the construction activities would occur 20 hours per day across the two, 10-hour shifts and 23 days per month. The maximum daily emissions occur during month 12 for all pollutants except PM_{10}, which peaks during month 18. The maximum annual construction emissions for all pollutants occur between months 10 and 21, which is calendar year 2025.

The maximum daily and annual criteria pollutant emissions from the combined onsite and offsite construction activities are presented in Table 5.1-18. The detailed emission calculations for construction are provided in Appendix 5.1D.

Table 5.1-18. Project Construction Criteria Pollutant Emissions

Construction Emissions	NO_X	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Average Daily Emissions (lbs/day)	119	480	49.5	1.19	23.6	18.4
Maximum Annual Emissions (tpy)	23.6	96.7	9.47	0.23	4.46	3.51

GHG Emissions. GHG emissions from Project construction were calculated using the same methodology used for criteria pollutants. The maximum daily and annual GHG emissions from the combined onsite and offsite construction activities are presented in Table 5.1-19. The detailed emission calculations for construction are provided in Appendix 5.1D.

Table 5.1-19. Project Construction Greenhouse Gas Emissions

Construction Emissions	CO_2	CH_4	N_2O	CO_2e
Average Daily Emissions (MT/day)	45.6	<0.01	<0.01	45.7
Maximum Annual Emissions (MT/year)	18,005	0.72	0.14	18,066

TAC Emissions. Construction-related emissions of TACs will result from the Project's mobile source combustion activities during the construction phase. See Section 5.9 for a detailed discussion and quantification of TAC emissions from Project construction, as well as the results of the HRA.

5.1.7.2.2 Mitigation Measures for Construction

Construction activities are known to result in impacts due to fugitive dust and other emissions that may result in adverse impacts to air quality. The Project owner will comply with all required fugitive dust mitigation measures consistent with ICAPCD Regulation VIII and the CEQA Guidelines. The required mitigation measures to be implemented by the Project owner during Project construction include the following (ICAPCD 2017):

- All disturbed areas, including bulk material storage which is not being actively utilized, shall be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by using water, chemical stabilizers, dust suppressants, tarps or other suitable material such as vegetative ground cover.

- All onsite and offsite unpaved roads will be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering, except as otherwise provided for by Rule 801.
- All unpaved traffic areas 1 acre or more with 75 or more average vehicle trips per day will be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering.
- The transport of bulk materials shall be completely covered unless six inches of freeboard space from the top of the container is maintained with no spillage and loss of bulk material. In addition, the cargo compartment of all haul trucks is to be cleaned and/or washed at delivery site after removal of bulk material.
- All track-out or carry-out will be cleaned at the end of each workday or immediately when mud or dirt extends a cumulative distance of 50 linear feet or more onto a paved road within an urban area.
- Movement of bulk material shall be stabilized prior to handling or at points of transfer with application of sufficient water, chemical stabilizers or by sheltering or enclosing the operation and transfer line.
- The construction of any new unpaved road is prohibited within any area with a population of 500 or more unless the road meets the definition of a temporary unpaved road. Any temporary unpaved road shall be effectively stabilized, and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering.
- Use alternative fueled or catalyst equipped diesel construction equipment, including all off-road and portable diesel-powered equipment to the extent feasible.
- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes as a maximum.
- Limit, to the extent feasible, the hours of operation of heavy-duty equipment and/or the amount of equipment in use.
- Replace fossil fueled equipment with electrically driven equivalents (provided they are not run via a portable generator set).

Additional mitigation measures are available in ICAPCD's CEQA Guidelines for construction as discretionary or enhanced measures and may be implemented at the request of the CEC or ICAPCD.

5.1.7.2.3 Significance Criteria for Construction

Table 5.1-20 presents the ICAPCD's regional air quality significance thresholds currently being implemented for construction, as derived from the ICAPCD's CEQA Guidelines (ICAPCD 2017), as well as a comparison to the Project's construction emissions. In the absence of a GHG construction threshold of significance, SCAQMD's CEQA threshold of significance was used (SCAQMD 2019).

Table 5.1-20. ICAPCD Construction CEQA Significance Thresholds

Pollutant	Project Construction Emissions	Construction Thresholds
NO_x	119 lbs/day	100 lbs/day
VOC	49.5 lbs/day	75 lbs/day
PM_{10}	23.6 lbs/day	150 lbs/day
$PM_{2.5}$	18.4 lbs/day	--
SO_x	1.19 lbs/day	--
CO	480 lbs/day	550 lbs/day
CO_2e	18,066 MT/year	10,000 MT/year

Source: ICAPCD 2017, SCAQMD 2019

Note:

-- = Not applicable and/or no standard

As shown, construction emissions from all onsite and offsite Project activities are not expected to exceed the significance thresholds except for NO_2 and GHGs (CO_2e). An exceedance of the significance thresholds does not necessarily indicate the Project would have significant impacts, but does indicate the need for additional analysis. For NO_2, atmospheric dispersion modeling was performed, in accordance with the methodology presented in Section 5.1.9, to demonstrate that Project construction would not exceed either the NAAQS or CAAQS. Based on the results presented in Section 5.1.10.2, the Project would have less-than-significant impacts with respect to criteria pollutants.

For GHGs, one must also consider the Project's conformance with regional climate action plans. Although the Project's construction GHG emissions exceed the significance threshold, those short-term emissions are necessary to support the construction of a new geothermal steam processing facility for electricity generation, which is an activity encouraged in the Imperial County Regional Climate Action Plan (Ascent 2021). Once built, the Project will also support the State's goals of increasing renewable energy resources and reducing GHG emissions. Therefore, the Project is expected to have a potentially less-than-significant impact with respect to GHGs.

5.1.8 Best Available Control Technology Evaluation

ICAPCD does not have BACT guidelines. To evaluate if the Project meets the BACT requirements, BACT guidelines published by other air districts in California, CARB, and the EPA for cooling tower particulate matter emissions and geothermal power plant H_2S emissions were reviewed.

5.1.8.1 BACT for Cooling Tower Particulate Matter Emissions

The San Joaquin Valley Air Pollution Control District's (SVJAPCD) BACT Guideline for cooling towers is to use High Efficiency Cellular Type Drift Eliminators (0.0005 percent drift rate) (SJVAPCD 2018), which is consistent with listings from EPA's Reasonably Available Control Technology (RACT)/ BACT/Lowest Achievable Emission Rate (LAER) Clearinghouse.[5] There are no BACT guidelines or listings from other air districts for cooling towers. The cooling tower of the proposed Project would be designed to have 0.0005 percent drift eliminator and thus satisfies the BACT requirements.

5.1.8.2 BACT for H_2S Emissions

Currently, there are no applicable BACT listings for H_2S emissions from geothermal power plant operations. However, ICAPCD approved a BACT analysis for a similar facility in 2017. This approved BACT analysis utilized a sparger system for H_2S removal from the gas stream and a biological oxidation box to oxidize the fluid phase H_2S into elemental sulfur and or sulfates with destruction and removal efficiencies (DRE) of 90 percent and 90 percent (CalEnergy 2017), respectively. The proposed Project would utilize this same H_2S treatment system consisting of a sparger and a biological oxidation box to remove H_2S from the geothermal stream. The proposed sparger system and biological oxidation box are expected to operate with a minimum DRE of 96.5 percent and 95 percent, respectively. The proposed Project would use up-to-date technologies and the H_2S control system is typical in geothermal power plant designs that have been permitted in other air districts and in other states.

5.1.8.3 Summary

The particulate matter emissions from the cooling tower and the H_2S emissions from the geothermal stream are subject to BACT requirements. Table 5.1-21 summarizes the proposed BACT for the Project's cooling tower particulate matter emissions and the H_2S emissions from the geothermal stream.

[5] Available online at https://www.epa.gov/catc/ractbactlaer-clearinghouse-rblc-basic-information.

Table 5.1-21 Proposed BACT

Pollutant	Applicable BACT from Guidelines	Project Proposed BACT
PM_{10}/$PM_{2.5}$	High Efficiency Drift Eliminator at 0.0005%	High Efficiency Drift Eliminator at 0.0005%
H_2S	90% DRE with a combination sparger and biological oxidation box	H_2S sparging and biological oxidation box with greater than 96.5% and 95% control efficiency, respectively

As shown in Table 5.1-21, the cooling tower meets the BACT requirements for particulate matter because it will be equipped with a high efficiency drift eliminator with 0.0005 percent drift. While there is no published BACT for H_2S from the proposed Project, H_2S emissions will be controlled with a sparger and biological oxidation box system with 96.5 and 95 percent control efficiency, respectively, consistent with a similar project's BACT analysis within ICAPCD for H_2S abatement. As such, the Project meets the BACT requirements under ICAPCD Rule 207.

5.1.9 Environmental Analysis – Air Quality Impact Analysis Methodology

An ambient air quality impact analysis was conducted to compare ground-level impacts resulting from the Project's operation- and construction-related emissions with established federal and state ambient air quality standards. This section describes the methodology used in developing both the magnitude and spatial extent of the ground-level concentrations resulting from the Project's emissions.

Potential air quality impacts were evaluated consistent with the approved Air Quality Modeling Protocol, as described herein. A copy of the approved Air Quality Modeling Protocol is included in Appendix 5.1C. In addition to what is presented in the approved Air Quality Modeling Protocol, criteria pollutant impacts from the Project's construction phase were also evaluated, as specifically requested by the CEC. All input and output modeling files have been provided to the ICAPCD and CEC under separate cover.

5.1.9.1 Dispersion Model Selection and Options

The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) (Version 22112) was used for this ambient air quality impact analysis, as recommended in the EPA's Appendix W, *Guideline on Air Quality Models* (EPA 2017a). AERMOD is a steady-state Gaussian plume model that simulates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. This model is recommended for short-range (less than 50 kilometers) dispersion from the source.

AERMOD incorporates the plume rise model enhancement (PRIME) algorithm for modeling building downwash and is designed to accept input data prepared by two specific preprocessor programs, AERMOD meteorological data processor (AERMET) and AERMOD terrain processor (AERMAP). AERMOD was run with the following technical options:

- Direction-specific building downwash
- Regulatory default options unless otherwise specified herein
- Rural dispersion characteristics
- Actual receptor elevations and hill height scales obtained from AERMAP (Version 18081)

Default model options for temperature gradients, wind profile exponents, and calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor (complex terrain) heights option were used in this modeling analysis.

The following subsections present details of other inputs required for dispersion modeling with AERMOD.

5.1.9.1.1 Meteorological Data

Five years of AERMET-processed meteorological data were obtained from the CARB Hotspots Analysis and Reporting Program (HARP) AERMOD Meteorological Files webpage[6] for the Imperial County Airport (KIPL, WBAN ID: 03144). The 5 years of data were processed by CARB with AERMET Version 19191 for 2015 through 2018 and 2021. The years 2019 and 2020 were not included in the meteorological data set because they were likely determined to be incomplete by CARB. The data set was selected based on completeness, similar surrounding land use as the plant site and proximity to the facility, as shown in Figure 5.1-2. Wind speeds and directions for this data set are presented in the wind rose in Figure 5.1-3. The average wind speed for the 5-year period was 3.45 meters per second (m/s).

5.1.9.1.2 Receptor Grid Selection and Coverage

The ambient air boundary was defined by the fence line surrounding the facility. The selection of receptors in AERMOD was as follows:

- Discrete receptors every 25 meters (m) around the ambient air boundary (i.e., fence line)
- 25-m spacing from the fence line to 500 m from grid origin
- 100-m spacing from beyond 500 m to 1,000 m from the fence line
- 250-m spacing from beyond 1,000 m to 5,000 m from the fence line
- 500-m spacing from beyond 5,000 m to 10,000 m from the fence line

All receptors and source locations were expressed in the Universal Transverse Mercator North American Datum 1983, Zone 11 coordinate system. U.S. Geological Survey National Elevation Dataset terrain data was used in conjunction with the AERMAP preprocessor (Version 18081) to determine receptor elevations and terrain maxima.

Concentrations within the facility fence line were not calculated. Figure 5.1-4 displays the receptor grids used in the modeling assessment.

5.1.9.1.3 Ambient Air Boundary

The ambient air boundary is defined by the property line that surrounds the Applicant-owned property within which non-authorized personnel access is precluded. The ambient air boundary for the Project facility is represented in Figure 5.1-5.

5.1.9.1.4 Building Downwash

Building influences on the air dispersion of emissions from point source stacks were calculated by incorporating the EPA Building Profile Input Program for use with the PRIME algorithm (BPIP-PRIME). Stack heights, building locations, and building dimensions were obtained from the most currently available architectural plans and onsite measurements. Stacks located on or adjacent to buildings were given base elevations of said buildings. A list of the buildings and their coordinates is included in Appendix 5.1B.

As part of this analysis, a good engineering practice (GEP) stack height screening was performed to determine which stack height should be used in the modeling. The GEP stack height is defined as the height in which the plume dispersion from the stack is not influenced by building downwash. This GEP stack height is calculated as the lesser of the following two criteria:

- 65 m
- The sum of the maximum building height for which the stack is in the area of influence plus 1.5 times the lesser of the building height or projected building width

[6] Available online at https://ww2.arb.ca.gov/resources/documents/harp-aermod-meteorological-files.

Figure 5.1-2
Meteorological Data Station Location
Black Rock Geothermal Project
Imperial County, California

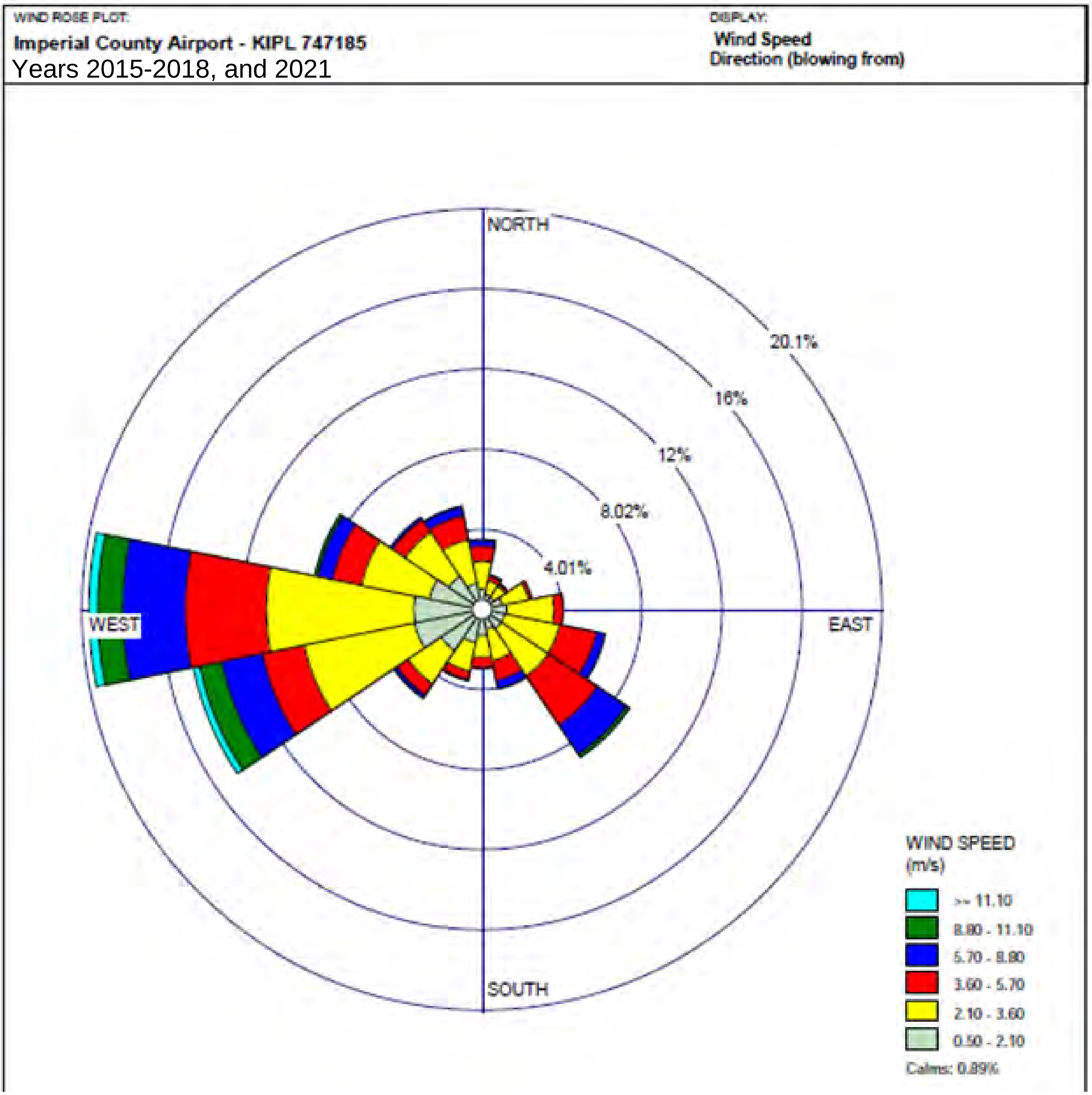


Figure 5.1-3
Meteorological Data Wind Rose
Black Rock Geothermal Project
Imperial County, California

Jacobs

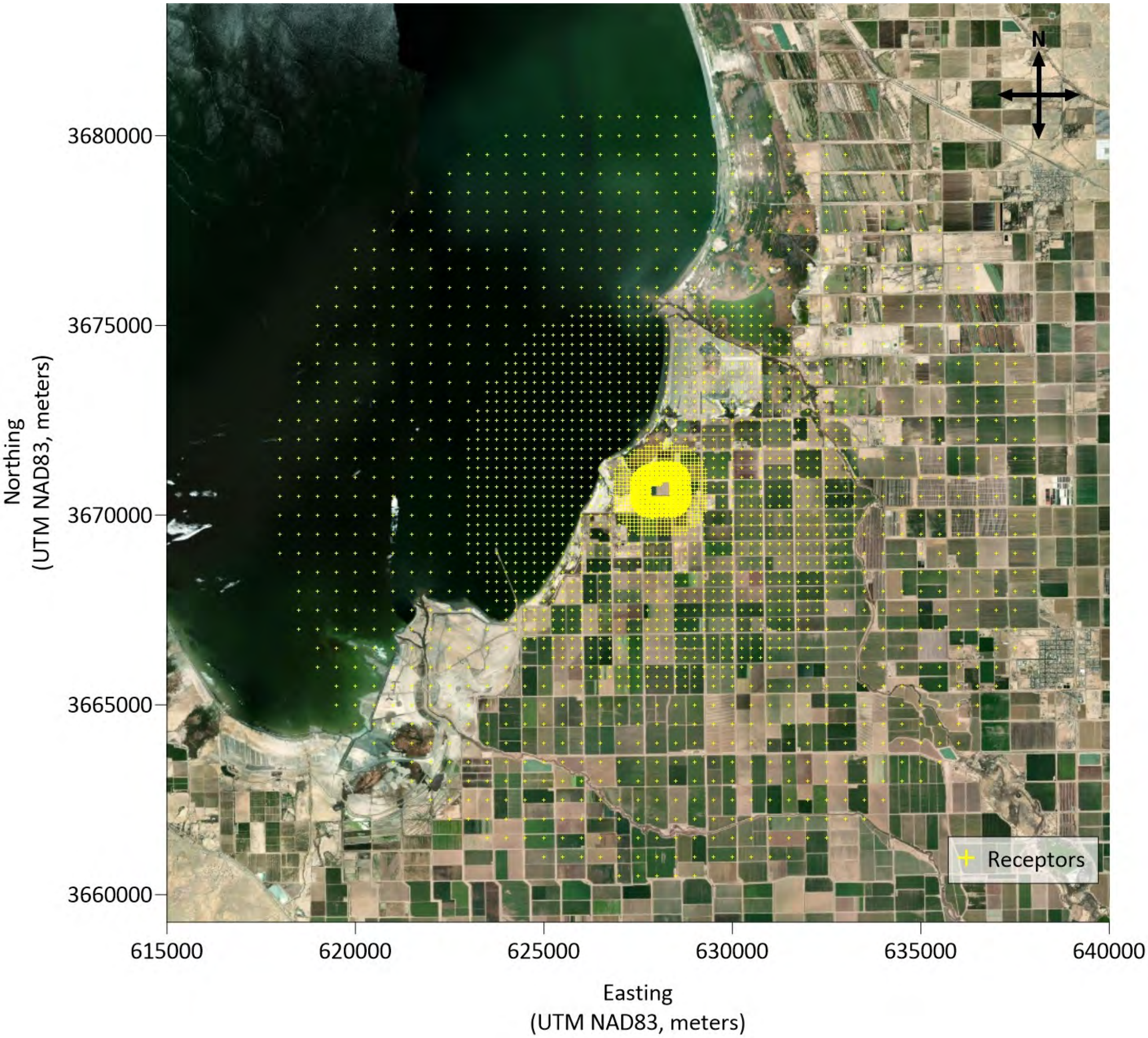


Figure 5.1-4
Dispersion Modeling Receptor Grid
Black Rock Geothermal Project
Imperial County, California

Jacobs

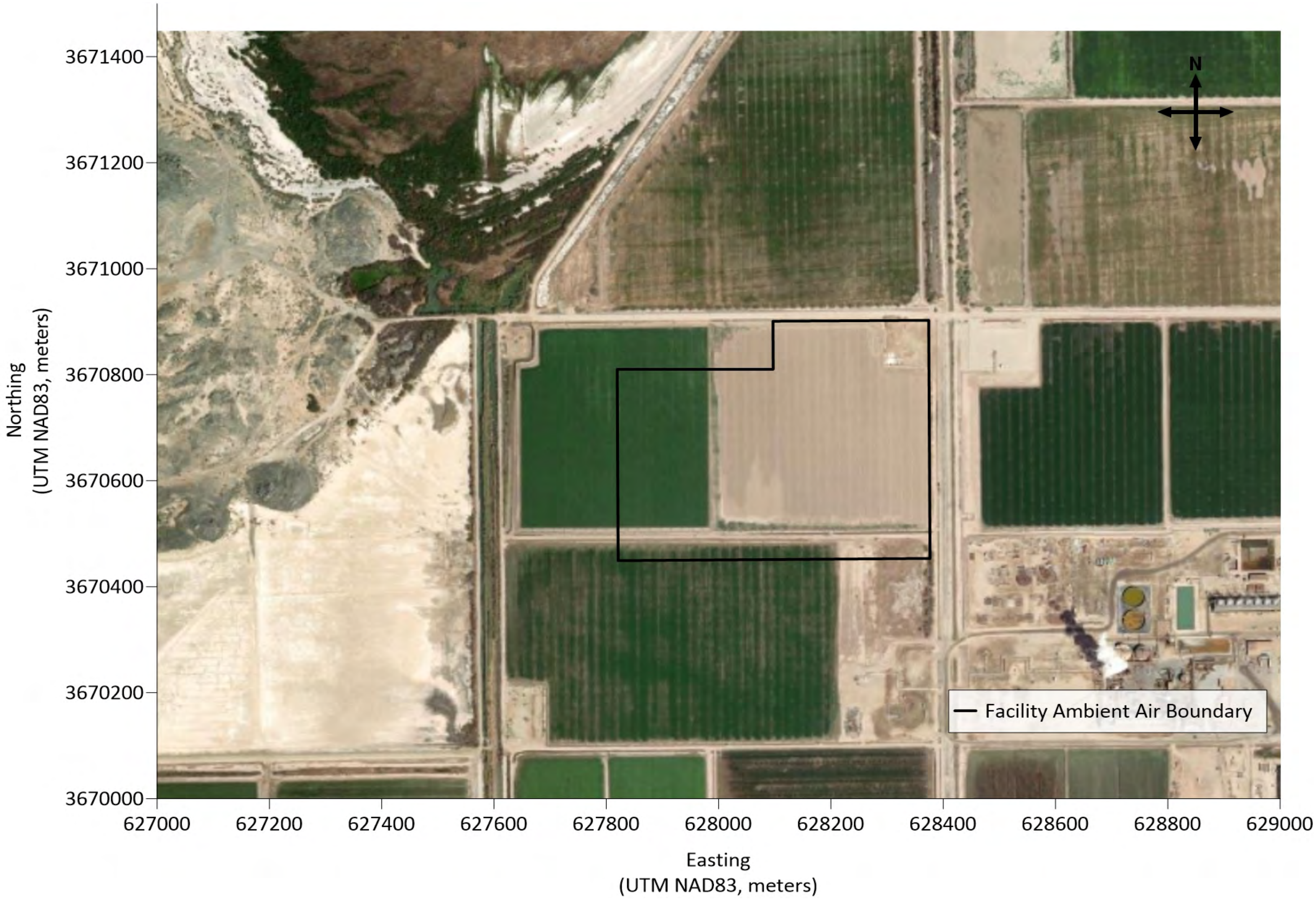


Figure 5.1-5
Facility Ambient Air Boundary
Black Rock Geothermal Project
Imperial County, California

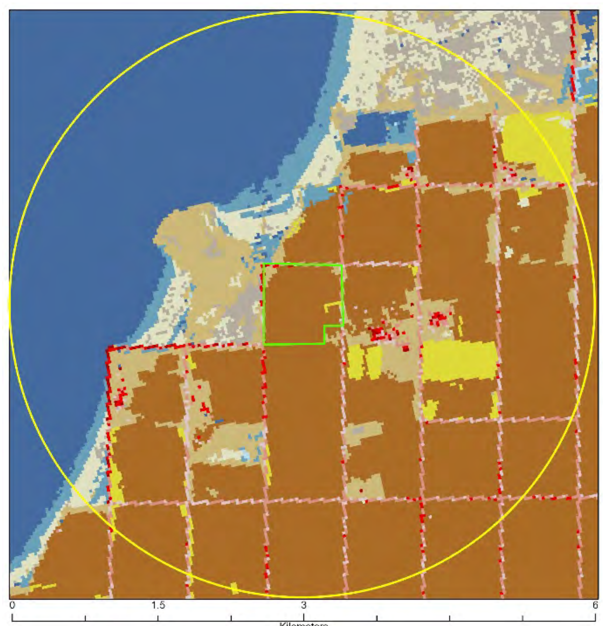
Jacobs

The stack heights used in this dispersion modeling analysis were the actual stack height or the GEP stack height, whichever is less as calculated by AERMOD.

5.1.9.1.5 Rural versus Urban Option

The land use surrounding the facility was evaluated for classification as either urban or rural. A land use analysis was performed following the Auer land use methodology (Auer 1978) using the most recent available land use data. Land use data within a 3-kilometer radius for the site was obtained from the U.S. Geological Survey's 2019 National Land Cover Database (NLCD), as shown below. This data set classified land use for individual 30- by 30-m cells into 15 primary land use categories for the Project site. Of the 15 land use categories in the 2019 NLCD data set, the following two categories are considered urban for dispersion modeling purposes:

- **Developed, Medium Intensity (NLCD Code 23)**—This classification includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50 to 79 percent of the total cover.
- **Developed, High Intensity (NLCD Code 24)**—This classification includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial spaces. Impervious surfaces account for 80 to 100 percent of the total cover.



Land Use Color	Land Use Code ID No.	Land Use Description	Cell Count	% Land Category
	11	Open Water	13,821	28.30%
	21	Developed, Open Space	604	1.24%
	22	Developed, Low Intensity	1,074	2.20%
	23	Developed, Medium Intensity	272	0.56%
	24	Developed, High Intensity	84	0.17%
	31	Barren Land	2,156	4.41%
	52	Shrub/Scrub	4,099	8.39%
	71	Herbaceous	2,289	4.69%

Land Use Color	Land Use Code ID No.	Land Use Description	Cell Count	% Land Category
	81	Hay/Pasture	1,231	2.52%
	82	Cultivated Crops	21,743	44.52%
	90	Woody Wetlands	35	0.07%
	95	Emergent Herbaceous Wetlands	1,433	2.93%

If more than 50 percent of the area within 3 kilometers is classified as urban land use, the URBAN option may be used for AERMOD modeling of the facility. The analysis showed that less than 1 percent of the land within a 3-kilometer radius of the facility may be classified as urban; therefore, the URBAN option in AERMOD was not used in the dispersion modeling analysis.

5.1.9.2 Source Characterization

The Project's worst-case operation- and construction-related emissions of criteria pollutants, GHGs, and TACs are presented in Section 5.1.7 and, unless otherwise noted, were used for modeling based upon the applicable pollutant and standard. Details of the source specific model inputs are provided in the following subsections.

5.1.9.2.1 Project Operation

The modeled sources for Project operation include the cooling towers, diesel-fired emergency generators, diesel fire water pump, PTU, and RM. Details of the source specific model inputs and modeled emission rates are presented below and included in Appendix 5.1B. The operational source layout for the modeling is included in Figure 5.1-6.

Emissions from O&M equipment and vehicles were not modeled as those operations are infrequent, varied spatially throughout the Project site, and assumed to have a negligible impact on ground-level concentrations relative to the Project's other emission sources.

Cooling Towers. The cooling towers were modeled as a point source in AERMOD with the stack diameter, height, flow rate, temperature, drift eliminator efficiency and location based upon the latest design data. Each of the specific cooling tower stack parameters used in the modeling analysis is presented in Table 5.1-22. As stated in Section 5.1.7, the cooling towers represent emissions from the cooling tower process as well as the sparger. The modeled emission rates are included in Appendix 5.1B.

Table 5.1-22. Modeling Parameters – Cooling Tower [a]

Source ID	Elevation (m)	Release Height (m)	Stack Diameter (m)	Discharge Temperature (K)	Discharge Velocity (m/s)
CT1	-68.58	12.98	10.63	311.76	7.91
CT2	-68.58	12.98	10.63	311.76	7.91
CT3	-68.58	12.98	10.63	311.76	7.91
CT4	-68.58	12.98	10.63	311.76	7.91
CT5	-68.58	12.98	10.63	311.76	7.91
CT6	-68.58	12.98	10.63	311.76	7.91
CT7	-68.58	12.98	10.63	311.76	7.91

[a] Modeling parameters presented in metric units to mirror what is presented in the modeling input/output files.

Note:

K = degrees Kelvin

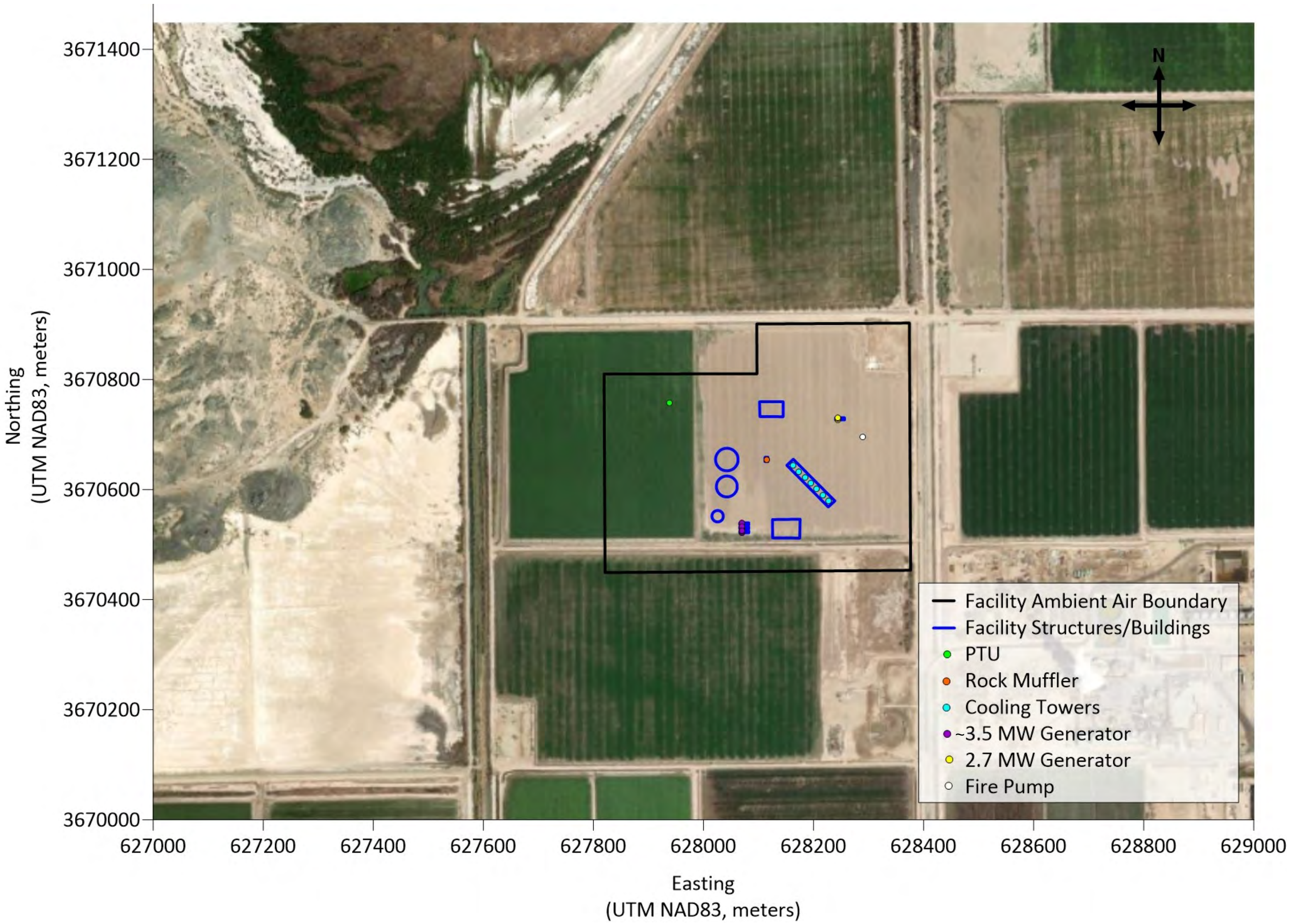


Figure 5.1-6
Operational Source Layout
Black Rock Geothermal Project
Imperial County, California

Jacobs

Diesel-fired Emergency Generators and Diesel Fire Water Pump. The diesel-fired emergency generators and diesel fire water pump were modeled as point sources in AERMOD with the stack diameter, height, flow rate, temperature, and location based on the design data provided by the vendors. Generators 1 through 4 are equipped with Tier 4 emission controls which each vent through three stacks; therefore, each generator is represented by three stacks with emissions and flow evenly distributed between them. Each of the specific stack parameters used in the modeling analysis is presented in Table 5.1-23. For purposes of modeling, the fire pump is assumed to operate one hour per day and the generators are assumed to operate up to 2 hours per day and once per 8-hour period, all of which are conservatively assumed to potentially occur within the same day. The modeled emission rates are included in Appendix 5.1B.

Table 5.1-23. Modeling Parameters – Emergency Diesel Engines [a]

Source ID	Elevation (m)	Release Height (m)	Stack Diameter (m)	Discharge Temperature (K)	Discharge Velocity (m/s)
FPUMP	-68.58	4.60	0.15	665.00	53.30
G1_1	-68.58	6.22	0.32	763.15	38.08
G1_2	-68.58	6.22	0.32	763.15	38.08
G1_3	-68.58	6.22	0.32	763.15	38.08
G2_1	-68.58	6.26	0.32	748.15	46.36
G2_2	-68.58	6.26	0.32	748.15	46.36
G2_3	-68.58	6.26	0.32	748.15	46.36
G3_1	-68.58	6.26	0.32	748.15	46.36
G3_2	-68.58	6.26	0.32	748.15	46.36
G3_3	-68.58	6.26	0.32	748.15	46.36
G4_1	-68.58	6.26	0.32	748.15	46.36
G4_2	-68.58	6.26	0.32	748.15	46.36
G4_3	-68.58	6.26	0.32	748.15	46.36

[a] Modeling parameters presented in metric units to mirror what is presented in the modeling input/output files.

For purposes of the 1-hour NO_2 standard, emergency engines in this analysis were classified as intermittent sources because they have less than 500 hours per year of operation according to EPA (EPA 2011). As a result, the annual average hourly emission rate for each engine was used in the 1-hour averaging period NO_2 modeling analysis, rather than the maximum hourly emission rate, consistent with EPA's *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 NAAQS Memorandum* (EPA 2011).

Geothermal Steam Flashing Activities. Onsite operations may include the direct release of geothermal steam to the atmosphere through the PTU or the RM. Each of these operations will include the release of hot steam from defined structures and areas within the Project site. As a result of the heated nature of the steam and defined release point, each source was modeled as a point source in AERMOD. The temperature of the geothermal fluid for the PTU was conservatively assumed at 100°C (373.15 degrees Kelvin [K]) with the conservative average operational flow of 250,000 pounds per hour converted to a volumetric flow rate based upon the density of water vapor at 100°C (373.15 K), according to source specifications. Source parameters for the RM were developed based upon vendor provided data. The MTU was not included in this modeling analysis due to its use at various (i.e., temporary) well locations throughout the Project site for only a limited number of hours. Additionally, the emissions from MTU operation would be minimal and less than emissions from the PTU and RM. Each of the specific stack parameters used in the modeling analysis is presented in Table 5.1-24. The modeled emission rates are included in Appendix 5.1B.

Table 5.1-24. Modeling Parameters – Geothermal Steam Flashing Sources [a]

Source ID	Elevation (m)	Release Height (m)	Stack Diameter (m)	Discharge Temperature (K)	Discharge Velocity (m/s)
RMP (Rock Muffler)	-68.58	7.32	7.35	400.35	4.75
PTU	-68.58	18.29	2.24	373.15	13.43

[a] Modeling parameters presented in metric units to mirror what is presented in the modeling input/output files.

5.1.9.2.2 Project Construction

The Project's construction-related emissions would include combustion emissions from mobile sources, including diesel construction-type equipment and onsite vehicles, and fugitive dust emissions. The onsite equipment and vehicle exhaust emissions were evenly distributed over the construction area. These combustion-related emissions were modeled as a grid of point sources with a horizontal stack release spaced approximately 25 m apart over the entire construction area. The horizontal release type is an AERMOD option which negates mechanical plume rise. This conservative approach was used because it is unknown whether all construction equipment and vehicles will have vertically oriented exhaust stacks. The exhaust parameters for each point source were estimated based upon data for typical construction equipment.

Fugitive dust emissions from roadways, grading activities, and material loading/unloading were characterized as a single area-poly source within the property, with a 10-m buffer from the nearest property boundary and assuming a ground-level release. This approach is conservative for modeling ground-level fugitive emissions with no initial vertical dimension and assumes grading activities would not continuously occur within 10 m of the proposed facility fence line.

Each of the specific stack parameters used in the modeling analysis for combustion and fugitive dust emission sources are presented in Tables 5.1-25 and 5.1-26, respectively. The modeled emission rates are included in Appendix 5.1D. The construction source layout for the modeling is included in Figure 5.1-7.

Table 5.1-25. Modeling Parameters – Construction Combustion Sources [a]

Source ID	Elevation (m)	Release Height (m)	Stack Diameter (m)	Discharge Temperature (K)	Discharge Velocity (m/s)
Point_1 through Point_352	Varies [b]	4.60	0.13	533	18.0

[a] Modeling parameters presented in metric units to mirror what is presented in the modeling input/output files.

[b] Source-specific elevations were calculated with AERMAP and are included in Appendix 5.1D.

Table 5.1-26. Modeling Parameters – Construction Fugitive Dust Sources [a]

Source ID	Elevation (m)	Release Height (m)	Initial Vertical Dimension (m)
AREA_1	-70.1	0	0

[a] Modeling parameters presented in metric units to mirror what is presented in the modeling input/output files.

5.1.9.3 Additional Model Selection

In addition to AERMOD and its pre-processor AERMAP, several other EPA and CARB models and programs were used to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations. The models used were BPIP-PRIME (Version 04274) and the AERSCREEN (Version 15181) dispersion model for fumigation impacts. These models, along with options for their use and how they are used, are discussed below.

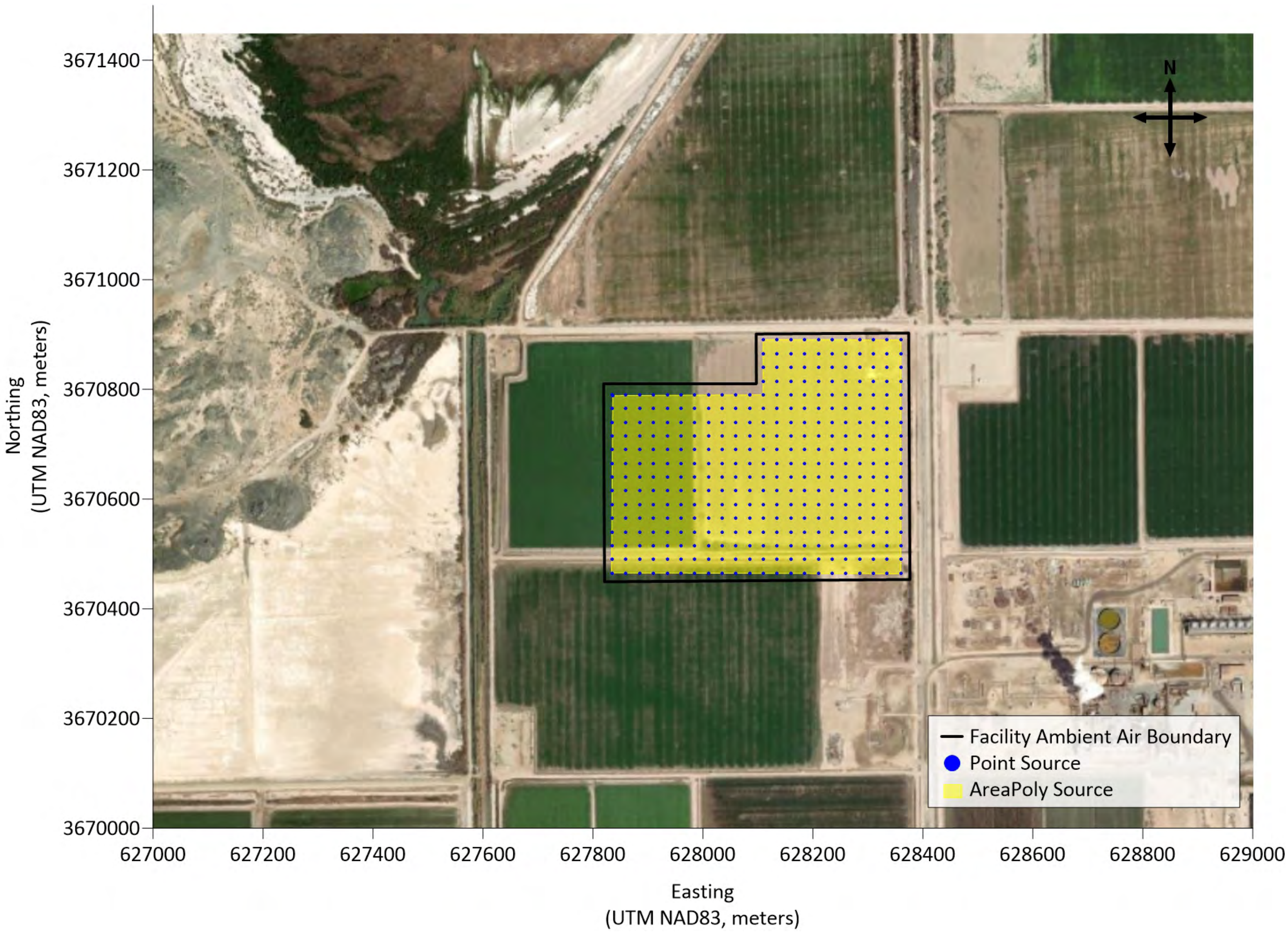


Figure 5.1-7
Construction Source Layout
Black Rock Geothermal Project
Imperial County, California

Jacobs

The AERSCREEN model was used to evaluate inversion breakup fumigation impacts for all short-term averaging periods (24 hours or less). The methodology outlined in EPA-454/R-92-019 (EPA 1992a) was followed for this analysis. The fumigation concentrations were then compared to the maximum AERSCREEN concentrations under normal dispersion for all meteorological conditions. Because the Project's fumigation impacts were less than the AERSCREEN maxima, as described in Section 5.1.10.1.2, additional analyses were not required.

5.1.9.4 Oxides of Nitrogen Modeling Methodology and Chemistry

The *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51 (EPA 2017a) recommends a tiered screening approach to characterize the conversion of total NO_X from the Project to NO_2. A Tier 1 approach assumes a 100 percent conversion of total NO_X to NO_2 and is typically overly conservative. The Tier 2 approach allows for the use of the Ambient Ratio Method 2 (ARM2). The Tier 1 and Tier 2 options do not require agency approval.

For this analysis, the Tier 2 approach was selected using the ARM2 model with a default in-stack ratio of 0.5 and a default out-of-stack ratio of 0.9.

5.1.9.5 Cumulative Source Analysis

Per CEC requirements, a cumulative impacts analysis for the Project's typical operating mode will be conducted for any pollutants which exceed the Class II Significant Impact Levels (SILs). Impacts from the Project will be combined with other stationary emissions sources within a 6-mile radius that have received construction permits but are not yet operational or are in the permitting process (such as the NSR or CEQA permitting process).[7] The stationary emissions sources included in the cumulative impacts assessment will be limited to new or modified sources (individual emission units) that would cause a net increase of 5 tpy or more per modeled criteria pollutant. Therefore, VOC sources, equipment shutdowns, permit-exempt equipment registrations, rule compliance, permit renewals, or replacement/upgrading of existing systems will not be included in the cumulative impacts analysis. TAC emissions will also be excluded from the cumulative impacts analysis. The facilities with cumulative sources identified for inclusion in the air quality impacts analysis are presented in Table 5.1-27.

Table 5.1-27. Cumulative Impacts Assessment – Facility List

CUP-0011	Project Name	Applicant	Area-Location	Phase
13-0031	Wilkinson Solar Farm	8 Minute Energy	Niland	Pending Construction
13-0032	Lindsey Solar Farm	8 Minute Energy	Niland	Pending Construction
17-0014	Midway Solar Farm IV	8 Minute Energy	Calipatria	Pending Construction
18-0040	Ormat Wister Solar	Omi 22 LLC/Ormat	Niland	Under Construction
21-0021	Hell's Kitchen Geothermal Exploration Project	Controlled Thermal Resources	Niland	Entitlement Process
20-0008	Energy Source Mineral ALTiS	Energy Source Minerals	Imperial County	Pending Construction

The cumulative air quality impacts analysis will be performed using the same modeling methodology presented in Section 5.1.9.1. The fence lines for the cumulative sources will not be included in the modeling analysis as they do not define the ambient boundary for modeling purposes.

The maximum predicted cumulative impacts will represent the impact at the receptor location identified as the maximum receptor for each pollutant required to have a cumulative impacts assessment. The maximum modeled concentrations from the analysis will then be added to representative background

[7] Existing sources are not included in the cumulative impacts assessment as their emissions are assumed to be accounted for with the ambient air background concentrations.

concentrations, and the results compared to the applicable CAAQS and NAAQS for each pollutant required to be included in the cumulative impacts assessment.

The Applicant will compile a source list for the facilities identified in Table 5.1-27, making conservative assumptions as necessary, and provide the source list to CEC staff for review and comment. Specifically, the Applicant would value input on the appropriateness of excluding specific sources (sources with negligible emissions, administrative permit amendments with no increase in air emissions, and VOC sources) and selecting the modeled scenarios. Following receipt of CEC staff's comments, the source list will be finalized and a cumulative air quality impact analysis will be prepared within 30 days of the application being deemed complete.

5.1.9.6 H_2S Methodology

H_2S in the ambient air near the Salton Sea is subject to episodic events that result in concentrations which temporarily exceed the CAAQS of 0.03 parts per million (ppm). These episodic events of H_2S exceedances are well known and largely due to biogenic sources and activity (SCAQMD 2021). As a result, monitoring data in the region may not be representative for use in a CAAQS modeling analysis.

Specifically, the 1-hour H_2S CAAQS was adopted in 1969 for purposes of odor control and not for protection of public and environmental health. People have experienced eye irritation at concentrations of 50 ppm which is much greater than the CAAQS of 0.03 ppm (CARB 2022b). Therefore, temporary exceedances of the H_2S CAAQS would not result in elevated exposure of the public and environment to H_2S health-related risks but would be characterized as a nuisance and an odor impact.

As a result of the Project location and nature of the standard, H_2S is analyzed similarly to nuisance related impacts caused by odorous compounds. Specifically, the 1-hour H_2S analysis will follow the ICAPCD's methodology for assessing odor-related impacts, as presented in Section 4.6(b) of the CEQA Air Quality Handbook, which states that H_2S emissions may result in impacts that would not be significant except as a nuisance. Table 3 of the Guidelines provides screening distances for odor impacts, which is 1 mile for all facility types (ICAPCD 2017).

The Project's non-routine operations, including commissioning, startup, shutdown, and downtime of emission controls, would occur infrequently throughout the year and were not included in the H_2S modeled scenarios. As such, the H_2S results presented below reflect emissions associated with only routine power generation operations, which are anticipated to occur no less than 80 percent of the year. The non-routine operational conditions would occur for unknown durations randomly during the year and are difficult to predict with any reasonable certainty given their impacts have a strong dependence on meteorological conditions. At similar geothermal power plants operated by the Applicant, these non-routine operations occur for less than 50 percent of the time used to estimate emissions for this Project (in other words, this analysis is conservative with regards to the frequency and duration of non-routine operations). The potential for these infrequent events to occur during meteorological conditions hindering dispersion is expected to be minimal.

The nearest residences and sensitive receptors are located greater than 1 mile away from the Project location. Given the location of these receptors and the ICAPCD's CEQA Guidelines, the 1-hour H_2S modeling analysis will not include any receptors within 1 mile of the Project. Any potential impacts within this 1-mile radius would not be considered nuisance-related and not expose any nearby residences or sensitive receptors to any potential nuisances.

5.1.9.7 Model Outputs

Maximum short-term and annual impacts were used for determining compliance with all CAAQS, since these standards are never to be exceeded. The same maximum impacts were also conservatively used for assessing compliance with the following NAAQS: 1-hour and 8-hour CO (high, second-highs allowed); 1-hour SO_2 (5-year average of the 99^{th} annual percentiles of the 1-hour daily maximum allowed); 3-hour and 24-hour SO_2 (high, second-highs allowed); and 24-hour PM_{10} (sixth high over 5-years allowed). These same maximum impacts were also conservatively used for comparison to the NAAQS SILs. For 1-hour NO_2, the 5-year average of the annual 1-hour maxima and 98th annual percentiles of the 1-hour daily maximum were used for assessing compliance with the SIL and NAAQS, respectively. For 24-hour $PM_{2.5}$, the 5-year average of the annual 24-hour maxima and 98th annual percentiles were used for assessing compliance with the SIL and NAAQS, respectively. Finally, for annual $PM_{2.5}$, the 5-year average of the annual impacts was used for assessing compliance with both the SIL and NAAQS.

5.1.10 Environmental Analysis – Air Quality Impact Analysis Results

The following sections present the results of the air quality impact analyses for determining the changes to ambient air quality concentrations in the Project region as a result of Project construction and operation. Cumulative multi-source modeling assessments, which are used to analyze impacts from the Project plus nearby new or modified sources, will be performed at a later date following consultation with the appropriate agencies and per the methodology described in Section 5.1.9.5.

5.1.10.1 Project Operation

5.1.10.1.1 Ambient Air Quality Standards

Based on the Section 5.1.9.7 delineation of modeled results to applicable standards, modeled operational impacts were compared with the SILs, NAAQS, and CAAQS. To determine the magnitude and location of the maximum impacts for each pollutant and averaging period, the AERMOD model was used with all 5 years of meteorological data. All maximum facility impacts occurred well inside the fine gridded receptors with 25-m spacing. Therefore, additional 25-m refined receptor grids were not required.

The secondary formation of $PM_{2.5}$ and ozone from their precursors was also accounted in the Project's operational impacts based upon EPA Maximum Emission Rates of Precursors (MERPS) View Qlik[8] and EPA Methodology. Specifically, secondary impacts were calculated and added to the respective modeled results. The calculated secondary impact results are presented in Table 5.1-28.

Table 5.1-28. Operation Air Quality Impact Results – Secondary Emissions from Precursors

Pollutant	Precursor	Modeled Precursor Emission Rate (tpy)	Modeled Secondary Impact Concentration (µg/m³) [a]	Project Emissions (tpy)	Project Secondary Impact Concentration (µg/m³)
24-Hour $PM_{2.5}$	NO_x	500	0.025	1.19	<0.01
	SO_2	500	0.077	<0.01	<0.01
Annual $PM_{2.5}$	NO_x	500	0.001	1.19	<0.01
	SO_2	500	0.002	<0.01	<0.01
8-Hour Ozone	NO_x	500	0.84	1.19	<0.01
	VOC	500	0.06	1.01	<0.01

[a] The modeled secondary impacts were obtained from the Los Angeles County hypothetical source with a 10-m stack height.

The Project will not result in any direct emissions of ozone and, as seen in Table 5.1-28, the secondary impacts of ozone from its Project-emitted precursors of NO_x and VOC are less than 0.01 microgram per cubic meter (µg/m³). This secondary ozone impact is well below the SIL of 1 part per billion (ppb) and the Project would not cause or contribute to a violation of the NAAQS. As a result, no further analysis of ozone is presented.

As can be seen in Table 5.1-29, facility impacts are less than the EPA's SILs for all pollutants and averaging periods except $PM_{2.5}$. For pollutants and averaging periods with a predicted concentration that

[8] Available online at https://www.epa.gov/scram/merps-view-qlik.

is not significant (that is, if they are less than the SIL), the modeling is complete for that pollutant and averaging period and compliance with the NAAQS/CAAQS is demonstrated by not causing or contributing to a violation. If impacts are above the SIL, a cumulative modeling analysis is required. Both 24-hour and annual $PM_{2.5}$ predicted concentrations exceed their respective SIL and will, therefore, require a cumulative modeling analysis. Imperial County and CEC will receive the cumulative analysis under separate cover.

Table 5.1-29. Operation Air Quality Impact Results – Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Class II SIL (µg/m³)	Exceeds Class II SIL?
NO_2 [a]	5-year average of 1-hour yearly maxima (NAAQS)	1.21	7.55	No
	Annual maximum	0.04	1.00	No
Ozone	8-hour maximum	0.01	1.96	No
CO	1-hour maximum	1,427	2,000	No
	8-hour maximum	119	500	No
SO_2	1-hour maximum	<0.01	7.86	No
	3-hour maximum	<0.01	25.0	No
	24-hour maximum	<0.01	5.00	No
	Annual maximum	<0.01	1.00	No
PM_{10}	24-hour maximum	3.19	5.00	No
	Annual maximum	0.36	1.00	No
$PM_{2.5}$	5-year average of 24-hour yearly maxima (NAAQS)	1.59	1.20	Yes
	5-year average of annual concentrations (NAAQS)	0.20	0.20	Yes

Note:

-- = Not applicable and/or no standard

The Project's maximum modeled concentrations are conservatively compared to the CAAQS and NAAQS, regardless of the SIL results, in Table 5.1-30. As shown, maximum combined impacts (modeled plus background) are less than all the CAAQS and NAAQS except for the PM_{10} CAAQS. The modeled exceedances of the PM_{10} CAAQS are due to high background concentrations, which already exceed the CAAQS (the area is already designated as a nonattainment area for the PM_{10} CAAQS). As noted above, the facility is already projected to have maximum impacts less than the SILs for both 24-hour and annual PM_{10} (the only pollutant with background concentrations above the ambient air quality standard). Thus, the Project would not significantly contribute to current exceedances of the PM_{10} CAAQS.

Table 5.1-30. Operation Air Quality Impact Results – Ambient Air Quality Standards

Pollutant	Averaging Period	Maximum Conc. (µg/m³)	Background Conc. (µg/m³)	Total Conc. (µg/m³)	CAAQS (µg/m³)	NAAQS (µg/m³)	Exceeds Standard?
NO_2*	1-hour maximum (CAAQS)	141	105	246	339	--	No
	5-year average of 1-hour yearly 98th percentiles (NAAQS)	1.04	65.2	66.2	--	188	No
	Annual maximum	0.04	17.4	17.4	57	100	No

Pollutant	Averaging Period	Maximum Conc. (µg/m³)	Background Conc. (µg/m³)	Total Conc. (µg/m³)	CAAQS (µg/m³)	NAAQS (µg/m³)	Exceeds Standard?
H_2S	1-hour maximum (CAAQS)	18.8	--	18.8	42	--	No
CO	1-hour maximum (CAAQS and NAAQS)	1,427	5,266	6,693	23,000	40,000	No
	8-hour maximum (CAAQS and NAAQS)	119	3,549	3,668	10,000	10,000	No
SO_2	1-hour maximum (CAAQS and NAAQS)	<0.01	22.5	22.5	655	196	No
	3-hour maximum (NAAQS)	<0.01	22.5	22.5	--	1,300 [a]	No
	24-hour maximum (CAAQS and NAAQS)	<0.01	7.10	7.10	105	365	No
	Annual maximum (NAAQS)	<0.01	1.10	1.10	--	80	No
PM_{10}	24-hour maximum (CAAQS) [b]	3.19	241.3	244	50	--	Yes
	24-hour average high-sixth-high (NAAQS)	2.48	142	144	--	150	No
	Annual maximum (CAAQS) [b]	0.36	39.8	40.2	20	--	Yes
$PM_{2.5}$	5-year average of 24-hour yearly 98th percentiles (NAAQS)	1.21	21.0	22.2	--	35	No
	Annual maximum (CAAQS)	0.21	9.40	9.61	12	--	No
	5-year average of annual concentrations (NAAQS)	0.20	8.67	8.87	--	12.0	No

[a] Secondary standard.

[b] The PM_{10} CAAQS are not applicable as the area is designated as nonattainment.

Note:

-- = Not applicable and/or no standard

5.1.10.1.2 Fumigation Analysis

Fumigation analyses with the EPA Model AERSCREEN (Version 21112) were conducted for inversion breakup conditions based on EPA guidance given in EPA-454/R-92-019 (EPA 1992b). Shoreline fumigation impacts were additionally assessed as the nearest distance to the shoreline of any large bodies of water is within 3 kilometers with the Salton Sea located less than 1,000 m to the west and northwest of the Project. Since AERSCREEN is a single point source model, only one representative cooling tower stack was modeled as it represents the Project's only source with a stack height greater than 10 m that emits criteria pollutants. Other AERSCREEN inputs included the cooling tower building data, cooling tower stack parameters, the minimum and maximum observed temperature values used by the ICAPCD for generating the Imperial County Airport meteorological data (27°F and 122°F [-3°C and 50°C], respectively), default seasonal and land cover data for cultivated land and average moisture, a minimum fence line distance of 125 m, rural dispersion conditions, no flagpole receptors, a minimum wind speed of 2.5 m/s with a 10-m anemometer height, and flat terrain. Impacts were initially evaluated for unitized emission rates (1.0 pound per hour).

The results of the fumigation analysis in AERSCREEN indicated no meteorological hours fit the fumigation criteria; therefore, no fumigation calculations were possible. This is the result of the fact that no hours meeting the stability and wind speed criteria were present, causing AERCREEN to issue a notice that no hours meet the criteria. Based upon these facts, no fumigation impacts are expected to occur from the Project.

5.1.10.1.3 Nitrogen and Particulate Deposition Impacts

The proposed Project may result in emissions of nitrogenous compounds such as NO_X and NH_3. Nitrogen oxide gases (NO and NO_2) convert to nitrate particulates in a form that is suitable for uptake by most plants and could promote plant growth and primary productivity. Coastal salt marshes are a common natural habitat in the vicinity of the Project where nitrogen deposition may occur. The critical load for atmospheric nitrogen deposition into coastal wetlands is difficult to establish because wetlands subject to tidal exchange have open nutrient cycles. In addition, nitrogen loading in wetlands is often affected by sources other than atmospheric deposition (Morris 1991). Various studies that have examined nitrogen loading in intertidal salt marsh wetlands have found critical loads to range from between 63 and 400 kilograms per hectare per year (kg $ha^{-1}yr^{-1}$) (Caffrey et al. 2007; Wigand et al. 2003). The wetlands near the Project are not expected to be sensitive to atmospheric nitrogen deposition as the impacts would likely be minimal compared to agricultural runoff nitrogen loading.

Regardless, a deposition analysis was performed using AERMOD with the options and inputs as described in Section 5.1.9.1. In addition, the following data were used/assumed for this analysis:

- AERMOD wet and dry deposition options. Depositional rates and parameters were based upon nitric acid (HNO_3) which, of all the depositing species, has the highest affinity for impacts to soils and vegetation and tendency to stick to what it is deposited on.
- Dry deposition land use characteristics were developed using satellite aerial imagery for each 10-degree increment within a 3-kilometer radius surrounding the Project.
- Dry deposition seasonal categories were assigned based upon historical meteorological trends for the region.
- NO_X and NH_3 were assumed to be 100 percent converted into atmospherically-derived nitrogen at the release point, where applicable, rather than allowing for the conversion of NO_X and NH_3 to occur over distance and time within the atmosphere, which is more realistic.
- Maximum settling velocities were selected to produce conservative deposition rates.

Emissions of depositional nitrogen were conservatively calculated as a complete conversion of in-stack NO_X and NH_3 from each of the combustion sources. This was done by multiplying the nitrogen mass fraction of each of the pollutants by the respective average annual emissions. Accordingly, modeled impacts will overstate potential effects.

The dry deposition algorithms in AERMOD include land use characteristics and some dry gas deposition resistance terms based on five seasonal categories and nine land use categories. The seasonal categories for each month of modeling are as follows:

- Midsummer: April, May, June, and July
- Autumn: August, September, and October
- Late Autumn/Winter without snow: November, December, and January
- Transitional Spring: February and March

Land use categories are used within AERMOD to calculate dry deposition of the emitted nitrogen compounds. For example, in areas of lush vegetation, the gaseous nitrogen compounds would have a higher uptake and, therefore, dry deposition would be higher at these areas than in bodies of water or urban areas with fewer trees. A determination for land use categories used in the analysis was conducted using satellite aerial imagery for which each 10-degree increment within a 3-kilometer radius surrounding the Project was defined as either grassy suburban area or unforested wetland.

AERMOD also requires the input of wet and dry depositional parameters based on the nitrogen-containing species being emitted. For this analysis, it was conservatively assumed that all nitrogen emitted was in the form of HNO_3, as HNO_3 is the most aggressive species with regards to deposition. Based on the above, over-predictive modeling approach, the maximum modeled annual deposition averaged over the wetlands was 608 kg $ha^{-1}yr^{-1}$. The Project's nitrogen deposition impacts are not expected to significantly contribute to nitrogen loading on coastal marshes because of several factors, including the fact that the area surrounding the Project is not a densely vegetated coastal marsh land and that depositional nitrogen formation requires time for the chemical reaction to occur. Because the predominate wind patterns (west to east) in the Project vicinity, among other factors, will result in a majority of the potential air quality impacts occurring away from the Project site and nearby wetlands, time and distance will reduce ground-level concentrations contributing to nitrogen deposition.

Particulate emissions will be controlled by diesel exhaust particulate filtration and the exclusive use of ultra-low sulfur diesel fuel for stationary combustion sources and high-efficiency drift eliminators for the cooling towers. The deposition of PM_{10} can affect vegetation through either physical or chemical mechanisms. Physical mechanisms include the blocking of stomata so that normal gas exchange is impaired, as well as potential effects on leaf adsorption and reflectance of solar radiation. Information on physical effects is limited, presumably in part because such effects are slight or not obvious except under extreme situations (Lodge et al. 1981). Given the emission controls incorporated into the Project design and modeled particulate impacts, no additional mitigation measures are required.

5.1.10.2 Project Construction

Based on the Section 5.1.9.7 delineation of modeled results to applicable standards, modeled construction impacts were compared with the SILs, NAAQS, and CAAQS. To determine the magnitude and location of the maximum potential impacts for each pollutant and averaging period, the AERMOD model was used with all 5 years of meteorological data. All modeled maximum facility impacts occurred well inside the fine gridded receptors with 25-m spacing. Therefore, additional 25-m refined receptor grids were not necessary.

The secondary formation of $PM_{2.5}$ and ozone from their precursors were also accounted in the Project's construction impacts based upon EPA MERPS View Qlik and EPA Methodology (EPA 2019). Specifically, secondary impacts were calculated and added to the respective modeled results. The calculated secondary impact results are presented in Table 5.1-31.

Table 5.1-31. Construction Air Quality Impact Results – Secondary Emissions from Precursors

Pollutant	Precursor	Modeled Precursor Emission Rate (tpy)	Modeled Secondary Impact Concentration ($\mu g/m^3$) [a]	Project Emissions (tpy)	Project Secondary Impact Concentration ($\mu g/m^3$)
24-Hour $PM_{2.5}$	NO_x	500	0.025	23.6	<0.01
	SO_2	500	0.077	0.23	<0.01
Annual $PM_{2.5}$	NO_x	500	0.001	23.6	<0.01
	SO_2	500	0.002	0.23	<0.01
8-Hour Ozone	NO_x	500	0.84	23.6	0.04
	VOC	500	0.06	9.47	<0.01

[a] The modeled secondary impacts were obtained from the Los Angeles County hypothetical source with a 10-m stack height.

The Project construction will not result in any direct emissions of ozone and, as seen in Table 5.1-31, the secondary impacts of ozone from its Project-emitted precursors of NO_x and VOC are 0.04 µg/m^3. This secondary ozone impact is well below the SIL of 1 ppb such that the Project would not cause or contribute to a violation of the NAAQS. As a result, no further analysis of ozone is necessary.

As can be seen in Table 5.1-32, potential impacts are less than the EPA's SILs for all pollutants and averaging periods except 1-hour and annual NO_2, 24-hour and annual PM_{10}, and annual $PM_{2.5}$. For pollutants and averaging periods with a predicted concentration that is not significant (that is, if they are less than the SIL), the modeling is complete for that pollutant and averaging period and compliance with the NAAQS/CAAQS is demonstrated by not causing or contributing to a violation. If impacts are above the SIL, a cumulative modeling analysis is required. 1-hour and annual NO_2, 24-hour and annual PM_{10}, and annual $PM_{2.5}$ predicted concentrations exceed their respective SIL and will, therefore, require a cumulative modeling analysis. Imperial County and CEC will receive the cumulative analysis under separate cover.

Table 5.1-32. Construction Air Quality Impact Results – Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration (µg/m^3)	Class II SIL (µg/m^3)	Exceeds Class II SIL?
NO_2	5-year average of 1-hour yearly maxima (NAAQS)	56.1	7.55	Yes
	Annual maximum	10.2	1.00	Yes
Ozone	8-hour	0.03	1.96	No
CO	1-hour maximum	116	2,000	No
	8-hour maximum	93.2	500	No
SO_2	1-hour maximum	0.31	7.86	No
	3-hour maximum	0.28	25.0	No
	24-hour maximum	0.15	5.00	No
	Annual maximum	0.11	1.00	No
PM_{10}	24-hour maximum	5.60	5.00	Yes
	Annual maximum	1.11	1.00	Yes
$PM_{2.5}$	5-year average of 24-hour yearly maxima (NAAQS)	1.00	1.20	No
	5-year average of annual concentrations (NAAQS)	0.22	0.20	Yes

Note:

-- = Not applicable and/or no standard

The Project's maximum modeled concentrations are compared to the CAAQS and NAAQS in Table 5.1-33. As shown, maximum combined impacts (modeled plus background) are less than all the CAAQS and NAAQS except for the PM_{10} CAAQS. The modeled exceedances of the PM_{10} CAAQS are due to high background concentrations, which already exceed the CAAQS (like the majority of the state, the area is designated as a nonattainment area for the PM_{10} CAAQS). The Project is not below the SIL for the 24-hour and annual PM_{10} standards though the Project owner will implement construction control measures as described in Section 5.1.7.2.2. These control measures would reduce particulate emissions to the extent required by ICAPCD, thus making the Project consistent with attainment plans for the PM_{10} standards. Additionally, the PM_{10} emissions associated with construction of the Project, as presented in Table 5.1-20, are below the ICAPCD significance threshold of 150 pounds per day. Therefore, the Project construction would likely result in less-than-significant impacts with respect to particulate emissions.

Table 5.1-33. Construction Air Quality Impact Results – Ambient Air Quality Standards

Pollutant	Averaging Period	Maximum Concentration (µg/m^3)	Background (µg/m^3)	Total (µg/m^3)	CAAQS (µg/m^3)	NAAQS	Exceeds Standard?
NO_2	1-hour maximum (CAAQS)	56.7	105	162	339	--	No
	5-year average of 1-hour yearly 98th percentiles (NAAQS)	54.7	65.2	120	--	188	No
	Annual maximum	10.2	17.4	27.6	57	100	No
CO	1-hour maximum (CAAQS and NAAQS)	116	5,266	5,382	23,000	40,000	No
	8-hour maximum (CAAQS and NAAQS)	116	3,549	3,665	10,000	10,000	No
SO_2	1-hour maximum (CAAQS and NAAQS)	0.31	22.5	22.8	655	196	No
	3-hour maximum (NAAQS)	0.28	22.5	22.8	--	1,300	No
	24-hour maximum (CAAQS and NAAQS)	0.15	7.10	7.25	105	365	No
	Annual maximum (NAAQS)	0.11	1.10	1.21	--	80.0	No
PM_{10}	24-hour maximum (CAAQS) [b]	5.60	241.3	247	50.0	--	Yes
	24-hour average high-sixth-high (NAAQS)	4.75	142	147	--	150	No
	Annual maximum (CAAQS) [b]	1.11	39.8	40.9	20.0	--	Yes
$PM_{2.5}$	5-year average of 24-hour yearly 98th percentiles (NAAQS)	0.86	21.0	21.9	--	35.0	No
	Annual maximum (CAAQS)	0.22	9.40	9.62	12.0	--	No
	5-year average of annual concentrations (NAAQS)	0.22	8.67	8.89	--	12.0	No

[a] Secondary standard.

[b] The PM_{10} CAAQS are not applicable as the area is designated as nonattainment.

Note:

-- = Not applicable and/or no standard

5.1.11 Laws, Ordinances, Regulations, and Statutes

Table 5.1-34 presents a summary of federal, state, and local air quality LORS deemed applicable to the Project. Specific LORS related to air quality and climate change are discussed in greater detail in Sections 5.1.11.1 and 5.1.11.2, respectively.

Table 5.1-34. Summary of LORS – Air Quality

LORS	Purpose	Regulating Agency	Project Conformance
Federal Regulations (EPA)			
CAA Amendments of 1990, 40 CFR Part 50	Establishes ambient air quality standards for criteria air pollutants.	EPA Region IX	The modeling analysis for the Project presented in Section 5.1.10 demonstrates the Project will not cause or contribute to a violation of the state or federal ambient air quality standards during even the worst-case operating profile, except for H_2S and 24-hour and annual $PM_{2.5}$. The Project will not exceed the H_2S CAAQS when considering only routine operations and treating H_2S as a nuisance with a 1-mile exclusion zone. Although the Project meets the NAAQS for 24-hour and annual $PM_{2.5}$, a cumulative impacts analysis will be performed to demonstrate compliance when considering the cumulative impact of nearby sources.
40 CFR Part 51 (NSR) (ICAPCD Rule 207)	Requires preconstruction review and permitting of new or modified stationary sources of air pollution to allow industrial growth without interfering with the attainment and maintenance of ambient air quality standards.	ICAPCD with EPA Region IX oversight	Requires NSR permitting for construction of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than the NAAQS. The NSR requirements are implemented at the local level with EPA oversight (ICAPCD Rule 207). An ATC and permit to operate (PTO) will be obtained from ICAPCD prior to construction of the Project. As a result, the compliance requirements of 40 CFR 51 will be met.
40 CFR Part 52 (PSD)	Allows new sources of air pollution to be constructed, or existing sources to be modified in areas classified as attainment, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I Areas (e.g., national parks and wilderness areas).	ICAPCD with EPA Region IX oversight	The PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing major stationary source. ICAPCD classifies an unlisted source (which is not in the specified 28 source categories) that emits or has the PTE 250 tpy of any pollutant regulated by the CAA as a major stationary source. For listed sources, the threshold is 100 tpy. NO_x, VOC, or SO_2 emissions from a modified major source are subject to PSD if the cumulative emission increases for either pollutant exceeds 40 tpy. ICAPCD Rule 207 additionally outlines a significant increase as 15 tpy of PM_{10}. In addition, a modification at a nonmajor source is subject to PSD if the modification itself would be considered a major source. In May 2010, EPA issued the GHG permitting rule officially known as the “Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule” (GHG Tailoring Rule), in which EPA defined six GHG pollutants (collectively combined and measured as CO_2e) as NSR-regulated pollutants. Under the GHG Tailoring Rule, new projects that emit GHG pollutants above certain threshold levels would be subject to PSD permitting beginning in July 2011. However, in July 2014, the U.S. Supreme Court ruled that EPA could not regulate GHG emissions alone. As a result, new sources with a GHG PTE equal to or greater than 75,000 tpy of CO_2e are no longer required to obtain a PSD permit specifically for GHG emissions. If the new source would require a PSD permit as a result of criteria pollutant PTE, a BACT analysis to evaluate GHG emissions control would still be required. The Project is a geothermal-powered PGF and would not be considered one of the 28 listed source categories. Therefore, the emission rates were compared to the 250-tpy threshold. As shown in Section 5.1.7, the emission increases from the Project would not exceed the 250-tpy threshold. Therefore, the Project would not be subject to PSD.

LORS	Purpose	Regulating Agency	Project Conformance
40 CFR Part 60 Subpart IIII (NSPS) (ICAPCD Regulation XI)	Establishes national standards of performance for new or modified stationary compression ignition internal combustion engines.	ICAPCD with EPA Region IX Oversight	The Project will include four diesel-fired emergency generators and one diesel fire pump which are subject to operations, maintenance, and emissions requirements of this subpart. The Project's diesel engines will be operated and maintained as per the manufacturer specifications. The emergency generators will be Tier 4 compliant, meaning their emissions will not exceed any of the emission limitations of this subpart. The fire pump will be Tier 2 compliant and will be certified to emission rates that meet the requirements of this subpart.
40 CFR Part 70 (Title V) (ICAPCD Regulation IX)	CAA Title V Operating Permits Program.	ICAPCD with EPA Region IX Oversight	The Title V Operating Permits Program requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. The requirements of 40 CFR Part 70 apply to facilities that are subject to NSPS requirements and are implemented at the local level through ICAPCD Regulation IX. According to Regulation IX, Rule 903, a facility would be required to submit a Title V application if the facility has a PTE greater than 100 tpy of any regulated air pollutant except GHGs or if the HAP PTE is greater or equal to 25 tpy for combined HAPs and 10 tpy for individual HAPs. A Title V application is only required for GHGs if the facility has a PTE greater than 100,000 tpy CO_2e. The Project will not exceed any Title V thresholds itself, excluding commissioning years. However, if the Project is later connected to the existing Applicant-owned geothermal plants to share geothermal fluid and steam, Title V applicability will be reassessed. All permitting will be conducted through ICAPCD and compliant with their rules and regulations.
40 CFR Part 64 (Compliance Assurance Monitoring [CAM] Rule)	Establishes onsite monitoring requirements for emission control systems.	ICAPCD with EPA Region IX Oversight	Requires facilities to monitor the operation and maintenance of emissions control systems and report any control system malfunctions to the appropriate regulatory agency. If an emission control system is not working properly, the CAM Rule also requires a facility to take action to correct the control system malfunction. The CAM Rule applies to emissions units with uncontrolled PTE levels greater than applicable major source thresholds. Emission control systems governed by Title V operating permits requiring continuous compliance determination methods are generally compliant with the CAM Rule. The only emission controls for the Project include H_2S, which is not a pollutant applicable to major source thresholds. Therefore, the unabated Project emissions presented in Section 5.1.7 would not exceed the major source thresholds and the CAM rule would not be applicable.
40 CFR Part 63 (HAPs, Maximum Available Control Technology [MACT])	Establishes national emission standards to limit emissions of HAPs or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established from facilities in specific categories.	ICAPCD with EPA Region IX Oversight	Establishes emission standards to limit emissions of HAPs from specific source categories for major HAP sources. Sources subject to 40 CFR Part 63 requirements must either use the MACT, be exempted under 40 CFR Part 63, or comply with published emission limitations. Projects would be subject to the 40 CFR Part 63 requirements if the HAP PTE is greater or equal to 25 tpy for combined HAPs and 10 tpy for individual HAPs. As shown in Section 5.1.7, the Project would not exceed the major source thresholds for HAPs (10 tpy for any one pollutant or 25 tpy for all HAPs combined). Therefore, the Project would be less than the 40 CFR Part 63 applicability threshold.

LORS	Purpose	Regulating Agency	Project Conformance
State Regulations (CARB)			
California Health & Safety Code (CHSC), Section 41700	Prohibits emissions in quantities that adversely affect public health, safety, businesses, or property.	ICAPCD with CARB Oversight	The CEC Conditions of Certification and the ICAPCD ATC processes are developed to ensure that no adverse public health effects or public nuisances result from operation of the Project.
Senate Bill 32 – California Global Warming Solutions Act of 2016 (SB 32)	Aims to reduce carbon emissions within the state by approximately 40 percent from 1990 levels by the year 2030.	ICAPCD with CARB Oversight	Requires CARB to develop regulations to limit and reduce GHG emissions. As a geothermal-powered PGF, this Project will support the emission reduction goals of SB 32.
17 CCR, Article 5	Establishes GHG limitations, reporting requirements, and a Cap and Trade offsetting program.	CARB	CARB has promulgated a Cap and Trade regulation that limits or caps GHG emissions and requires subject facilities to acquire GHG allowances. The Project GHG emissions have been estimated, and the Project owner will report emissions and acquire allowances and offsets consistent with these regulations if required.
California Senate Bill 1368 – Emissions Performance Standards (SB 1368)	Limits long-term investments in baseload generation by the state's utilities to power plants that meet an emissions performance standard jointly established by the CEC and the California Public Utilities Commission (CPUC).	CEC with CARB Oversight	The Project is considered a baseload facility subject to this regulation with GHG emissions that satisfy this requirement, emitting 138 pounds CO_2 per megawatt-hour[9] compared to the threshold of 1,100 pounds CO_2 per megawatt-hour.
California Assembly Bill 617– Community Air Protection Plan (AB 617)	Establishes community air monitoring and emission reduction plans to reduce exposure in communities most impacted by air pollution.	ICAPCD with CARB Oversight	The Project is not located in a community identified in AB 617. The Project will comply with all applicable ICAPCD emissions reporting requirements and rules and regulations.

[9] Calculated as 46,619 tpy CO_2 x 2,000 pounds per ton / 77 MW-net / 8,760 hours per year.

LORS	Purpose	Regulating Agency	Project Conformance
Local Regulations (ICAPCD)			
Rule 201	Defines the types and permits required.	ICAPCD	An ATC and PTO will be obtained from ICAPCD prior to construction of the Project.
Rule 204	Outlines the information required for inclusion in a permit application.	ICAPCD	Requires permit applications to include sufficient information to allow ICAPCD's determination of compliance with applicable rules. The Project will include all required information from this Application for Certification (AFC) in the ICAPCD ATC/PTO application.
Rule 207	Establishes pre-construction review requirements for new or modified stationary sources.	ICAPCD	An ATC and PTO will be obtained from ICAPCD prior to construction of the Project.
Rule 208	Permits inspection of permitted sources by ICAPCD.	ICAPCD	The Project will be available for ICAPCD inspection upon notification.
Rule 400	Limits NO_X emissions from fuel burning equipment.	ICAPCD	The Project's emergency generators and fire pump emissions do not exceed the ICAPCD Rule 400 limit of 140 lbs/hr, as shown in Section 5.1.7.
Rule 400.3	Limits NO_X and CO emissions from fuel burning equipment.	ICAPCD	The Project's emergency generators will be Tier 4 compliant equipment with NO_X emission rates well below the ICAPCD Rule 400.3 limit of 90 ppm. The fire pump is not subject to this Rule as it will operate 50 hours per year or less for maintenance and testing or in an emergency situation to protect human life and public health.
Rule 401	Limits visible emissions.	ICAPCD	Rule 401 prohibits visible emissions other than water vapor as dark as or darker than Ringlemann No. 1 for periods greater than 3 minutes in any hour. Visible emissions from the Project would result from particulate emissions from the cooling tower and stationary internal combustion engines. All sources will be operated according to manufacturer specifications to minimize visibility impacts due to inadequate combustion and excess particulate emissions.
Rule 403	Establishes air contaminant maximum emission rates for particulate matter.	ICAPCD	The Project is exempt from this rule as it operates only emergency diesel generators and a fire pump as combustion sources. The power generation activities are steam-powered and are, therefore, not applicable combustion sources.
Rule 405	Limits sulfur compound emissions.	ICAPCD	Rule 405 limits sulfur compound emissions to no more than 0.2 percent by volume from any source and combusted diesel fuels must be less than 0.5 percent by weight. The primary Project sulfur compound emissions will be H_2S, which will be monitored through analytical testing of the NCG and cooling towers to confirm Rule 405 standards are not exceeded. All diesel fuel combusted at the Project will be ultra-low sulfur diesel with a sulfur content not to exceed 15 ppm by weight.
Rule 407	Prohibits public nuisances.	ICAPCD	The Project will obtain an ATC and PTO from ICAPCD which will confirm Project operations do not cause public nuisance.

LORS	Purpose	Regulating Agency	Project Conformance
Rule 800	Establishes fugitive dust limits and mitigation measures.	ICAPCD	The Project will implement best available control measures during construction activities, as listed in Section 5.1.7.2.2. These measures will minimize fugitive dust emissions to the extent feasible. In addition, a Storm Water Pollution Prevention Plan will be developed to further minimize fugitive dust emissions during construction and operation.
Rule 801	Establishes construction and earthmoving fugitive dust limits and mitigation measures.	ICAPCD	The Project will implement best available control measures during construction activities, as listed in Section 5.1.7.2.2. These measures will comply with the requirements of this rule and minimize fugitive dust emissions to the extent feasible. The Project will also prepare and file a Dust Control Plan with ICAPCD, as required.
Rule 803	Establishes carry-out and track-out fugitive dust limits and mitigation measures.	ICAPCD	The Project will implement best available control measures during construction activities, as listed in Section 5.1.7.2.2. These measures will comply with the requirements of this rule and minimize fugitive dust emissions to the extent feasible.
Rule 804	Establishes open area fugitive dust limits and mitigation measures.	ICAPCD	The Project will implement best available control measures during construction activities, as listed in Section 5.1.7.2.2. These measures will comply with the requirements of this rule and minimize fugitive dust emissions to the extent feasible.
Rule 805	Establishes paved and unpaved roads fugitive dust limits and mitigation measures.	ICAPCD	The Project will implement best available control measures during construction activities, as listed in Section 5.1.7.2.2. These measures will comply with the requirements of this rule and minimize fugitive dust emissions to the extent feasible.
Regulation IX (Title V)	Implements the operating permit requirements of Title V of the CAA as amended in 1990.	ICAPCD	The Project will consult with ICAPCD regarding permit applicability and apply for a Title V air permit if required.
Rule 1001	Implements federal NESHAP provisions of 40 CFR Part 61.	ICAPCD	The Project is not subject to Rule 1001 as there are no applicable 40 CFR Part 61 subparts listed in Rule 1001, Section D.
Rule 1002	Implements CARB's Airborne Toxic Control Measures (ATCM) provisions.	ICAPCD and CARB	The Project will implement best management practices during construction, consistent with Section 5.1.7.2.2, which will comply with all applicable construction-related ATCM provisions. The Project operations will include stationary internal combustion engines which will be fired using ultra-low sulfur diesel with a sulfur content not to exceed 15 ppm by weight.
Rule 1003	Establishes cooling tower emissions limits and hexavalent chromium provisions.	ICAPCD	The Project will not dose cooling tower circulating water with chromium containing compounds. Additionally, analytical data of the cooling tower condensate will be collected, as required by this rule, to ensure chromium levels do not exceed Rule 1003 levels of 0.15 milligrams per liter. A cooling tower compliance plan will also be submitted to the ICAPCD, as required, to ensure compliance with this rule.
Regulation XI (NSPS)	Implements federal NSPS provisions of 40 CFR Part 60.	ICAPCD	The Project will comply with all applicable NSPS regulations, as stated in the 40 CFR Part 60 LORS entry above.

5.1.11.1 Specific LORS Discussion – Air Quality

5.1.11.1.1 Federal LORS

The EPA implements and enforces the requirements of many of the federal air quality laws. EPA has adopted the following stationary source regulatory programs in its effort to implement the requirements of the CAA, each of which are described below:

- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- PSD
- NSR
- Title V: Operating Permits Program

National Standards of Performance for New Stationary Sources–40 CFR Part 60, Subpart IIII. The NSPS program provisions limit the emissions of criteria pollutants from new or modified facilities in specific source categories. The applicability of these regulations depends on the equipment size or rating; material or fuel process rate; and/or the date of construction, or modification. Reconstructed sources can be affected by NSPS as well.

Subpart IIII establishes emission and operational limits of criteria pollutants for new stationary compression ignition engines. All stationary diesel engines installed and operated at the Project will be compliant with operational and emission provisions in Subpart IIII specific to their respective engine types.

National Emission Standards for Hazardous Air Pollutants–40 CFR Part 63. The NESHAP program provisions limit HAP emissions from existing major sources of HAP emissions in specific source categories. The NESHAP program also requires the application of MACT to any new or reconstructed major source of HAP emissions to minimize those emissions. Subpart ZZZZ will be applicable to the Project's stationary diesel combustion engines (fire pump and emergency generators). Subpart Q will not be applicable to the proposed cooling tower as chromium-based water treatment will not be used in its operations.

Prevention of Significant Deterioration Program–40 CFR Parts 51 and 52. The PSD program requires the review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies only to pollutants for which ambient concentrations do not exceed the corresponding NAAQS. The PSD program allows new sources of air pollution to be constructed, and existing sources to be modified, while maintaining the existing ambient air quality levels in the Project region and protecting Class I areas from air quality degradation. The Project is not expected to trigger the PSD permitting requirements.

New Source Review–40 CFR Parts 51 and 52. The NSR program requires the review and permitting of new or modified major stationary sources of air pollution to allow industrial growth without interfering with the attainment of NAAQS. NSR applies to pollutants for which ambient concentrations exceed the corresponding NAAQS. The Project's air quality impact analysis complies with all applicable NSR provisions, as shown in Section 5.1.10.

Title V – Operating Permits Program–40 CFR Part 70. The Title V Operating Permits Program requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. Title V applies to major facilities, acid rain facilities, subject solid waste incinerator facilities, and any facility listed by EPA as requiring a Title V permit. The proposed facility will not be subject to Title V permitting itself. However, if the proposed Project is later connected to the existing Applicant-owned geothermal plants to share geothermal fluid and steam, Title V applicability will be reassessed.

5.1.11.1.2 State LORS

CARB's jurisdiction and responsibilities fall into the following five areas: (1) implement the state's motor vehicle pollution control program; (2) administer and coordinate the state's air pollution research program; (3) adopt and update the CAAQS; (4) review the operations of the local air pollution control districts (APCDs) to ensure compliance with state laws; and (5) review and coordinate preparation of the State Implementation Plan (SIP). Some key programs which support the above responsibilities, as applicable to the Project, are described below.

Assembly Bill 617 – Community Air Protection Program. AB 617 establishes the Community Air Protection Program (CAPP) to focus on reducing exposure in communities most impacted by air pollution. The CAPP establishes community-wide air monitoring and emission reduction programs as well as provides funding to incentivize early actions to deploy cleaner technologies in the affected communities.

Air Toxic "Hot Spots" Act – California Health & Safety Code Sections 44300-44384. The Air Toxics "Hot Spots" Information and Assessment Act requires the development of a statewide inventory of TAC emissions from stationary sources. The program requires affected facilities to: (1) prepare an emissions inventory plan that identifies relevant TACs and sources of TAC emissions; (2) prepare an emissions inventory report quantifying TAC emissions; and (3) prepare an HRA, if necessary, to quantify the health risks to the exposed public. Facilities with significant health risks must notify the exposed population, and in some instances must implement risk management plans to reduce the associated health risks. The Project's compliance with this program is detailed in Section 5.9.

Public Nuisance – California Health & Safety Code Section 41700. Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or which endanger the comfort, repose, health, or safety of the public, or that damage business or property.

Airborne Toxic Control Measure for Stationary Compression Ignition Engines – 17 CCR Section 93115. This ATCM is aimed at reducing DPM and criteria pollutant emissions from stationary diesel-fueled compression ignition engines through fuel requirements, operational restrictions, and emission limits. The ATCM applies to points of sale of stationary compression ignition engines for use in California except portable engines, engines for motive power, auxiliary engines on marine vessels, and agricultural wind machines.

5.1.11.1.3 Local LORS – ICAPCD

The ICAPCD is responsible for implementing regulations at the local level which minimize air emissions for purposes of complying with federal standards. Key regulations applicable to the Project are summarized below.

ICAPCD Regulation II – Permits. ICAPCD Regulation II establishes the basic framework for acquiring permits to construct and operate from the air district. The AFC will be the basis for the District's Determination of Compliance. A separate ATC application will be submitted to the ICAPCD. The ATC application, for the purposes of maintaining consistency with the AFC, will be similar in scope and detail, and will contain the required District permit application forms.

ICAPCD Regulation VIII – Fugitive Dust Rules. Regulation VIII implements multiple fugitive dust requirements to limit particulate emissions. The ATC application to be filed with the ICAPCD will comply with all required fugitive dust rules and requirements through implementation of the best management practices identified in Section 5.1.7.2.2.

ICAPCD Regulation IX – Federal Operating Permit Program. Regulation IX (Title V Permits) implements the federal operating permit program at the local District level. The ATC application to be filed with the ICAPCD will contain all the required application forms.

ICAPCD Regulation X – Air Toxic Control Measures. Regulation X (ATCM) incorporates by reference the provisions regarding air toxic emissions including federal NESHAPs, CARB ATCMs, and specific limits for cooling towers operations. The Project will comply with all ATCMs and other operational limitations.

ICAPCD Prohibitory or Source-Specific Rules. Relevant ICAPCD prohibitory or source-specific rules include the following:

- **Rule 400 – Fuel Burning Equipment:** Establishes limits for NO_X emissions from stationary sources. Rule 400 prohibits NO_X emissions of 140 pounds or greater per hour from stationary fuel burning equipment. Stationary fuel burning operations at the Project are not expected to exceed 140 pounds per hour of NO_X.
- **Rule 400.3 – Internal Combustion Engines:** Establishes emission limitations for NO_X and CO from internal combustion engines greater than 50 horsepower. Internal combustion emissions from the Project will not exceed the emission limitations in Rule 400.3(C).
- **Rule 401 – Opacity of Emissions:** Prohibits discharges to the atmosphere of any air contaminant other than water darker than No. 1 on the Ringlemann Chart or similar obstruction for a period greater than three minutes in any hour. Emissions from the Project are not expected to cause high opacity plumes other than water vapor discharge.
- **Rule 403 – General Limitations on the Discharge of Air Contaminants:** Establishes limits for air contaminant emissions for multiple operation types. Section (B)(2) is relevant to Project's proposed sources, as it limits air contaminant concentrations in standardized gas flows. The Project's proposed sources will not exceed the emission limitations for any air contaminant.
- **Rule 405 – Sulfur Compounds Emission Standards, Limitations, and Prohibitions:** Establishes limits for the sulfur emissions from all sources. Rule 405 limits the sulfur content of emissions to not exceed 0.2 percent by volume. The rule additionally specifies fuel sulfur content limitations of 0.5 percent by weight for fluid and solid fuels and emissions not to exceed 500 ppm by volume or 200 pounds per hour for fuel burning equipment. All diesel fuel combusted by the Project during construction and operations will be ultra-low sulfur diesel not to exceed 15 ppm sulfur.
- **Rule 407 – Nuisances:** Restricts discharges of air contaminants at any quantity that cause injury, detriment, nuisance, or annoyance to a considerable number of persons or the general public.

5.1.11.2 Specific LORS Discussion – Climate Change and Global Warming

State law defines GHGs to include the following: CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 (California Health and Safety Code Section 38505[g]). The most common GHG that results from human activity is CO_2, followed by CH_4 and N_2O. Key federal, state, and local legislative actions associated with GHG emissions and climate change are described below.

5.1.11.2.1 Federal Legislative Action

Executive Order 13423, signed by President George W. Bush on May 14, 2007, directed the EPA and Department of Transportation (DOT) to establish regulations to reduce GHG emissions from on-road and non-road motor vehicles and non-road engines by 2008. In 2009, the National Highway Traffic Safety Administration (NHTSA) finalized a rule regulating fuel efficiency and GHG emissions from cars and light-duty trucks for model year 2011 and further expanded the rule to model years 2012 through 2016 in 2010.

On December 19 2007, the EPA passed the Energy Independence and Security Act of 2007, that aims to reduce GHG emissions at a national level and strengthen the initiatives established by Executive Order 13423 (EPA 2007). The act's two key measures include the following: 1) increasing the supply of alternative fuel sources through mandatory Renewable Fuel Standards by requiring fuel producers to use at least 36 billion gallons of biofuel in 2022, and 2) establishing a target of 35 miles per gallon of fuel efficiency for a combined fleet of cars and light-duty trucks by model year 2020. The act also required the NHTSA to establish a fuel economy program for both medium and heavy-duty trucks and a fuel economy standard for work trucks.

On October 30, 2009, the EPA published the Mandatory Reporting Rule (codified in 40 CFR Part 98), that requires mandatory reporting of GHG emissions from large sources and suppliers in the U.S. (EPA 2023c). In general, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, facilities that inject CO_2 underground, users of electrical transmission and distribution equipment, and facilities that emit 25,000 MT or more per year of CO_2e emissions are required to submit annual reports to the EPA. Despite the Project's annual emissions exceeding 25,000 MT CO_2e per year, the Project does not include large stationary sources, supply operations, electrical transmission and distribution equipment containing more than 17,820 pounds of SF_6 and PFCs, or other covered processes; therefore, GHG mandatory reporting would not apply to the Project.

On December 7, 2009, the EPA Administrator signed two findings regarding GHGs in direct response to the U.S. Supreme Court's decision in *Massachusetts v. EPA* (No. 05-1120). The first finds that the current and projected concentrations of the six key well-mixed GHGs in the atmosphere (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) threaten the public health and welfare of current and future generations. The second finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare (EPA 2023b).

On June 3, 2010, the EPA promulgated the final GHG Tailoring Rule (75 Federal Register [FR] 31514). The GHG Tailoring Rule established clear applicability thresholds for stationary source emitters of GHGs under PSD and Title V regulations. In general, any new stationary source with GHG emissions of 100,000 tpy CO_2e or greater became subject to both PSD review and the Title V program. On June 23, 2014, the U.S. Supreme Court issued a decision prohibiting the EPA from considering GHG emissions when determining PSD review and Title V program applicability (*Utility Air Regulatory Group v. EPA*, No. 12-z1146). Per the U.S. Supreme Court decision, the EPA may continue to require GHG emission limitations in PSD and Title V permits, if PSD review and the Title V program are triggered by emissions of criteria pollutants (EPA 2023e). Because no stationary sources of this magnitude are associated with the Project, PSD and Title V regulations would not apply to the Project.

In 2010, the Obama Administration issued a memorandum directing the DOT, Department of Energy (DOE), EPA, and NHTSA to develop additional standards regarding fuel efficiency and GHG emissions reduction, clean fuels, and advanced vehicle infrastructure. In response to this memorandum, EPA and NHTSA proposed coordinated federal GHG and fuel economy standards for light-duty vehicles for model years 2017 through 2025. The proposed standards are projected to achieve 163 grams per mile of CO_2 in model year 2025, on an industry fleetwide average basis. This standard is equivalent to 54.5 miles per gallon if achieved solely through fuel efficiency. The final rule was adopted in 2012 for model years 2017 through 2021 only. On April 2, 2018, EPA determined that the proposed standards for model years 2022 through 2025 were not appropriate and required revision (EPA 2017b). In response, NHTSA is currently drafting language to further tighten fuel economy standards by increasing fuel efficiency by 8 percent annually for model years 2024 through 2026 and increasing the estimated fleetwide average by 12 miles per gallon for model year 2026, relative to model year 2021 (NHTSA 2021). Additionally, in December 2021, EPA revised the light-duty vehicle emissions standards for model years 2023 through 2026 to provide for more stringent emission reductions. These emission reductions would result in an estimated reduction of three billion tons of GHG emissions through 2050 (EPA 2023a).

In addition to the cars and light-duty truck regulations described above, the EPA and NHTSA developed fuel economy and GHG standards for medium- and heavy-duty trucks for model years 2014 through 2018 in 2011 (EPA & NHTSA 2023). The standards for CO_2 emissions and fuel consumption are specific to three main vehicle categories: combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles. This regulatory program is expected to reduce GHG emissions and fuel consumption for the affected vehicles by 6 to 23 percent over the 2010 baselines.

In August 2016, EPA and NHTSA adopted the phase two program related to the fuel economy and GHG standards for medium- and heavy-duty trucks. The phase two program will apply to model years 2018 through 2027 vehicles with certain trailers and model years 2021 through 2027 for semi-trucks, large pickup trucks, vans, and all types and sizes of buses and work trucks. The final standards are expected to lower CO_2 emissions by approximately 1.1 billion MT and reduce oil consumption by up to 2 billion barrels over the lifetime of the vehicles sold under the program (EPA & NHTSA 2023). Note that this and other mobile source-oriented regulatory policies described in this section will have little effect on the Project as fuel economy requirements are most often implemented at the manufacturer level rather than by the end-user. However, availability of more fuel-efficient vehicles would have the positive effect of lowering criteria pollutant and GHG emissions associated with the Project's vehicle trips.

5.1.11.2.2 State Legislative Action

In response to the transportation sector accounting for more than half of California's CO_2 emissions, AB 1493 was passed in July 2002, requiring CARB to establish GHG emission standards for passenger vehicles, light-duty trucks, and other vehicles determined to be vehicles that are primarily used for non-commercial personal transportation within the state. Specifically, AB 1493 required that CARB set GHG emission standards for motor vehicles manufactured in 2009 and all subsequent model years. CARB adopted the standards in September 2004 which will reduce GHG emissions by approximately 22 percent in the near-term (2009 through 2012), as compared to emissions from the 2002 fleet, and by approximately 30 percent in the mid-term (2013 through 2016).

The framework for regulating GHG emissions in California falls under the implementation requirements of the Global Warming Solutions Act of 2006 (referred to as AB 32), which was signed into law by the California State Legislature in 2006 and updated by Senate Bill 32 (SB 32). AB 32 required CARB to design and implement emission limits, regulations, and other measures such that statewide GHG emissions are reduced in a technologically feasible and cost-effective manner to 1990 levels by 2020. The statewide 2020 emissions limit was 431 million MT CO_2e; CO_2 emissions account for approximately 90 percent of this value (CARB 2023c). In 2016, SB 32 provided a post-2020 GHG emission reduction target of 40 percent below 1990 levels by 2030.

Issued on January 18, 2007, Executive Order S-1-07 sets a declining Low Carbon Fuel Standard for GHG emissions measured in CO_2e grams per unit of fuel energy sold in California. The goal of the Low Carbon Fuel Standard is to reduce the carbon intensity of California passenger vehicle fuels by at least 10 percent by 2020. Carbon intensity is a measurement of the amount of GHG emissions in the lifecycle of a fuel, including extraction/feedstock production, processing, transportation, and final consumption, per unit of energy delivered. The regulation, adopted by CARB in April 2009, is expected to increase the production of biofuels, including those from alternative sources, such as algae, wood, and agricultural waste. The Low Carbon Fuel Standard was amended in 2011, 2015, and most recently in 2018, all of which strengthen the implementation and carbon benchmarks through 2030 to help achieve the statewide emission targets of AB 32 and SB 32.

In December 2007, CARB adopted the first regulation pursuant to AB 32, which requires mandatory reporting of GHG emissions from large emitting facilities, suppliers, and electricity providers. This regulation was significantly revised to better align with EPA's Mandatory Reporting Rule; the revised regulation became effective January 1, 2013. The current regulation, which includes additional minor revisions to accommodate the Cap and Trade Program, became effective January 1, 2015 (CARB 2023e). CARB adopted the California Cap and Trade Program on October 20, 2011. Under the California Cap and Trade Program, covered entities have had an obligation to secure GHG allowances and/or offsets since 2013; fuel suppliers have had an obligation to secure GHG allowances and/or offsets since 2015 (CARB 2023b). The California Cap and Trade Program will be in effect until at least December 31, 2030, through the 2017 adoption of AB 398 (Climate Action Reserve 2017). As a geothermal electricity generation source with emissions greater than 10,000 MT CO_2e per year, the Project would be required to report emissions from non-exempt sources[10] under 17 CCR Section 95101(a)(1)(B)(7). The facility would not, however, be subject to the Cap and Trade Program as the facility's fugitive emissions from geothermal steam processing do not count towards a covered compliance obligation, as defined in 17 CCR Section 95852.2(b)(1), making the facility's covered emissions (i.e., insulating gas) less than 25,000 MT CO_2e per year.

[10] Stationary combustion emissions from the Project's diesel fire water pump and diesel-fired emergency generators are not subject to GHG emissions reporting per the exclusions provided in 17 CCR Section 95101(f).

In 2008, SB 375 was signed into law, addressing GHG emissions associated with the transportation sector through regional transportation and sustainability plans. Specifically, SB 375 requires CARB to adopt regional GHG reduction targets for the automobile and light-duty truck sector for 2020 and 2035. Once adopted, regional metropolitan planning organizations (MPOs) are responsible for preparing a Sustainable Communities Strategy, to be included within their Regional Transportation Plan, which forecasts a regional development pattern that will achieve, if feasible, SB 375's GHG reduction targets. If a Sustainable Communities Strategy is unable to achieve the GHG reduction target, an MPO must prepare an Alternative Planning Strategy demonstrating how the GHG reduction target would be achieved through alternative development patterns, infrastructure, or additional transportation measures or policies.

The first Climate Change Scoping Plan, a plan required by AB 32, was also approved in 2008. This plan, which is to be updated at least every five years, includes a suite of policies to help the State achieve its GHG targets, in large part leveraging existing programs whose primary goal is to reduce harmful air pollution. The currently operative plan is the 2022 Scoping Plan, which assesses progress towards achieving the SB 32 2030 target and lays out a path to achieve carbon neutrality by 2045 (CARB 2023a).

In January 2012, CARB approved the Advanced Clean Cars program, a new emissions-control program for model years 2015 through 2025. The program presents a single coordinated package that includes elements for emission reductions of GHGs and smog- and soot-causing pollutants, promotion of clean cars, and providing fuels for clean cars. To improve air quality, CARB has implemented new emission standards to reduce smog-forming emissions beginning with 2015 model year vehicles. It is estimated that cars will emit 75 percent less smog-forming pollution in 2025 than the average new car sold in 2012. To reduce GHG emissions, CARB, in conjunction with the EPA and NHTSA, has adopted new vehicle GHG standards for model years 2017 through 2025; the new standards are estimated to reduce GHG emissions by 40 percent in 2025, as compared to model year 2012. The Zero Emissions Vehicle (ZEV) program will act as the focused technology of the Advanced Clean Cars program by requiring manufacturers to produce increasing numbers of ZEVs and plug-in hybrid electric vehicles for model years 2018 through 2025. The Advanced Clean Cars II Program (ACCII) was approved in 2022, which developed rules and standards for vehicle model years 2026 through 2035. The ACCII will rapidly scale down emissions of light-duty passenger cars, pickup trucks, and sport utility vehicles by amending the Zero-Emission Vehicle Regulation to require an increasing number of zero-emission vehicles and amending the Low-Emission Vehicle Regulation to increase the stringency of standards for gasoline cars and heavier passenger trucks (CARB 2022a).

Executive Order B-16-12 was also issued in 2012 and directs state entities under the Governor's direction and control to support and facilitate the development and distribution of ZEVs. This Executive Order also sets a long-term target of reaching 1.5 million ZEVs on California's roadways by 2025, effectively reducing GHG emissions from the transportation sector to 80 percent below 1990 levels by 2050. In furtherance of this Executive Order, the Governor convened an Interagency Working Group on ZEVs that has published multiple reports regarding the progress made on the penetration of ZEVs in the statewide vehicle fleet.

In 2015, SB 350 was signed into law, establishing new clean energy, clean air, and GHG reduction goals for 2030 and beyond. Specifically, SB 350 increases California's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030. SB 100, signed into law in 2018, requires California utilities to reach 50 percent renewable resources by December 31, 2026, and 60 percent by December 31, 2030. SB 100 also establishes policy that renewable energy resources and other zero-carbon resources supply 100 percent of all retail sales of electricity by December 31, 2045. As a renewable energy resource, the Project will support achievement of these goals.

AB 1236, signed into law in October 2015, requires a city, county, or city and county to approve applications for the installation of electric vehicle charging stations. The intent of AB 1236 is to implement the timely and cost-effective installation of electric vehicle charging stations, each of which meets specified statewide standards.

Under AB 32, CARB, as the principal state agency in charge of regulating sources of GHG emissions in California, has been tasked with adopting regulations for the reduction of GHG emissions. The effects of this proposed Project are evaluated based both upon the quantity of GHG emissions and whether the Project implements reduction strategies identified in the 2022 Scoping Plan.

5.1.11.2.3 Local Legislative Action

In 2021, Imperial County published the Imperial County Regional Climate Action Plan. This regional climate action plan helps establish goals for sustainability and GHG reductions across Imperial County to meet the goals established at the state level in AB 32, SB 32, and Executive Orders B-30-15 and S-3-05. To meet these targets, the plan calls for multiple sectors to implement reduction measures such as carpool, increased efficiency of new building construction, and the encouragement to procure energy from geothermal sources. The proposed Project will serve to directly support this Regional Climate Action Plan by providing another source of geothermal electricity for use in the region (Ascent 2021).

5.1.12 Agency Jurisdiction and Contacts

Table 5.1-35 presents the contact information for each agency contacted during the development of this Project which may exercise jurisdiction of air quality issues and permitting.

Table 5.1-35. Agency Contacts for Air Quality

Air Quality Concern	Agency	Contact
Public exposure to air pollutants	CEC	Mr. Joseph Hughes Air Resources Supervisor 1 California Energy Commission 715 P Street Sacramento, CA 95814 Phone: 916-980-7951 E-mail: Joseph.Hughes@energy.ca.gov
	ICAPCD	Jesus Ramirez APC Division Manager 150 S. 9th Street El Centro, CA 92243-2839 Phone: 442-265-1800 E-mail: jesusramirez@co.imperial.ca.us

5.1.13 Permit Requirements and Schedules

An ATC application and Dust Control Plan is required in accordance with the ICAPCD's rules. The ATC application submitted to the ICAPCD will consist of the Project Description, Air Quality, and Public Health sections of the AFC and appropriate Appendices, plus the ICAPCD application forms. In addition, the ICAPCD Title V forms will also be included in the application package, if required. The Dust Control Plan will consist of the Project Description and Air Quality sections of this AFC in addition to a summary of the Project conformance plan for ICAPCD Rule 801, Section F.

5.1.14 References

Ascent Environmental (Ascent). 2021. *Imperial County Regional Climate Action Plan*. June. https://www.imperialctc.org/assets/documents/transportation-plans-and-studies/ICTC-Regional-Climate-Action-Plan_FINAL.pdf.

Auer, A.H. 1978. "Correlation of Land Use and Cover with Meteorological Anomalies." *Journal of Applied Meteorology*. No. 17. pp. 636-643.

Caffrey, Jane M., Thomas P. Chapin, Hans W. Jannasch, and John C. Haskins. 2007. "High nutrient pulses, tidal mixing and biological response in a small California estuary: Variability in nutrient concentrations from decadal to hourly time scales." ScienceDirect. 71 (2007) 368e380.

CalEnergy. 2017. Elmore Back-Pressure Turbine Installation, April 2017 Update to Air Permit Application. March.

California Air Resources Board (CARB). 2016. *Ambient Air Quality Standards*. May. https://ww2.arb.ca.gov/sites/default/files/2020-07/aaqs2.pdf.

California Air Resources Board (CARB). 2022a. *Advanced Clean Cars II Regulation*. November. https://ww2.arb.ca.gov/rulemaking/2022/advanced-clean-cars-ii.

California Air Resources Board (CARB). 2022b. "Hydrogen Sulfide and Health." Accessed October 2022. https://ww2.arb.ca.gov/resources/hydrogen-sulfide-and-health.

California Air Resources Board (CARB). 2023a. "AB 32 Climate Change Scoping Plan." Accessed March 2023. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan.

California Air Resources Board (CARB). 2023b. "Cap-and-Trade Program." Accessed March 2023. https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.

California Air Resources Board (CARB). 2023c. "GHG 1990 Emissions Level & 2020 Limit." Accessed March 2023. https://www.arb.ca.gov/cc/inventory/1990level/1990level.htm.

California Air Resources Board (CARB). 2023d. "iADAM Air Quality Data Statistics Select 8 Summary." Accessed February 2023. https://www.arb.ca.gov/adam.

California Air Resources Board (CARB). 2023e. "Mandatory Greenhouse Gas Reporting Regulation." Accessed March 2023. https://ww2.arb.ca.gov/mrr-regulation.

California Air Resources Board (CARB). 2023f. "Maps of State and Federal Area Designations." Accessed February 2023. https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations.

Climate Action Reserve. 2017. "AB 398: California extends cap-and-trade program." July. https://www.climateactionreserve.org/blog/2017/07/20/ab-398-california-extends-cap-and-trade-program/.

ICF et al. (ICF). 2022. *CalEEMod (California Emissions Estimator Model) User Guide Version 2022.1*. April. https://www.caleemod.com/user-guide.

Imperial Irrigation District (IID). 2022. BHE Cluster – 357 MW (IPP-150, IPP-151, IPP-152) System Impact Study, November 7.

Imperial County Air Pollution Control District (ICAPCD). 2017. *CEQA Air Quality Handbook*. December. https://apcd.imperialcounty.org/wp-content/uploads/2020/01/CEQAHandbk.pdf.

Imperial County Air Pollution Control District (ICAPCD). 2018. *Imperial County 2018 Redesignation Request and Maintenance Plan for Particulate Matter Less then 10 Microns in Diameter*. October. https://apcd.imperialcounty.org/wp-content/uploads/2020/01/2018PM10PlanBoardPacket.pdf.

Imperial County Air Pollution Control District (ICAPCD). 2023. "Planning." Accessed February 2023. https://apcd.imperialcounty.org/planning/.

Lodge, James P., Alan P. Waggonerc, Donald T. Klodt, Donald T.; Crain, N. Clark. 1981. "Non-health effects of airborne particulate matter." *Atmospheric Environment*. Volume 15, Issue 4, p. 431-482.

Morris, J.T. 1991. “Effects of Nitrogen Loading on Wetland Ecosystems with Particular Reference to Atmospheric Deposition.” *Annual Review of Ecology and Systematics*. Vol. 22: 257-279.

National Highway Traffic Safety Administration (NHTSA). 2021. “USDOT Proposes Improved Fuel Economy Standards for MY 2024-2026 Passenger Cars and Light Trucks.” August. https://www.nhtsa.gov/press-releases/fuel-economy-standards-2024-2026-proposal.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2018. *Best Available Control Technology (BACT) Guideline*. July. https://www.valleyair.org/busind/pto/bact/chapter8.pdf.

South Coast Air Quality Management District (SCAQMD). 2006. *Final – Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds*. October. http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/particulate-matter-(pm)-2.5-significance-thresholds-and-calculation-methodology/final_pm2_5methodology.pdf?sfvrsn=2.

South Coast Air Quality Management District (SCAQMD). *2008. Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans*. December. http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgboardsynopsis.pdf?sfvrsn=2.

South Coast Air Quality Management District (SCAQMD). 2019. *South Coast AQMD Air Quality Significance Thresholds*. April. http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf.

South Coast Air Quality Management District (SCAQMD). 2021. *South Coast AQMD Upgrades Monitoring and Notification System for Odors from the Salton Sea.* August/September South Coast AQMD Advisor Newsletter. September. http://www.aqmd.gov/home/research/publications/august-september-2021/salton-sea-monitoring-upgrades.

U.S. Environmental Protection Agency (EPA). 1992a. *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised*. EPA-454/R-92-019, Office of Air Quality Planning and Standards, Research Triangle Park, NC. October.

U.S. Environmental Protection Agency (EPA). 1992b. *Workbook for Plume Visual Impact Screening and Analysis*. EPA-454/R-92-023. October.

U.S. Environmental Protection Agency (EPA). 1996. *Compilation of Air Pollution Emission Factors, Volume I, Fifth Edition; AP-42. With Supplements*. Section 3.3, Gasoline and Diesel Industrial Engines, and Section 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines. October.

U.S. Environmental Protection Agency (EPA). 2007. “Summary of the Energy Independence and Security Act.” December. https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act.

U.S. Environmental Protection Agency (EPA). 2011. *Memorandum: Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard.* March.

U.S. Environmental Protection Agency (EPA). 2016. AERSCREEN Bug Regarding Fumigation – Workaround. E-Mail from James Thurman to George Bridgers (et.al.), Office of Quality Planning and Standards, Research Triangle Park, NC. March 29.

U.S. Environmental Protection Agency (EPA). 2017a. *Appendix W of 40 CFR Part 51—Guideline on Air Quality Models (Revised)*. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, January.

U.S. Environmental Protection Agency (EPA). 2017b. *Final Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards Under the Midterm Evaluation*. January. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100QQ91.pdf.

U.S. Environmental Protection Agency (EPA). 2023a. "Final Rule to Revise Existing National GHG Emissions Standards for Passenger Cars and Light Trucks Through Model Year 2026." Accessed February 2023. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-revise-existing-national-ghg-emissions.

U.S. Environmental Protection Agency (EPA). 2023b. "Greenhouse Gas Emissions: Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Section 202(a) of the Clean Air Act." Accessed March 2023. https://www.epa.gov/climate-change/endangerment-and-cause-or-contribute-findings-greenhouse-gases-under-section-202a.

U.S. Environmental Protection Agency (EPA). 2023c. "Greenhouse Gas Reporting Program (GHGRP): Resources by Subpart for GHG Reporting." Accessed March 2023. https://www.epa.gov/ghgreporting/resources-subpart-ghg-reporting.

U.S. Environmental Protection Agency (EPA). 2022d. "Monitor Values Report." Accessed February 2023. https://www.epa.gov/outdoor-air-quality-data/monitor-values-report.

U.S. Environmental Protection Agency (EPA). 2023e. "New Source Review (NSR) Permitting: Clean Air Act Permitting for Greenhouse Gases." Accessed March 2023. https://www.epa.gov/nsr/clean-air-act-permitting-greenhouse-gases.

U.S. Environmental Protection Agency (EPA). 2023f. "Nonattainment Area for Criteria Pollutants (Green Book)." Accessed February 2023. https://www.epa.gov/green-book.

U.S. Environmental Protection Agency and National Highway Traffic Safety Administration (EPA & NHTSA). 2023. "Regulations for Greenhouse Gas Emissions from Commercial Trucks & Buses." Accessed February 2023. https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-commercial-trucks.

Wigand, C.; McKinney, R.A.; Charpentier, M.A.; Chintala, M.M.; Thursby, G.B. 2003. "Relationships of nitrogen loadings, residential development, and physical characteristics with plant structure in New England salt marshes." *Estuaries*. 26: 1494-1504.

5.2 Biological Resources

This section describes the affected environment, regulatory framework, and impacts to biological resources from the proposed Black Rock Geothermal Project (BRGP or Project) in Imperial County, California. The Project will consist of a geothermal facility, five production wells, and seven injection wells (Figure 5.2-1). The production wells will be on three well pads, and the injection wells will be on four well pads. Production and injection wells will be connected to the geothermal facility by aboveground pipelines supported on metal pedestals in concrete foundations. A generation tie (gen-tie) line will connect the site to a switching station.

The Applicant contracted Jacobs Engineering Group Inc. (Jacobs) to conduct a protocol-level botanical survey, biological resources reconnaissance survey, a protocol-level Yuma Ridgway's rail (*Rallus obsoletus yumanensis*) and California black rail (*Laterallus jamaicensis coturniculus*) survey, and an aquatic resource delineation for the BRGP Biological Study Area (BSA). For the purposes of the biological resources analysis, biologists surveyed an area larger than the final Project footprint to allow for flexible placement of Project features while avoiding sensitive areas (Figure 5.2-1). The BRGP BSA is 1,412.24 acres. In developing the BSA, the Project elements were buffered to encapsulate potential impacts on different resources. Buffers of 150 feet were set to capture potential temporary impacts associated with construction for all Project elements except construction laydown, construction camps, borrow pits, parking lots, and pull sites. Potential permanent impacts were captured using a 50-foot buffer on the same Project elements to account for operations. Gen-tie line pull sites were buffered by 0.2 acre, while laydown yards, construction camps, and borrow pits were unbuffered. In accordance with CEC regulations, the geothermal facility was buffered by one mile, and the well pads, associated pipelines, auxiliary features, and gen-tie line were buffered by 1,000 feet.

The evaluation of biological resources presented here:

- Discusses the affected environment, including a regional overview, vegetation types, and habitat present in the Project area, invasive plant species with the potential to/known to occur within the BSA, wildlife likely to occur within the BSA, and special-status species with the potential to occur within the vicinity.
- Presents the results of biological surveys in and near the Project site.
- Presents an environmental analysis of the Project, including standards of significance, potential impacts of construction and operation of the Project, and impacts to special-status species.
- Evaluates any potential cumulative effects to biological resources in the Project vicinity.
- Identifies proposed mitigation measures that will avoid, minimize, or compensate for adverse impacts.
- Demonstrates conformance with applicable LORS.
- Identifies the regulatory agency contacts.
- Identifies permit requirements.
- Presents the references used to prepare this section, all figures depicting Project layout, locations of known special-status species records, vegetation and land cover types, tables of all potential special-status species within the BSA and observed species lists.
- Includes U.S. Army Corps of Engineers (USACE) wetland determination forms and photos.

5.2.1 Affected Environment

The affected environment section discusses vegetation communities and habitat present in the Project area, invasive plant species known to occur or potentially occurring, wildlife species typically found in the area, and a discussion of special-status species known to occur or potentially occurring in the Project vicinity.

The BRGP BSA includes the plant site, auxiliary features, and gen-tie line, which are located on privately owned lands within the jurisdiction of Imperial County, California. Elevations within the BSA range between 230 and 205 feet below mean sea level. The BRGP will be located 225 feet below mean sea level. The BRGP BSA occurs on two U.S. Geological Survey (USGS) 7.5-minute quadrangles: Obsidian Butte and Niland. Land use in the surrounding area includes agricultural and geothermal production.

5.2.1.1 Regional Overview

The BSA lies within an ecoregion known as the Salton Sink (CDFW 2022b), which is defined by a low area surrounded by mountains with no outlet for flowing water. Much of the Imperial Valley is below sea level and is surrounded by mountain ranges. The Chocolate Mountains to the east and northeast reach elevations exceeding 2,000 feet above mean sea level, while the Santa Rosa Mountains to the west and northwest are approximately 4,500 feet above mean sea level. The Salton Sea is the lowest point in the valley, at a current elevation of approximately 227 feet below mean sea level. Rain falling on the interior slopes of the surrounding mountain ranges flows to the Salton Sea, where it is supplemented by irrigation water. Because the Salton Sea has no outlet, accumulated salts and chemicals are unable to be flushed from the system. As of 2020, the salinity of the Salton Sea is greater than twice the salinity of ocean water (CNRA 2021).

Based on long-term data collected at Brawley, California, approximately 15 miles south-southeast of the southwestern corner of the BSA, precipitation levels peak from December through March (Table 5.2-1), and the total average annual precipitation is 2.65 inches. The average low January temperature is 69.4 degrees Fahrenheit (°F), and the average high July temperature is 107.6°F (WRCC 2022).

The BSA is highly disturbed by agriculture and geothermal development and does not contain high-quality natural habitat. Most of the land cover types found within the BSA are classified as nonnatural, including agriculture, developed, and disturbed. Nonnatural is defined as being modified by human activities, whereas natural vegetation and land cover types are defined as unmodified by human activities (NatureServe 2004). Natural vegetation types within the BSA include North American Arid West Emergent Marsh, North American Warm Desert Playa, and Invasive Southwest Riparian Woodland and Shrubland.

Despite the increasing salinity of the Salton Sea, migratory bird species are attracted to the Salton Sea because of abundant food sources. The rivers, agricultural canals, and drains flowing into the Salton Sea contain freshwater, providing some habitat for piscivorous and insectivorous birds. The Salton Sea also provides important habitat features for migrating or overwintering birds such as islets, sand bars, and snags for nesting and roosting. Of specific note, Obsidian Butte and Alamo River delta are major roosting and feeding sites for California brown pelicans (*Pelecanus occidentalis californicus*) and migratory birds (CDFW n.d.). As a result, the Salton Sea is an important stop along the Pacific Flyway. The BSA is less than one mile from the Salton Sea, Obsidian Butte, and Alamo River (Figure 5.2-1).

5.2.1.1.1 Wildlife Movement Corridors

Wildlife movement corridors are linear features along which animals can travel from one habitat or resource area to another. These movement corridors, also known as dispersal corridors or landscape linkages, provide connectivity through landscapes fragmented by human development. The BSA is located adjacent to, but outside of, identified essential regional wildlife linkages. The *California Essential Habitat Connectivity Project* has no mapped Essential Connectivity Areas within the BSA (Spencer et al. 2010). The closest Essential Connectivity Area is approximately 10 miles northeast of the BSA along the Chocolate Mountains. *A Linkage Network for the California Deserts*, used in the Desert Renewable Energy Conservation Plan (DRECP) analysis, has no mapped habitat linkages or wildlife movement corridors within the BSA (Penrod et al. 2012). The closest linkage network is more than 50 miles northwest of the Project and connects landscape blocks in the San Bernardino Mountains between Joshua Tree National Park and the San Bernardino National Forest.

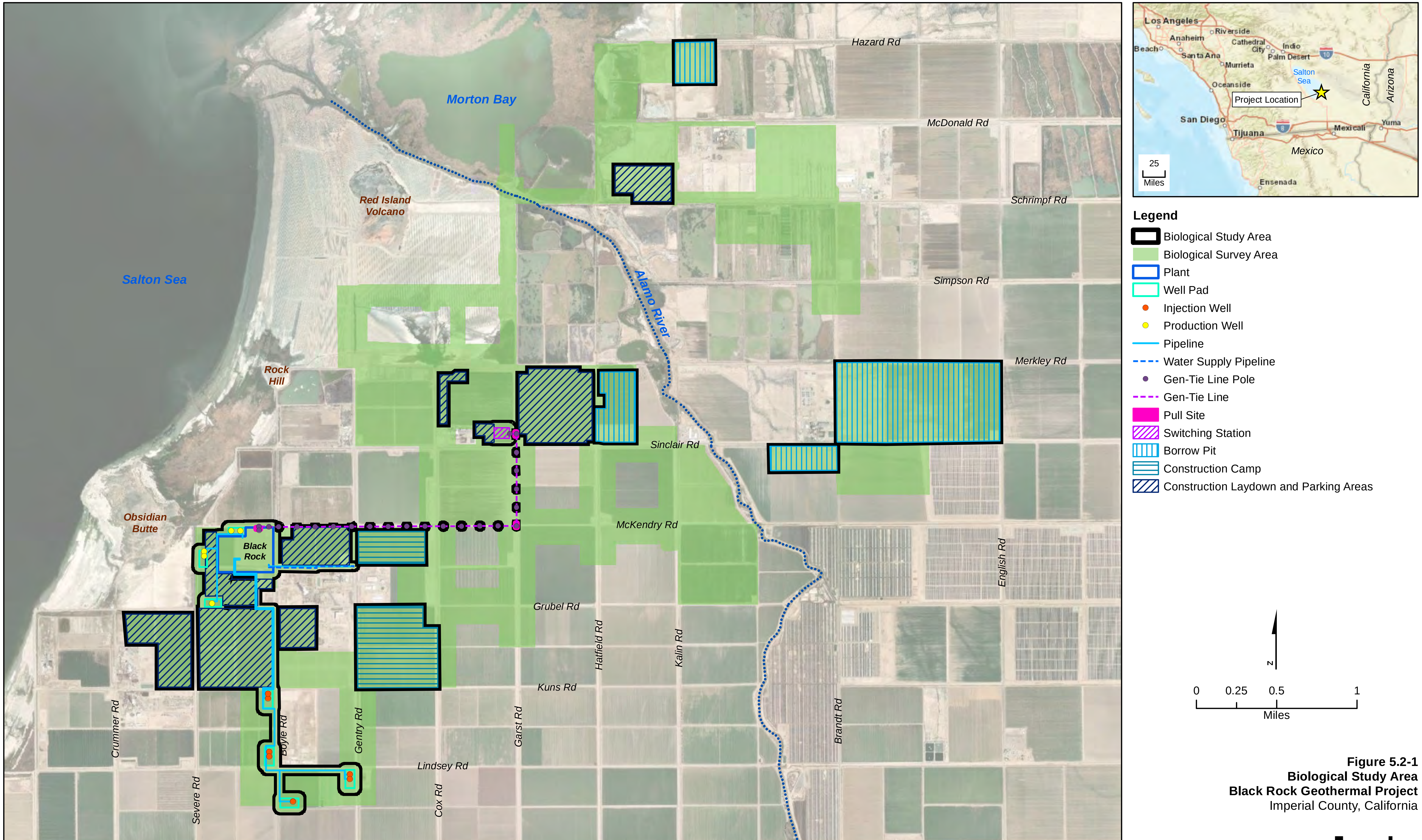


Figure 5.2-1
Biological Study Area
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Bio\Black_Rock\BR_Figure_1_230216.mxd

Table 5.2-1. Monthly Climate Summary, Brawley, California (041048), 1910 to 2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	69.4	73.7	79.0	86.0	94.1	102.9	107.6	106.5	102.3	91.3	78.8	69.9	88.5
Average Min. Temperature (°F)	38.9	43.1	47.6	53.2	59.8	66.8	75.2	75.8	69.5	57.8	46.0	39.2	56.1
Average Total Precipitation (inches)	0.40	0.39	0.26	0.11	0.03	0.01	0.05	0.30	0.25	0.22	0.17	0.46	2.65

Source: WRCC 2022

5.2.1.2 Significant Regional Protected Areas

Important ecological reserves and designated open spaces occur within the region (Figure 5.2-2). These protected areas provide important habitat for migratory birds along the Pacific Flyway, as well as habitat for several special-status plant and wildlife species. Conservation areas within the Project vicinity are described in the following subsections.

The U.S. Fish and Wildlife Service (USFWS) manages the Sonny Bono Salton Sea National Wildlife Refuge (SBSSNWR). The SBSSNWR manages agricultural lands, wetlands, and upland habitat to supply foraging and nesting opportunities to birds using the Salton Sea area. The SBSSNWR was established in 1930 and includes lands owned and leased along the Salton Sea's southeast shoreline and within the Salton Sea. The BSA is adjacent to the SBSSNWR.

The California Department of Parks and Recreation manages the Salton Sea State Recreation Area located approximately 14 miles northwest of the BRGP along the Salton Sea's eastern shore. This area provides visitors with recreation opportunities such as camping, biking, hiking, kayaking, wading, and wildlife watching.

The California Department of Fish and Wildlife (CDFW) manages the Imperial Wildlife Area, which is separated into the Wister Tract and the Hazard Tract. The BSA is adjacent to the Hazard Tract.

5.2.1.3 Aquatic Resources

The BSA is located within the Salton Sea Watershed (18100200) hydrologic unit (USGS 2022a). The dominant hydrologic feature is the Salton Sea. Two rivers, the New and the Alamo, flow generally south to north into the sea. Large irrigation features include the East Highline, the Coachella, and Westside Main canals.

The USFWS National Wetlands Inventory (NWI) and USGS National Hydrography Dataset (NHD) maps were reviewed to determine locations of mapped aquatic resources within the BSA (Figure 5.2-3) (USFWS 2022b; USGS 2022b). These databases identified several excavated wildlife ponds, minor irrigation canals and drains, and areas of palustrine emergent marsh and woodland/scrub-shrub habitat within the BSA.

5.2.1.4 Special-status Habitat Types and Critical Habitat

Special-status habitat types are natural vegetation communities listed by the CDFW California Natural Diversity Database (CNDDB) because of the rarity of the community in the state or throughout its entire range. The level of significance of a project's impact on a given sensitive natural community depends on that natural community's relative abundance.

Critical habitat is designated by the USFWS as essential for the conservation of a federally listed species. Federal or private action that may result in a take of a listed species, or destruction or adverse modification of designated critical habitat, requires consultation with the USFWS pursuant to sections 7 or 10 of the federal Endangered Species Act (ESA).

The BSA does not contain any CDFW special-status habitats or USFWS designated critical habitat (CDFW 2022a; USFWS 2022a).

Legend

- Sonny Bono Salton Sea National Wildlife Refuge
- Imperial Wildlife Area
- Salton Sea State Recreation Area
- Biological Study Area
- Plant
- Well Pad
- Injection Well
- Production Well
- Pipeline
- Water Supply Pipeline
- Gen-Tie Line Pole
- Gen-Tie Line
- Pull Site
- Switching Station
- Borrow Pit
- Construction Camp
- Construction Laydown and Parking Areas

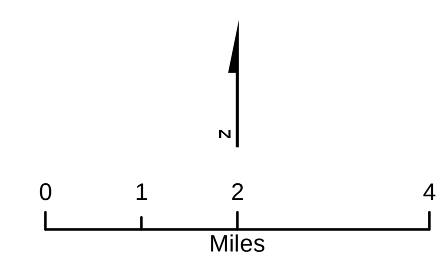


Figure 5.2-2
Significant Regional Protected Areas
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Bio\Black_Rock\BR_Figure_2_230216.mxd

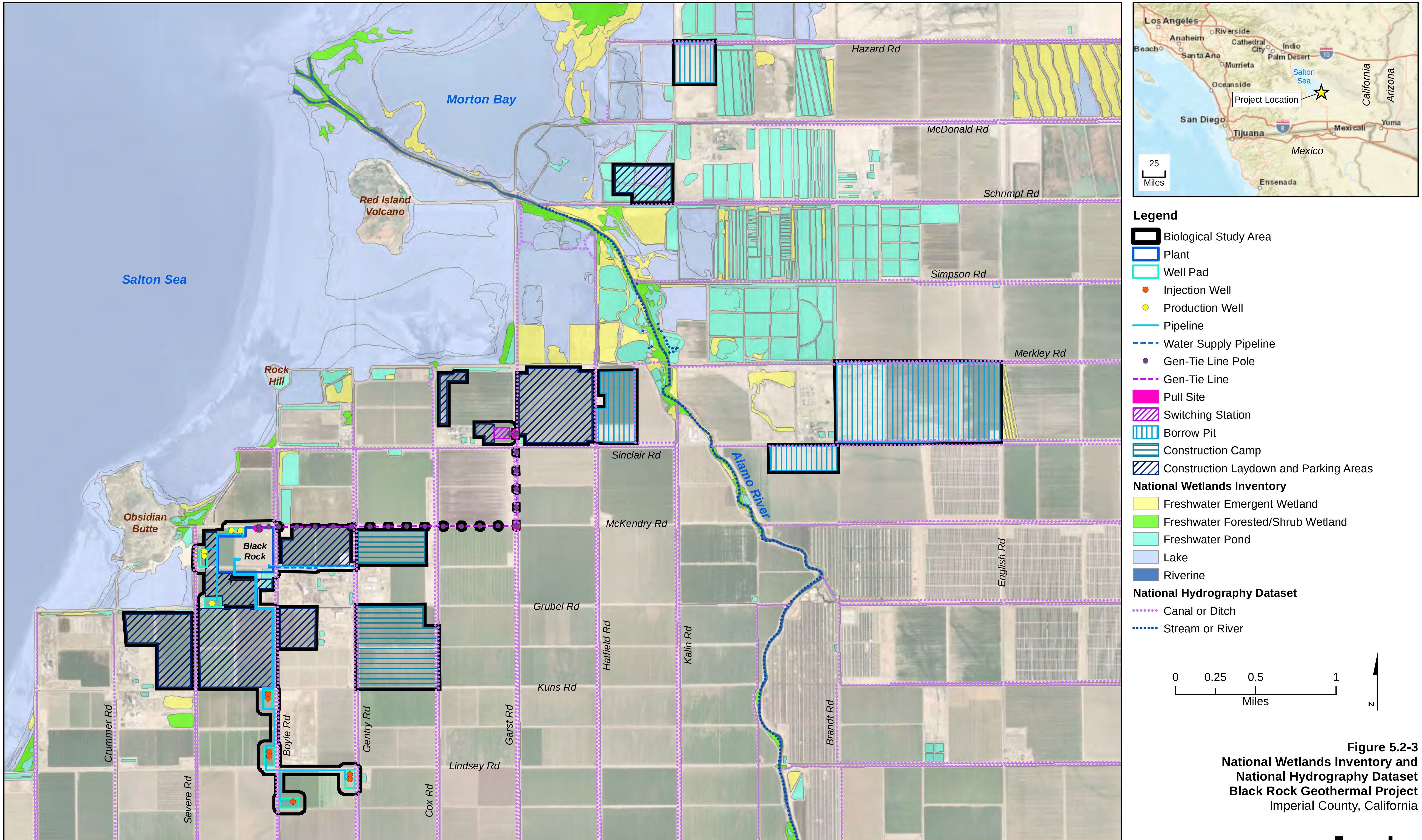


Figure 5.2-3
National Wetlands Inventory and National Hydrography Dataset
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Bio\Black_Rock\BR_Figure_3_230216.mxd

5.2.1.5 Special-status Species

Biologists queried the CNDDB RareFind5 database (CDFW 2023) and the USFWS Information for Planning and Consultation (IPaC) (USFWS 2022a), as well as other publicly available studies, information, and resources, for special-status biological resources in a 12 USGS-quadrangle query in and around the BSA. This includes special-status plants and wildlife and CDFW sensitive natural communities. A literature review was performed prior to field surveys to determine species status, habitat preferences, geographic distribution, elevation range, and known locations near the BSA; this information is summarized in Appendix 5.2A. A figure also is provided under a request for confidentiality in Appendix 5.2B. The potential for a special-status species to occur within the BSA was determined using the results of the literature review, biological reconnaissance survey, and focused surveys.

For the purposes of this discussion, a plant or wildlife species was considered special status if it met one or more of the following criteria:

- Species listed as threatened, endangered, or candidate for listing under the federal ESA (USFWS 1973)
- Species listed as threatened, endangered, candidate, or that have special requirements under the California Endangered Species Act (CESA) (CDFW 2022e, 2022f)
- Other species listed by CDFW as Fully Protected (FP), Species of Special Concern (SSC), Watch List (WL), or included in the *Special Animals List*[1] (CDFW 2022e)
- Species included on the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2022f)
- Species listed by the California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) List 1 to 4 in its *Inventory of Rare and Endangered Plants of California* (CNPS 2022a)
- USFWS Birds of Conservation Concern (BCC) (USFWS 2021)

Special-status species from these lists with known or potential habitat or distribution within a 1-mile buffer of the Project were evaluated for potential impacts from construction and operation. The results of this evaluation are discussed in the following sections.

5.2.1.5.1 Potential for Occurrence

A Jacobs Biologist evaluated the potential for each special-status species to occur according to the following criteria:

- **Not Expected:** Habitat in and adjacent to the BSA is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, and disturbance regime). Either there are no recorded observations of the species in the vicinity, or the records are from more than 25 years ago and are considered historical. Protocol surveys, if conducted, did not detect species.
- **Low Potential**: Few of the habitat components meeting the species requirements are present, and the majority of habitat in and adjacent to the BSA is unsuitable or of very poor quality. The species is not likely to be found in the BSA. Either there are no recorded observations of species in the vicinity or the records were historical. Protocol surveys, if conducted, did not detect species.
- **Moderate Potential**: Some of the habitat components meeting the species requirements are present, and only some of the habitat in or adjacent to the BSA is unsuitable. The species has a moderate probability of being found within the BSA. Recorded observations of this species are current (within the past 25 years) and it may be present in the vicinity.

[1] One species queried from the CNDDB, Caspian tern (*Hydroprogne caspia*), was not included in this analysis because it has no federal or state special-status listing.

- **High Potential**: All of the habitat components meeting the species requirements are present and most of the habitat in or adjacent to the BSA is highly suitable. The species has a high probability of being found within the BSA. Recorded observations of this species are current and present in the vicinity.
- **Present**: The species is observed within the BSA or has recorded observations from the past 25 years (for example, CNDDB occurrences).

5.2.1.5.2 Special-status Plants

During the literature review, 20 special-status plant species were evaluated for their potential to occur in the BSA (Appendix 5.2A). Of the 20 species analyzed, 19 are not expected to occur in the BSA because of lack of suitable habitat or were not observed during protocol-level surveys.

One species, Salton milk-vetch (*Astragalus crotalariae*) (CRPR 4.3), had low potential to occur in the BSA in the small area of North American Warm Desert Playa. This was observed as poor-quality suitable habitat and this species was not observed during protocol-level surveys.

5.2.1.5.3 Special-status Wildlife

During the literature review, 43 special-status wildlife species were evaluated for their potential to occur in the BSA (Appendix 5.2A). Of the 43 species analyzed, 22 are not expected to occur in the BSA because of lack of suitable habitat or were not observed during protocol-level surveys.

Table 5.2-2 provides a summary of special-status wildlife species with a potential to occur within the BSA. This subsection also includes a discussion of those species with moderate or high potential to occur or incidentally observed in the BSA.

Table 5.2-2. Special-status Wildlife Species with Potential to Occur in the BSA

Class	Common Name	Scientific Name	Regulatory Status[a]	Potential for Occurrence
Bird	Burrowing owl	*Athene cunicularia*	SSC, BCC	Present
Bird	California brown pelican	*Pelecanus occidentalis californicus*	FP	High Potential. The BSA has no potential nesting or foraging habitat for this species, but because of proximity to a historical nesting colony on Obsidian Butte, this species would be expected to fly over the BSA.
Bird	California gull	*Larus californicus*	WL[b], BCC	Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within the BSA. This species has potential to forage in the BSA.
Bird	Cooper's hawk	*Accipiter cooperii*	WL [b]	Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within the BSA. This species has potential to forage in the BSA.
Bird	Loggerhead shrike	*Lanius ludovicianus*	SSC, BCC	Low Potential
Bird	Long-billed curlew	*Numenius americanus*	WL [b]	Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within the BSA. This species has potential to forage in the BSA.
Bird	Mountain plover	*Charadrius montanus*	SSC, BCC	Low Potential
Bird	Short-eared owl	*Asio flammeus*	SSC, BCC	Low Potential

Class	Common Name	Scientific Name	Regulatory Status[a]	Potential for Occurrence
Bird	White-faced ibis	*Plegadis chihi*	WL [b]	Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within the BSA. This species has potential to forage in the BSA.
Bird	Yellow warbler	*Setophaga petechia*	SSC, BCC	Low Potential (foraging only)
Mammal	American badger	*Taxidea taxus*	SSC, fur bearing mammal	Low Potential
Mammal	Big free-tailed bat	*Nyctinomops macrotis*	SSC	Low Potential (foraging only)
Mammal	Desert kit fox	*Vulpes macrotis arsipus*	Fur bearing mammal	Low Potential
Mammal	California leaf-nosed bat	*Macrotis californicus*	SSC	Low Potential (foraging only)
Mammal	Mexican long-tongued bat	*Choeronycteris mexicana*	SSC	Low Potential (foraging only)
Mammal	Pallid bat	*Antrozous pallidus*	SSC	Low Potential (foraging only)
Mammal	Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SSC	Low Potential (foraging only)
Mammal	Spotted bat	*Euderma maculatum*	SSC	Low Potential (foraging only)
Mammal	Western mastiff bat	*Eumops perotis californicus*	SSC	Low Potential (foraging only)
Mammal	Western yellow bat	*Lasiurus xanthinus*	SSC	Low Potential (foraging only)
Mammal	Yuma hispid cotton rat	*Sigmodon hispidus eremicus*	SSC	Moderate Potential

[a] Regulatory Status

BCC – USFWS Bird of Conservation Concern

FP – CDFW Fully Protected Species

SSC – CDFW Species of Special Concern

WL – CDFW Watch List Species

[b] California gull, Cooper's hawk, long-billed curlew, and white-faced ibis are CDFW WL for nesting colonies.

Burrowing Owl. Burrowing owls inhabit open areas such as grasslands, pastures, coastal dunes, desert scrub, and the edges of agricultural fields. Burrowing owls use abandoned rodent burrows or build burrows in semi-compacted soil in the slopes of drainage canals next to agricultural fields in the Imperial Valley (CDFW 2023). Suitable nesting habitat is present along irrigation canals and berms, and foraging habitat is present in adjacent agricultural fields. This species is common year-round at the SBSSNWR (USFWS 2018).

California Brown Pelican. The California brown pelican forages in open water and is a colonial nester, using offshore islands that afford protection from ground-dwelling predators. This species has been documented historically on small rocky islets offshore of Obsidian Butte, Obsidian Butte, east side of Morton Bay, and the Alamo River delta (CDFW 2023; Appendix 5.2B, submitted under a request for confidential designation pending CEC staff review). Although suitable nesting or foraging habitat is not present in the BSA, Project components are less than 0.5 mile from a known nesting site at Obsidian Butte. In the fall and winter, California brown pelicans are reported as abundant to common at the SBSSNWR (USFWS 2018).

California Gull. California gulls nest along large freshwater or alkaline interior lakes (CDFW 2023). Preferred habitats during nonbreeding season include sandy beaches, mudflats, rocky intertidal areas, and fresh and saline emergent wetlands. Inland habitats include cropland habitats, landfill dumps, and open lawns in cities (CDFW 2022c). No suitable nesting sites are present in the BSA; however, this species was incidentally observed during biological surveys, and it has a potential to forage within the agricultural lands in BSA (Appendix 5.2A). This species is also reported common to abundant year-round at the SBSSNWR (USFWS 2018). Throughout its winter range, California gulls often are among the most abundant species (CDFW 2022c).

Cooper's Hawk. The Cooper's hawk nests in wooded areas in southern California, including the Sierra Nevada foothills, New York Mountains, and Owens Valley from 0 to 9,000 feet above mean sea level. Typical nesting sites include dense oak, deciduous riparian, and other forest habitats near water. No suitable nesting sites are present in the BSA; however, this species was incidentally observed during biological surveys (Appendix 5.2A). Cooper's hawks are reported as uncommon at the SBSSNWR (USFWS 2018).

Long-billed Curlew. This species breeds in northern California in grasslands and wet meadows adjacent to lakes or marshes. Long-billed curlews winter in coastal California estuaries and agricultural lands in Imperial County (CDFW 2022d). No suitable nesting sites are present in the BSA; however, this species was incidentally observed during biological surveys and the species has potential to forage in agricultural lands in the BSA (Appendix 5.2A). Excluding the summer, long-billed curlews are reported as being common to abundant at the SBSSNWR (USFWS 2018).

White-faced Ibis. The white-faced ibis occurs in freshwater willow marshes with dense thickets of bulrush (*Scirpus* sp. or *Schoenoplectus* sp.) for nesting, interspersed with areas of willow for foraging. Historic records for this species occur at the mouth of the New River at the southeastern end of the Salton Sea (CDFW 2023). No suitable nesting sites are present in the BSA; however, this species was incidentally observed during biological surveys and the species has potential to forage in agricultural lands in the BSA (Appendix 5.2A). This species also is reported as common to abundant at the SBSSNWR (USFWS 2018).

Yuma Hispid Cotton Rat. The Yuma hispid cotton rat occurs along the Colorado River and in grass and agricultural areas near irrigation waters (USFWS 2018). It occurs in wetlands and uplands with dense grass and herbaceous plants where it makes runways through the vegetation and burrows or nests on the surface (CDFW 2023). Moderately suitable nesting and foraging habitat is present in the BSA in canals, drains, moist areas, and agricultural lands. This species is relatively common in moist areas and agriculture at the SBSSNWR (USFWS 2018).

5.2.1.6 Biological Surveys

The Applicant's biologists and botanists conducted the following biological resource surveys in the BSA:

- Protocol-level botanical surveys, including vegetation mapping, in BSA
- Reconnaissance-level habitat mapping in CEC-mandated Project buffers (one mile for the geothermal plant area and 1,000 feet for well pads, pipelines, auxiliary features, and linear features)
- Reconnaissance-level wildlife surveys (burrowing owls are already known to occur in area)
- Protocol-level Yuma Ridgway's rail and California black rail surveys using the *Standardized North American Marsh Bird Monitoring Protocol* (Conway 2011)
- Aquatic resource delineation (Appendix 5.2C)

Table 5.2-3 provides the dates, biologists, and description of surveys conducted by Jacobs biologists, botanists, or subconsultants to support the Project.

Table 5.2-3. Biological Survey and Aquatic Resource Delineation Dates and Personnel

Dates	Biologists	Survey Description[a]
February 28 through March 3, 2022	Rachel Newton and Rebecca John	Aquatic resource delineation and reconnaissance-level wildlife survey
March 4, 2022	Rachel Newton and Morgan King	Protocol-level botanical surveys
March 5 through 12, 2022	Rachel Newton and Morgan King	Protocol-level botanical surveys, reconnaissance-level wildlife surveys
March 13, 2022	Rachel Newton and Morgan King	Aquatic resource delineation and reconnaissance-level wildlife survey
March 15, 2022	Rachel Newton and Eric Weis	Aquatic resource delineation and reconnaissance-level wildlife survey
March 19, 2022	Morgan King and Hannah Worthington	Protocol-level botanical surveys
May 6 through 31, 2022	Kathryn M. Sliwa and Courtney J. Conway	Protocol-level Yuma Ridgway's rail and California black rail surveys
November 4, 2022	Robert Hernandez	Reconnaissance-level biological survey

[a] Jacobs biologists, botanists, and subconsultants were hired by the Applicant to conduct surveys for three separate BHER projects during the same field efforts: BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project. These dates and descriptions were for all projects and surveys to account for overlapping project features and buffers. Auxiliary features will be used by all three facilities and included in duplicate in all permit applications.

5.2.1.6.1 Methods

Botanical Surveys

Jacobs botanists conducted botanical surveys in the BSA in late February and March 2022. Botanists completed a reconnaissance-level botanical survey focused on identifying all land cover and vegetation communities within the BSA and the potential for these communities to support special-status plant species. Windshield surveys were conducted by driving at 15 to 20 miles per hour along dirt and paved roads throughout the entire BSA. Most of the BSA is highly manipulated by agriculture or degraded without vegetation, thus lacking in potentially suitable habitat for any special-status plant species. When natural communities with potentially suitable habitat for special-status plants were encountered, botanists conducted surveys in accordance with CDFW and USFWS protocols (CDFW 2018; USFWS 1996).

Field surveys were scheduled in March to coincide with the blooming period of special-status plant species most likely to occur in the BSA. Prior to starting surveys, an orientation meeting was held to review common species and discuss anticipated conditions within the BSA. Key diagnostic features for special-status plant species with any potential to occur were reviewed. Survey transects and a data dictionary were generated prior to conducting the fieldwork and uploaded to ArcGIS Online. Data were recorded digitally and on hard copy. Digital data were collected on iOS devices with the Collector application on the ArcGIS Online platform. Submeter accuracy was attained by using a Trimble R1 receiver connected to devices via a Bluetooth connection. Two botanists familiar with the flora of the BSA conducted pedestrian surveys of potentially suitable habitat for special-status plants.

Botanical surveys were floristic in nature, with all taxa identified to the taxonomic level necessary to determine whether they are a special-status plant species. Common plant names were taken from the *Jepson Interchange List of Currently Accepted Names of Native and Naturalized Plants of California* (Jepson Flora Project 2022). Common plant names not provided in the Jepson eFlora list were taken from Calflora (2022).

Vegetation Communities and Land Cover

Natural vegetation communities were characterized in the field based on dominant and subdominant plant species and community structure and form. Vegetation within the BSA was classified using vegetation and land cover descriptions following the *Landcover Descriptions for the Southwest Regional Gap Analysis Project* (NatureServe 2004).

Invasive Plant Species

Invasive plant species also were documented as part of the botanical survey of the BSA. For purposes of this survey, invasive plant species are those species included on the weed lists of the California Department of Food and Agriculture (CDFA) (CDFA 2021) and the California Invasive Plant Council (Cal-IPC) (Cal-IPC 2022). Fourteen invasive plant species with highest potential to occur in the BSA were identified prior to March surveys:

1. Athel salt cedar (Tamarix aphylla)
2. Bermuda grass (Cynodon dactylon)
3. Chinese salt cedar (Tamarix chinensis)
4. Field bindweed (Convolvulus arvensis)
5. Giant reed (Arundo donax)
6. Golden wattle (Acacia pycnantha)
7. Kentucky bluegrass (Poa pratensis)
8. London rocket (Sisymbrium irio)
9. Mediterranean grass (Schismus sp.)
10. Puncturevine (Tribulus terrestris)
11. Rabbitfoot grass (Polypogon monspeliensis)
12. Russian thistle (Salsola tragus)
13. Sahara mustard (Brassica tournefortii)
14. Saltcedar (Tamarix ramosissima)

Invasive weeds were searched for during all phases of the field surveys. During the reconnaissance-level survey of the BSA in March, special attention was given to detecting and identifying non-native invasive plant species. Invasive plant species localities were documented digitally and on hard copy datasheets. Localities are defined as locations where one or more individuals were detected. Digital data were collected on iOS devices with the Collector application on the AGOL platform. Submeter accuracy was attained by using a Trimble R1 receiver that was connected to devices via Bluetooth connection. Bermuda grass is actively cultivated in the vicinity of the BSA, rendering control impractical. Therefore, this species was not included in the mapping effort.

Reconnaissance-level Buffer Surveys

Habitat, land cover, and vegetation community mapping was conducted within a 1-mile radius of the plant area and within 1,000 feet of the well pads, pipelines, auxiliary features, and linear features, where access was permitted.

Wildlife Surveys

Reconnaissance-level Wildlife Surveys

Jacobs biologists conducted a reconnaissance-level wildlife survey of the BSA in late February and March 2022. The primary focus of this survey was to record observed wildlife species in the vicinity, including incidental observations of burrowing owls. Biologists recorded all wildlife observations and wildlife sign (such as burrows, tracks, scat, carcasses, and vocalizations). Notes were made on vegetation types providing potentially suitable wildlife habitat. No protocol-level burrowing owl surveys were conducted because presence is presumed (CDFW 2012). Of California's breeding burrowing owl population, 70% is present in agricultural fields in Imperial County (Audubon California 2022). Biologists conducted windshield surveys and pedestrian surveys when burrowing owl, burrows, or burrowing owl sign was observed, and recorded incidental observations of burrowing owls in the BSA and buffers.

Protocol-level Yuma Ridgway's Rail and California Black Rail Surveys

Under subcontract to Jacobs, University of Idaho Department of Fish and Wildlife biologists Kathyrn Sliwa and Courtney Conway conducted habitat assessments of the BRGP using the *Standardized North American Marsh Bird Monitoring Protocol* (Conway 2011). Yuma Ridgway's rail has been documented historically in freshwater marshes along the Colorado River and along the southern and eastern ends of the Salton Sea. Suitable nesting habitat is largely absent within the BSA because of the dominance of agriculture and the related ongoing removal of cattails and bulrush from irrigation canals to improve water supplies. Prior to surveys, biologists identified and mapped the perimeter of all patches of suitable habitat (Sliwa 2022). No suitable habitat was found, and this species is not expected to occur within the BRGP BSA (Appendix 5.2A).

Aquatic Resource Delineation

The USFWS National Wetlands Inventory and USGS National Hydrography Dataset were queried to determine the location of potential wetlands and other water resources within the BSA (USFWS 2022b; USGS 2022b). A map of irrigation drains and canals operated and managed by the Imperial Irrigation District (IID) also was consulted (IID 2021). Wetlands and watercourses associated with IID drains and canals were excluded from this delineation because they will not be impacted by Project implementation.

The delineation was conducted within the 1,412.24-acre BSA in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the Ordinary High Water Mark (OHWM) Regulatory Guidance Letter No. 05-05 (USACE 2005), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0* (USACE 2008), *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008), and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010). Wetland indicator statuses for plants were taken from the National Wetland Plant List, version 3.4 (USACE 2018).

A data dictionary was generated prior to conducting the fieldwork and uploaded to ArcGIS Online. Digital data were collected on iOS devices with the Collector application on the ArcGIS Online platform. Submeter accuracy was attained by using a Trimble R1 receiver connected to devices via a Bluetooth connection.

5.2.1.6.2 Results

This section provides the results for botanical surveys, wildlife surveys, and aquatic resource delineation. Species that were observed during the botanical and biological reconnaissance surveys are provided in Appendix 5.2A. CNDDB locations of special-status species within a 1-mile buffer of the BSA are shown on Appendix 5.2B, submitted under a request for confidential designation pending CEC staff review.

Botanical Survey Results

Reference Site Visits

Botanists visited special-status plant reference site populations to confirm that the surveys were conducted at a time of year when species would be apparent and identifiable (CDFW 2018; USFWS 1996). Potential reference sites were found by searching the Consortium of California Herbaria for documented herbarium vouchers within 50 miles of the BSA (CCH2 Portal 2022). Reference sites for Salton milk-vetch were visited on March 19, 2022, because this is the one special-status plant species with the potential to occur within the BSA.

Salton milk-vetch is known to occur in saline soils in Sonoran desert scrub, clay flats, alkali sinks, mud flats, and roadsides on the eastern side of the Salton Sea. Dried remnants of this species were observed on March 19, 2022 (latitude 33.428611°, longitude -115.811111°). This location was very dry, and no annual species, including vegetative rosettes, were observed. The dominant species in the vicinity was creosote bush (*Larrea tridentata*). University of California Riverside herbarium staff confirmed identification of Salton milk-vetch via photographs on March 22, 2022 (Sanders and Salvato, pers. comm. 2022).

Botanical Survey

Botanists identified 40 plant species during the botanical survey of the BSA; a complete list of observed species is provided in Appendix 5.2A. Most habitats within the BSA have been altered. Natural plant communities observed within the BSA occurred in small patches less than three feet in diameter and were most frequently found in intermittently flooded irrigation canals or along the perimeter of agriculture fields. These communities also were associated with invasive plant species. One small, isolated area of North American Warm Desert Playa was observed within the BSA, which contained poor-quality suitable saline or alkaline habitat.

No special-status plant species were observed within the BSA.

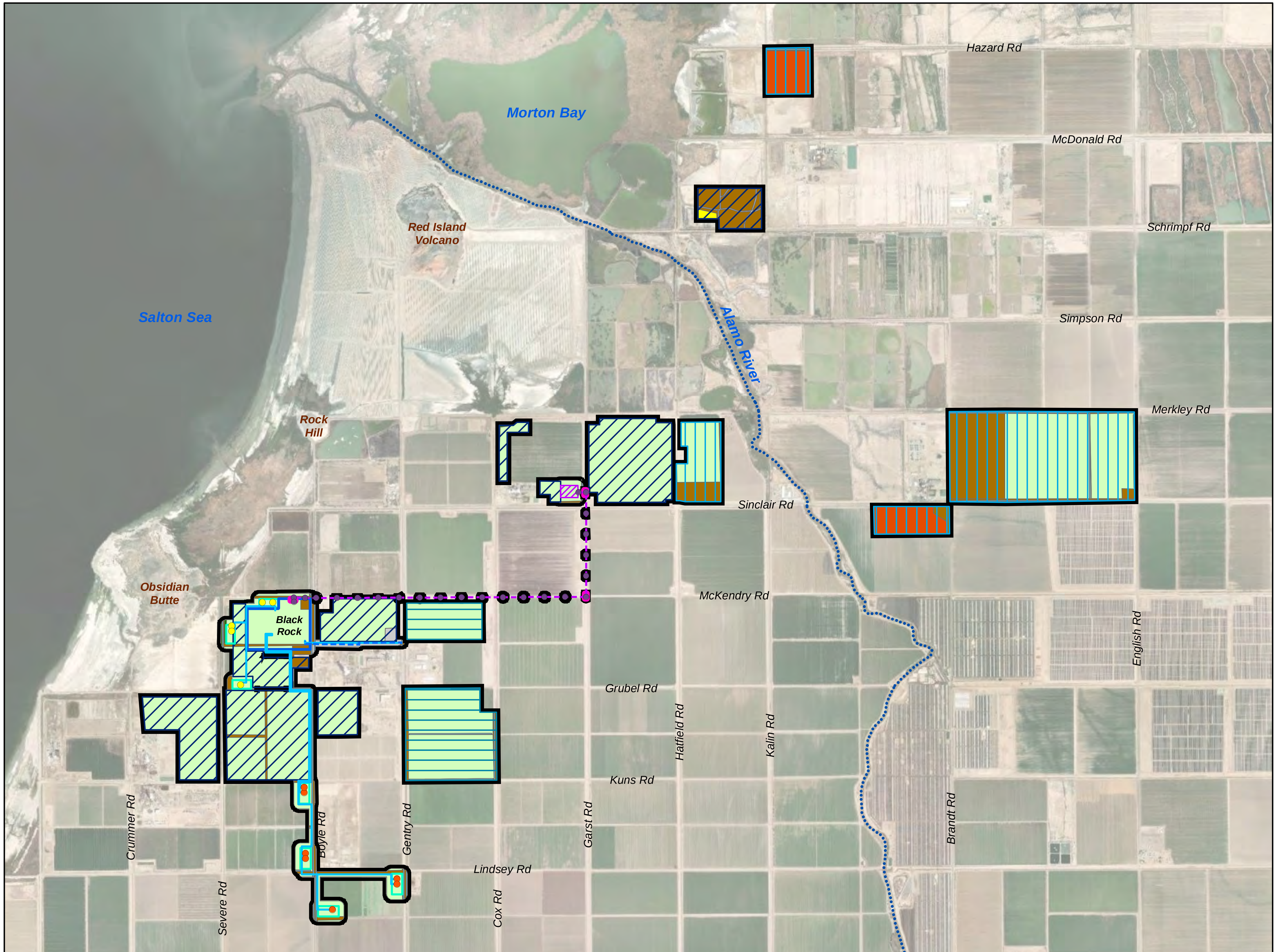
Land Cover Types and Vegetation Communities

Table 5.2-4 describes the major vegetation communities and land cover types that occur within the various Project components in the BSA. The following subsections also briefly describe the vegetation types and land cover. A total of seven vegetation communities and land cover types were mapped within the BSA (Figure 5.2-4). Table 5.2-5 describes the 11 major vegetation communities and land cover types mapped in the 1,000-foot and 1-mile buffers of the BSA.

Table 5.2-4. Vegetation Communities within the BRGP Biological Study Area

Vegetation Communities and Other Cover Types	Acreage within the Biological Study Area
Agriculture	1,071.71
Canals and Drains	30.34
Developed	14.04
Disturbed with Vegetation	218.91
Disturbed with No Vegetation	71.60
Invasive Southwest Riparian Woodland and Shrubland	2.71
North American Arid West Emergent Marsh	0.13
North American Warm Desert Playa	2.80
Total	1,412.24

Source: Jacobs 2022



Legend

- Biological Study Area
- Plant
- Well Pad
- Injection Well
- Production Well
- Pipeline
- Water Supply Pipeline
- Gen-Tie Line Pole
- Gen-Tie Line
- Pull Site
- Switching Station
- Borrow Pit
- Construction Camp
- Construction Laydown and Parking Areas

Land Cover and Vegetation Types

- Agriculture
- Canals and Drains
- Developed
- Disturbed with Vegetation
- Disturbed with No Vegetation
- Invasive Southwest Riparian Woodland and Shrubland
- North American Arid West Emergent Marsh
- North American Warm Desert Playa

Note:
Impacts to canals and drains are included for completeness; no IID infrastructure will be impacted by this Project.

0 0.25 0.5 1
Miles

N

Figure 5.2-4
Land Cover and Vegetation Types
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Bio\Black_Rock\BR_Figure_5_230216.mxd

Table 5.2-5. Vegetation Communities within the BRGP Biological Study Area Buffers

Vegetation Communities and Other Cover Types	Acreage within the Biological Study Area Buffers[a]
Agriculture	3,022.32
Barren Lands	95.81
Canals and Drains	135.36
Developed	393.42
Disturbed with Vegetation	819.99
Disturbed with No Vegetation	262.45
Invasive Southwest Riparian Woodland and Shrubland	167.27
North American Arid West Emergent Marsh	538.92
North American Warm Desert Playa	190.73
North American Warm Desert Volcanic Rockland	131.96
Open Water	234.61
Total	5,802.93

Source: Jacobs 2022

[a] The BSA buffer areas include the 1-mile buffer of the facility and the 1,000-foot buffers of well pads, pipelines, auxiliary features, and linear features. These are not shown on any figures.

The following sections discuss land cover types and vegetation communities within the BSA and associated buffers. Definitions are taken from Southwest Regional Gap Analysis Project unless otherwise noted (NatureServe 2004).

Agriculture

The predominant land cover within the BSA is agriculture. The crops grown in these fields during the botanical surveys include alfalfa (*Medicago sativa*), beets (*Beta* sp.), Bermuda grass, corn (*Zea mays*), cultivated oats (*Avena sativa*), romaine lettuce (*Lactuca sativa*), and wheat (*Triticum aestiv*um). Some fields were fallow or in between crop rotation. These lands may provide foraging habitat for overwintering migratory birds and resident waterfowl. The agriculture land cover type includes an area of planted palm trees observed in the Project buffer.

Barren Lands

Barren lands are characterized as barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulation of earthen material. Generally, vegetation accounts for less than 15% of total cover (NatureServe 2004). The barren land cover type is only present in the BSA buffer.

Canals and Drains

Canals and drains are not defined by the Southwest Regional Gap Analysis Project (NatureServe 2004). Concrete-lined and unlined drains are located along north-south and east-west oriented roads and in between agricultural fields. Generally, drains are less than 20 feet in width and have steep earthen banks. The drains within the BSA support sparse vegetation consisting of southern cattail (*Typha domingensis*), giant reed, and salt cedar. Periodic maintenance, including removal of vegetation, precludes habitat from supporting special-status plant species. Wildlife may forage in these locations. Burrowing owls are known to use holes in drains and under concrete canals. Irrigation infrastructure, including canals and drains, will not be impacted by the proposed Project.

Developed

The developed land cover type is nonnatural with manmade structures. Within the BSA, these areas generally consist of energy production facilities and associated infrastructure. The areas lack natural vegetation cover. Some buildings and structures provide suitable roosting or nesting habitat for common bat and bird species.

Disturbed with Vegetation

The disturbed with vegetation land cover type is not a natural land cover type and is characterized by some form and intensity of human disturbance. The amount and type of vegetation present is dependent on such things as level of soil compaction and duration since last disturbance; species typically found here are generally ruderal. This category also includes previously disturbed wetlands now with dead vegetation. The disturbed with vegetation land cover provides poor-quality wildlife habitat because of the level of human disturbance, sparse vegetation, and compacted soil. Wildlife species may still walk or fly over this land cover type as they move between higher-quality habitats.

Disturbed with No Vegetation

The disturbed with no vegetation land cover type is nonnatural. These areas consist of unpaved north-south and east-west oriented roads, and other cleared areas adjacent to agricultural fields and roadways typically used for equipment and material staging, parking, and deliveries in support of agricultural activities in the BSA. Wildlife use of disturbed areas would be transient only.

Invasive Southwest Riparian Woodland and Shrubland

Invasive Southwest Riparian Woodland and Shrubland is a seminatural vegetation type that forms in temporarily flooded areas along rivers or streams or in depressions. This vegetation type is dominated by two invasive species, salt cedar and giant reed. Other associated species include common reed (*Phragmites australis*) and arrowweed (*Pluchea sericea*). This vegetation type provides cover, foraging, and nesting for wildlife species.

North American Arid West Emergent Marsh

North American Arid West Emergent Marsh is a natural vegetation type in arid regions that forms in areas that collect water, such as along slow-moving streams and rivers, sloughs, and ponds. North American Arid West Emergent Marshes are frequently or continually inundated with water and have saturated soils. Typical vegetation includes cattails and bulrush. A variety of wildlife has potential to use this habitat for foraging and nesting. This vegetation type also is observed in intermittently flooded managed wetlands. Managed wetlands may be used for bird habitat or hunting and are found on private and public property (Figure 5.2-2). This vegetation type only occurs in the BSA buffer.

North American Warm Desert Playa

North American Warm Desert Playa is a natural vegetation type occurring on intermittently flooded alkaline or saline playa. Vegetation is typically sparse with less than 10% cover and highly alkaline or saline soils. Within the BSA, this habitat is restricted to Salton Sea margins and consists of salt-tolerant species such as bush seepweed (*Suaeda nigra*), iodine bush (*Allenrolfea occidentalis),* and salt cedar. These areas provide poor wildlife nesting habitat but could provide foraging habitat when flooded.

North American Warm Desert Volcanic Rockland

North American Warm Desert Volcanic Rockland is a natural vegetation type restricted to barren and volcanic substrates such as basalt lava and tuff. Vegetation is sparse and includes desert holly (*Atriplex hymenelytra*) and iodine bush. Some of these outcrops have been mined. Birds may nest or perch on these outcrops. Use of these outcrops by other wildlife is expected to be transient because of sparse vegetation. This vegetation type only occurs in the BSA buffer.

Open Water

Open water has less than 25% cover of vegetation or soil. Open water is associated with the Salton Sea and associated inlets. Waterfowl and aquatic species will use open water resources. This land cover type only occurs in the BSA buffer.

Invasive Plant Species

During the BRGP BSA floristic surveys, seven invasive plant species were observed (Appendix 5.2A). The most frequently observed species included the following:

- Giant reed
- London rocket
- Russian thistle
- Salt cedar

Wildlife Surveys

Reconnaissance-Level Surveys

A total of 51 wildlife species were observed during the reconnaissance-level survey and incidental observations, including 44 birds, five mammals, and two reptiles (Appendix 5.2A). Most wildlife species that inhabit, move through, or forage within the habitats identified previously are relatively common species.

The following five special-status wildlife species were observed during the reconnaissance-level surveys:

- Burrowing owl
- California gull
- Cooper's hawk
- Long-billed curlew
- White-faced ibis

With the exception of burrowing owls, these special-status species are CDFW WL and are protected during their nesting. Nesting habitat for California gull, Cooper's hawk, long-billed curlew, and white-faced ibis, all protected under the MBTA, is not present in the BSA and the BSA has generally low-quality suitable habitat for these species. These species may forage in agriculture lands present in BSA.

Burrowing owls were observed within the BSA during the wildlife reconnaissance-level survey; this species is present throughout the BSA vicinity. Appendix 5.2B, submitted under a request for confidential designation, provides results of all incidental burrowing owl observations in the BSA vicinity for context of burrowing owl occupation in the area. Burrowing owls were observed in holes in earthen drains and under concrete canals adjacent to agricultural fields. Burrowing owls are known to breed and forage throughout agricultural development in Imperial County (CDFW 2012). Burrowing owls are habituated to agricultural activities and geothermal facilities in the vicinity. This species would be expected to use berms or elevated areas near existing geothermal facilities.

California brown pelicans have historically nested on and near Obsidian Butte, which is located less than 0.5 mile from the BRGP plant site (Appendix 5.2B, submitted under a request for confidential designation). Although the BSA has no nesting or foraging habitat for the pelican, the proximity of high use areas to the BSA gives this species high potential to fly over the area.

Protocol-level Yuma Ridgway's Rail and California Black Rail Surveys

Biologists did not identify any suitable habitat for Yuma Ridgway's rail or California black rail; therefore, no protocol-level surveys were conducted within the BSA. The dominant land cover within the BSA is agricultural fields, most of which had active crops during the surveys. Rails are not expected to occur in the BSA (Sliwa 2022).

Aquatic Resource Delineation

The aquatic resource delineation found no aquatic resources within potential disturbance areas. Documentation of the aquatic resource delineation is provided in Appendix C.

5.2.2 Environmental Analysis

Potential direct and indirect impacts to biological resources were evaluated to determine the permanent and temporary effects of construction and operation of the proposed Project. Results from the field surveys, habitat evaluations, and aerial imagery interpretation were evaluated to address the potential for presence of sensitive biological resources in the BSA.

This section identifies biological resources that may be affected either directly or indirectly by the Project. Direct and indirect impacts may be either permanent or temporary. These impact categories are defined as follows and are applied as part of the environmental analysis:

- **Direct:** The California Environmental Quality Act (CEQA) defines direct impacts as those that result from a project and occur at the same time and place. Any alteration, disturbance, or destruction of biological resources that would result from project-related activities is considered a direct impact. Examples include loss of habitat resulting from clearing vegetation, encroaching into wetlands, diverting natural surface water flows, and the loss of individuals of a species.
- **Indirect:** CEQA defines indirect impacts as those caused by a project but that occur later in time or are farther removed in distance, although they are reasonably foreseeable and are related to the project. As a result of project-related activities, biological resources also may be affected in a manner that is not direct. Examples include elevated noise and dust levels, increased human activity, decreased water quality, and the introduction of invasive plants and wildlife.
- **Permanent:** All impacts that result in the irreversible removal of biological resources are considered permanent. Examples include constructing a building or permanent road on an area containing biological resources.
- **Temporary:** Any impacts considered to have reversible effects on biological resources can be viewed as temporary. Examples include increased vehicle movement and noise from temporary construction activities.

5.2.2.1 Significance Criteria

The BRGP may result in a significant impact on the environment if it would do the following:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as endangered, threatened, candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by CDFW or USFWS
- Have a substantial adverse effect on any riparian habitat or other special-status natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS
- Have a substantial adverse effect on federal or state protected waters of the United States (including wetlands) as defined by Sections 404 and 401 of the 1972 Amendments to the Federal Water Pollution Control Act, commonly known as the Clean Water Act, or the Porter-Cologne Act, either through direct removal, filling, hydrological alteration, or other means
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory native wildlife corridors, or impede the use of wildlife nursery sites
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan
- Threaten to eliminate a plant or animal community

CEQA Section 15380 provides that a plant or animal species may be treated as "rare or endangered" even if the species is not on one of the official lists if, for example, it is likely to become endangered in the foreseeable future.

5.2.2.2 Potential Impacts of Construction

This section provides a summary of potential impacts during BRGP construction.

5.2.2.2.1 BRGP Site

The BRGP site will have a footprint of approximately 55 acres. The current land use of the site is agriculture and disturbed (Figure 5.2-4). The Project also includes injection wells, production wells, associated pipelines, gen-tie line, and a switching station. Potential adverse impacts to biological resources from BRGP construction include clearing and grubbing and noise. Direct impacts to biological resources from BRGP's construction will be less than significant with the application of mitigation measures, worker training programs, pre-construction surveys, and biological monitoring. Any special-status species found within the Project site during pre-construction surveys will be protected by implementation of the measures listed in Section 5.2.3.

Construction of the BRGP may result in less than significant temporary indirect impacts to biological resources from construction activities. Project construction activities could temporarily displace wildlife foraging and nesting in Project area because of human presence, construction dust, lighting, and noise. The Applicant's implementation of mitigation measures and worker training programs will assist in limiting adverse indirect impacts to biological resources.

5.2.2.2.2 Temporary Construction Areas

BRGP temporary construction areas include laydown yards, parking lots, borrow pits, and a construction camp. Most of the temporary construction areas are agriculture or disturbed land cover types (Figure 5.2-4). Once construction is complete, mobile wildlife species will likely resume foraging and other uses of these vegetation types, limiting the long-term adverse impact of BRGP construction on biological resources.

5.2.2.2.3 Vegetation Communities

Project construction activities would not result in significant direct impacts to special-status vegetation communities because no such communities occur within the BSA. Temporary and permanent impacts to vegetation communities within the BSA are presented in Table 5.2-6.

Table 5.2-6. Temporary and Permanent Impacts to Vegetation Communities and Other Land Cover Types within the BRGP Biological Study Area

Vegetation Communities and Other Land Cover Types within the BSA	Impacts (acres)	
	Temporary	Permanent
Agriculture	963.30	108.41
Canals and Drains[a]	28.26	2.08
Developed	12.49	1.54
Disturbed with Vegetation	202.14	16.77
Disturbed with No Vegetation	71.60	0

Vegetation Communities and Other Land Cover Types within the BSA	Impacts (acres) Temporary	Permanent
Invasive Southwest Riparian Woodland and Shrubland	1.99	0.72
North American Arid West Emergent Marsh	0.13	0
North American Warm Desert Playa	2.80	0
Total	1282.71	129.53

[a] The proposed Project will not impact any irrigation infrastructure, including any canals and drains.

Permanent effects would result where vegetation is removed and new structures are installed. These effects would preclude most habitat function, except low-quality roosting and nesting for common bat and bird species in developed structures. Temporary effects to vegetation and wildlife habitat would occur during construction where vegetation is damaged by dust, crushed by vehicles, or removed for Project use.

Losses resulting from this Project are not considered significant, by themselves or cumulatively with other projects, because agricultural land, developed land, and disturbed areas (for example, roads) are not considered regionally important as habitat for wildlife. Burrowing owls primarily nest in canals and drains, which will not be impacted by this Project.

5.2.2.2.4 Special-Status Habitat Types and Critical Habitat

No special-status habitat types or critical habitat will be impacted by Project construction because none were mapped within the BSA or Project buffers.

5.2.2.2.5 Plant Species

Construction of the Project would not result in significant direct impacts to special-status plant species because no special-status plants were found within the BSA and suitable habitat for special-status plants is not present.

5.2.2.2.6 Wildlife Species

Temporary and permanent impacts to special-status wildlife could occur from removal of vegetation (resulting in loss of nesting/breeding and foraging habitat), trenching, entombment of animals in dens or burrows, collisions with vehicles, collision with power line conductors or towers, electrocutions, or disturbance from noise. With the implementation of awareness training, pre-construction surveys, and avoidance, mitigation and compensation measures proposed by the Applicant, there will be no significant, unmitigated environmental impacts associated with the construction of BRGP.

Construction activities may also result in an increase in accidental road kills due to increased vehicle traffic or clearing and removal of vegetation. Other potential causes of wildlife mortality or injury include entrapment in excavations or other supplies and equipment, or poisoning by ingestion or exposure to stored or spilled chemicals. Fluids used by equipment and vehicles (such as hydraulic fluid, antifreeze, oil, or fuel) that are spilled, even in small quantities, may be ingested by wildlife resulting in illness or death. Predators and scavengers may then consume the contaminated wildlife and become poisoned. Direct losses of animals in and adjacent to the Project may occur as a result of disturbance (such as, where flushing of adults off nests or abandonment of nests results in loss of eggs or young birds due to predation or exposure). If an individual special-status wildlife species is present, it would not likely represent a substantial component of the region's population and impacts to individuals would not preclude the ability for the species to be self-sustaining. With implementation of mitigation measures such as speed limits, pre-construction surveys, hazardous materials plan to clean up spills, monitoring, will reduce impacts to less than significant.

Development of the site is expected to represent a minimal loss of special-status wildlife species foraging habitat. Most Project impacts to foraging habitat will be temporary and the areas will revert to previous use post construction. Special-status bird and bat species could use similar foraging habitats in the Project vicinity as alternatives during construction and these habitats are not a limiting factor for these species. With implementation of mitigation measures, such as compensation for loss of burrowing owl foraging habitat, the impacts to biological resources will be less than significant.

Equipment used during construction of the facilities would result in air emissions of particulate matter, nitrogen oxides, carbon monoxide, volatile organic compounds, and sulfur dioxide. These pollutants have the potential to affect biological resources. Detailed information on construction emissions is included in Section 5.1, Air Quality. Construction emissions are expected to be below applicable ambient air quality health and secondary standards and, likewise, would be below significance criteria established for impacts to wildlife.

Project construction at the plant site would not result in significant direct or indirect impacts to wildlife movement corridors because of the already highly fragmented habitat and the BSA is not within defined wildlife movement corridor. The fencing around plant site is not expected to limit or impede foraging activity or general movements of wildlife species.

Noise from construction could temporarily discourage wildlife from foraging and nesting immediately adjacent to the Project area. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction activities could reduce the reproductive success of nesting birds. The California brown pelican is expected to be the most noise-sensitive species and is specifically addressed in the following discussion. The construction period is relatively short, and wildlife usually become habituated to ongoing general construction noise. As a result of these design features, the temporary nature of these activities, and the adherence to noise reducing mitigation measures, the noise levels at the Project fence line are not expected to have any significant impact on nearby wildlife resources.

Bright night lighting could disturb wildlife using areas adjacent to the BRGP (such as, nesting birds, foraging mammals, and flying insects). Night lighting is also suspected to attract migratory birds to areas and, if the lights are on tall structures, collisions could occur. Additionally, certain lighting may attract insects which in turn may attract birds, such as the short-eared owl, and bats to forage. The BRGP lighting will meet the requirements for security, safety, and will be shielded and pointed downward and away from the habitat outside of the Project area to minimize impacts to nesting birds and other nearby wildlife, and to reduce the potential for avian and bat attraction and collision. With implementation of lighting mitigation measures, the impacts to special-status wildlife will be less than significant.

The BRGP will result in construction of above ground structures, including power plant, substation, and the gen-tie line (with approximately 23 poles), that could potentially result in bird and bat collisions. Birds and bats would be expected to forage in adjacent agricultural lands, and the Project area is in the Pacific flyway used by migrating birds. The installation of gen-tie lines and poles will be constructed according to the most recent avian-friendly guidelines (APLIC 2006), ensuring that conductor wires are appropriately spaced to minimize the potential of avian electrocution. In addition, markers will be placed and maintained on the highest-bird-use portions of the proposed gen-tie lines to increase visibility and monitored for effectiveness. Bird and bat collisions would be reduced to less than significant levels by implementation of measures provided in Section 5.2.3.

Burrowing Owl

The construction of the plant is expected to have direct and indirect temporary impacts to burrowing owls. Resident burrowing owls are widespread in irrigation canals and berms associated with the agricultural lands around the Salton Sea. Biologists incidentally documented occupied burrowing owl burrows within the BSA (Appendix 5.2B, submitted under a request for confidential designation). Burrowing owls have adapted to agricultural landscapes, attaining the greatest densities ever recorded for the species in the Imperial Valley (Rosenberg et al. 2007). Direct impacts to burrowing owls would be expected by collapsing occupied burrows within permanent impact areas. However, many burrows exist in the BSA vicinity and mitigation measures would be in place to enhance or create additional burrows for displaced burrowing owl pairs and individuals. Burrowing owls potentially inhabiting burrows would be impacted by the noise, dust, and other disturbances associated with the construction of the BRGP. Indirect disturbance of adjacent burrowing owl populations from construction is not considered permanent, as temporarily displaced owls would be expected to return upon completion of Project construction. With the implementation of mitigation measures, including worker training, pre-construction surveys, burrow enhancement or creation, biological monitoring, and habitat and foraging compensation, impacts to burrowing owls will be less than significant.

California Brown Pelican

The California brown pelican is FP and has been documented at Obsidian Butte near the Project site. Although the BSA has no nesting or foraging habitat for the pelican, the proximity of high-use areas to the BSA gives it high potential to fly over the area.

Project noise has potential to temporarily impact California brown pelican at Obsidian Butte. Based on Huntington Beach Energy Project testimony by bird hearing expert Robert Dooling, Ph.D., USFWS's commonly used 60 A-weighted decibels (dBA) is an overly conservative noise threshold for birds. The A-weighting scale was developed based on human hearing. Audiograms show that birds are as much as 15 to 20 decibels less sensitive to low frequency noises, such as that from construction equipment (CEC 2014). For the purposes of this analysis, 80 dBA was used as the bird noise threshold. Typical construction activities are predicted to generate average noise levels between 84 and 87 dBA at 50 feet from the edge of the construction activity; noise levels would attenuate to below 80 dBA at a distance between 100 and 200 feet from the source (Section 5.7, Noise). The loudest construction activity would be pile driving at 104 dBA at 50 feet (Section 5.7, Noise). One pile driving location is in the northwest corner of the plant site and noise would attenuate to less than 80 dBA by 1,500 feet (Section 5.7, Noise). With adherence to design noise reducing mitigation measures, the noise impacts to California pelican at Obsidian Butte will be less than significant.

Nesting Migratory and Resident Birds

Almost all birds are protected under the Migratory Bird Treaty Act (MBTA) and California Department Fish and Game (CDFG) code 3503. Additionally, bird species designated as SSC are also protected under Title 14, California Code of Regulations (sections 670.2 and 670.5). Raptors are protected under various federal and state codes, including the MBTA, and CDFG codes 3503, 3503.5, and 3513. Eight special-status bird species have low potential[2] to forage or interact with the Project site during construction:

1. California gull
2. Cooper's hawk
3. Loggerhead shrike
4. Long-billed curlew
5. Mountain plover
6. Short-eared owl
7. White-faced ibis
8. Yellow warbler

Although nesting birds were not observed during the BSA surveys, any potential impacts to individuals or nests of these species resulting from the proposed Project require mitigation to reduce those impacts to less-than-significant levels. Potential impacts from construction on nesting birds could primarily occur from temporary construction noise and clearing and grubbing of the site. The Project will result in the permanent and temporary loss of potential foraging habitat for some migratory and resident birds. However, this loss is expected to be a less-than-significant impact because of the amount of similar habitat in the vicinity. Pre-construction surveys will occur before all ground disturbing activities commence, and these activities will occur outside of the nesting season (generally February 1 through

[2] California gull, Cooper's hawk, long-billed curlew, and white-faced ibis were observed during surveys and documented as present; however, no suitable nesting habitat is present in the BSA for these species.

August 31), where feasible. The impacts of the aforementioned actions and the potential for loss of bird species due to collisions with structures and vehicles would be significant in the absence of mitigation. However, mitigation measures designed to minimize these potential impacts to less-than-significant levels are detailed in Section 5.2.3.

Burrowing Mammals

This section provides a summary of potential impacts to burrowing mammals, American badger, desert kit fox, and Yuma hispid cotton rat.

American badger and desert kit fox have low potential to occur in the BSA, but they are documented in the SBSSNWR (USFWS 2018). Both species have potential to burrow in berms and around agricultural fields.

Yuma hispid cotton rat is known to burrow in dense vegetation in irrigation canals and drains, dense riparian or marsh vegetation types, and forage in agricultural lands. One CNDDB occurrence of this species was documented in query, but this species is reported as “common” in the SBSSNWR (USFWS 2018). Yuma hispid cotton rat has moderate potential to occur in canals and drains, and agricultural lands within BSA. The small acreages of Invasive Southwest Riparian Woodland and Shrubland or North American Arid West Emergent Marsh within the BSA also provide suitable habitat.

Direct impacts to these species would include being crushed in burrows during clearing and grading. Indirect impacts to these species would include disturbance associated with lighting, noise, and dust during construction. Biologists would survey for burrowing mammal species during pre-construction surveys. If a population of the Yuma hispid cotton rat is present, it would not likely represent a substantial component of the region’s population and impacts to individuals would not preclude the ability for the species to be self-sustaining. With the implementation of mitigation measures, including worker training, pre-construction surveys, and biological monitoring, impacts to American badger, desert kit fox, and Yuma hispid cotton rat will be less than significant.

Special-status Bat Species

Several special-status bat species have low potential to forage in the BSA in agricultural lands, riparian areas, and marshes. The roosting potential is low, in scattered trees or structures in or near the BSA. Temporary impacts to bats would include noise, lighting, and removal of agricultural lands for temporary construction use. Direct impacts would include collision with structures or electrocution. Through implementation of mitigation measures worker training, lighting, noise, gen-tie line design, impacts to special-status bats will be less than significant.

5.2.2.2.7 Jurisdictional Waters

Construction of the plant and other Project facilities (injection well pads, pipelines, and borrow site) will have no impacts to federally or state-jurisdictional wetlands or waters. If any gen-tie line impacts federal or state jurisdictional waters, a Section 404 permit from the U.S. Army Corps of Engineers (USACE) and a Section 401 permit from the Regional Water Quality Control Board would be required for potential impacts to these features.

5.2.2.3 Operation

Following initial construction activities, Project operation also would generate varying levels of dust, lighting, and noise disturbance adjacent to the plant site, offsite well pads, and, on limited occasion, in proximity to injection well pipelines. The level of disturbance from noise, lighting, and other elements associated with maintenance activities would be of smaller magnitude and of shorter duration than those associated with construction. A small, less-than-significant increase in this type of disturbance also would be anticipated for day-to-day general Project operations at the plant site.

5.2.2.3.1 Vegetation Communities

Operation of the Project would not result in significant direct impacts to special-status vegetation communities because no special-status vegetation communities occur on the site or within the surrounding BSA. Operation potentially could result in indirect impacts to vegetation communities through unauthorized access by workers and their vehicles, which can trample and destroy vegetation outside of, but immediately adjacent to, the proposed BSA. These impacts will be avoided, however, through implementation of Project mitigation measures including worker awareness training.

5.2.2.3.2 Plant Species

Operation of the Project would not result in significant direct impacts to special-status plant species because special-status plants are not known to occur within the BSA.

5.2.2.3.3 Wildlife Species

Direct impacts could result in mortality of wildlife by crushing or vehicle collisions, collision with structures, or electrocution during operation and maintenance activities. Implementation of the impact avoidance, minimization, and mitigation measures will reduce the Project's impacts on listed and special-status wildlife species to a level of insignificance.

For protected wildlife species, indirect impacts are possible from the noise associated with the operations of the proposed Project. In general, nearly all equipment will be specified to have near-field maximum noise levels that do not exceed 90 dBA at three feet from the activity (or 85 dBA at three feet where available as a vendor standard) to limit the noise exposure of plant personnel to acceptable levels. It is expected that during normal steady-state operations the 80 dBA threshold will not be exceeded beyond plant boundaries. Therefore, no significant noise impacts to special-status bird species would occur as a result of the operation of the Project.

5.2.2.3.4 Jurisdictional Waters

Operation of the Project plant site and offsite well field would not result in significant direct or indirect impacts to federally or state-jurisdictional waters. No jurisdictional waters exist within the footprints of these facilities.

5.2.2.4 Cumulative Impacts

With mitigation, the Project itself will not have significant adverse effects on biological resources. The cumulative impacts to specific environmental resources resulting from the Project considered together with other projects in the area also would be less than significant. Other projects would be required individually to comply with applicable biological resource-related LORS, undergo a CEQA environmental review process, and implement mitigation for their identified impacts. Regional mitigation issues would be addressed and coordinated on a regional basis by local agencies such as Imperial County, the Salton Sea Authority, and IID, as well as other interested stakeholders.

5.2.3 Mitigation Measures

The following sections describe the proposed measures that are intended to avoid and minimize potential adverse effects of the Project on biological resources.

5.2.3.1 Designated Biologist and Biological Monitor Selection

The Project owner will submit the resumes, including contact information, of the proposed Designated Biologist and any Biological Monitors to the Compliance Project Manager (CPM) for approval.

The Designated Biologist must meet the following minimum qualifications:

1. Bachelor's Degree in biological sciences, zoology, botany, ecology, or a closely related field
2. Three years of experience in field biology or current certification from a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society
3. At least one year of field experience with biological resources found in or near the BSA
4. The Biological Monitors will have a background in biology and be approved by the CPM.

If a Designated Biologist needs to be replaced, the specified information of the proposed replacement must be submitted to the CPM at least 10 working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the Project owner will immediately notify the CPM and submit the qualifications of a short-term replacement. The CPM will approve the short-term replacement within one business day. The short-term replacement will have all the duties and rights of a Designated Biologist while a permanent Designated Biologist is proposed to the CPM for consideration.

5.2.3.2 Designated Biologist and Biological Monitor Duties

The Project owner will ensure that the Designated Biologist and Biological Monitors will perform the following duties during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, and closure activities:

1. Advise the Project owner's Construction and Operation Managers on the implementation of the biological resources COCs.
2. Be present to supervise or conduct mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species or their habitats.
3. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions.
4. Prior to construction commencing each day, inspect active construction areas where animals may have become trapped. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically, inspect areas with high vehicle activity (parking lots) for animals in harm’s way.
5. Notify the Project owner and the CPM of any noncompliance with any biological resources COC.
6. Respond directly to inquiries of the CPM regarding biological resource issues.

5.2.3.3 Designated Biologist and Biological Monitor Authority

The Project owner's Construction and Operation Managers will act on the advice of the Designated Biologist or Biological Monitors to ensure conformance with the biological resource COCs.

If required by the Designated Biologist or Biological Monitors, the Project owner's Construction and Operation Managers will halt all site mobilization, ground disturbance, grading, construction, and operation activities in areas specified by the Designated Biologist as sensitive or which may affect a sensitive area or species.

The Designated Biologist and Biological Monitors will:

1. Halt all activities in any area when it is determined that there would be an adverse impact to sensitive species if the activities continued.
2. Inform the Project owner and the Construction and Operation Managers when to resume activities.

3. Notify the Compliance Project Manager (CPM) if there is a halt of any activities, and advise the CPM of any corrective actions that have been taken, or will be instituted, as a result of the halt.

5.2.3.4 Worker Environmental Awareness Program

The Project owner will develop and implement a CPM-approved Worker Environmental Awareness Program (WEAP) in which all employees, as well as employees of contractors and subcontractors who work on the BSA or at any related facilities during site mobilization, ground disturbance, grading, construction, operation, and closure, are informed about sensitive biological resources associated with the Project.

The WEAP will include:

1. Be developed by or in consultation with the Designated Biologist and consist of an onsite or training center presentation in which supporting written material is made available to all participants.
2. Discuss the locations and types of sensitive biological resources on the BSA and adjacent areas. Personnel will be advised that handling of any wildlife is prohibited.
3. Present the reasons for protecting these resources.
4. Present the meaning of various temporary and permanent habitat protection measures.
5. Identify whom to contact if there are further comments and questions about the material discussed in the program.
6. Include a training acknowledgment form to be signed by each worker indicating that they received training and will abide by the guidelines.
7. The specific program can be administered by video by a competent individual acceptable to the Designated Biologist.

5.2.3.5 Biological Resources Mitigation Implementation and Monitoring Plan

The Project owner will submit two copies of the proposed BRMIMP to the CPM for review and approval, and to CDFW and USFWS for review and comment, and will implement the measures identified in the approved BRMIMP.

The final BRMIMP will identify:

1. All biological resources mitigation, monitoring, and compliance measures proposed and agreed to by the Project owner
2. All biological resources COCs identified in the Commission’s Final Decision
3. All biological resources mitigation, monitoring, and compliance measures required in other state agency terms and conditions
4. All biological resources mitigation, monitoring, and compliance measures required in local agency permits, such as site grading and landscaping requirements
5. All sensitive biological resources to be impacted, avoided, or mitigated by Project construction, operation, and closure
6. All required mitigation measures for each special-status biological resource
7. Required habitat compensation strategy, including provisions for acquisition, enhancement, and management for any temporary and permanent loss of sensitive biological resources

8. A detailed description of measures that will be taken to avoid or mitigate temporary disturbances from construction activities
9. All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction
10. Aerial photographs, at an approved scale, of all areas to be disturbed during Project construction activities – one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of Project construction; include planned timing of aerial photography and a description of why times were chosen
11. Duration for each type of monitoring and a description of monitoring methodologies and frequency
12. Performance standards to be used to help decide if/when proposed mitigation is or is not successful
13. All performance standards and remedial measures to be implemented if performance standards are not met
14. A discussion of biological resources-related facility closure measures
15. A process for proposing plan modifications to the CPM and appropriate agencies for review and approval
16. A copy of all biological resources permits obtained

5.2.3.6 Construction Mitigation Management to Avoid Harassment or Harm

The Project owner will manage the construction site and related facilities in a manner to avoid or minimize impacts to local biological resources.

Typical measures are:

1. Install a temporary fence and provide wildlife escape ramps for construction areas that contain steep walled holes or trenches if outside of an approved, permanent exclusionary fence. The temporary fence will be constructed of materials that are approved by USFWS and CDFW. The ramps will be located at intervals not greater than 1,000 feet and will be sloped less than 45 degrees. All animals discovered in trenches will be allowed to escape voluntarily (by escape ramps or temporary structures), without harassment, before construction activities resume, or be removed from the trench or hole by a qualified biologist and allowed to escape unimpeded.
2. Make certain all food-related trash is disposed of in closed containers and removed at least once a week.
3. Prohibit feeding of wildlife by staff or contractors.
4. Prohibit non-security-related firearms or weapons from being brought to the site.
5. Prohibit pets from being brought to the site.
6. Minimize use of rodenticides and herbicides in the BSA.
7. Advise all employees, contractors, and visitors of the need to adhere to speed limits and to avoid any animals, including burrowing owls, which may be encountered on or crossing the roads to and from the BSA. The maximum speed on unpaved roads within 300 feet of occupied special-status species habitat will be restricted to 15 miles per hour or lower during construction.
8. Inspect all construction pipes, culverts, or similar structures with a diameter of four inches or greater for special-status species (such as burrowing owls) prior to movement or burial of pipe. Cap all pipes

with a diameter of four inches or greater if they are to be left in trenches overnight or in storage areas outside of the construction laydown area.

9. Report all inadvertent deaths of special-status species to the appropriate Project representative. Injured animals will be reported to USFWS and CDFW and the Project owner will follow instructions that are provided by USFWS and CDFW. All incidences of wildlife injury or mortality resulting from Project-related vehicle traffic on roads used to access the Project will be reported in the MCR.
10. Confine construction activities to the plant, well pad, or pipeline side of any existing or constructed barriers (such as roads or levees), where feasible, to reduce the potential disruption associated with human presence within potentially occupied special-status species habitat.

5.2.3.7 Pre-construction Surveys to Avoid Harassment or Harm

The Project owner will provide a pre-construction survey proposal in the BRMIMP. The CPM, in consultation with the CDFW, the SBSSNWR, the USFWS, and any other appropriate agencies, will determine the acceptability of the pre-construction survey protocols, the survey areas, and the Designated Biologist's prescriptions for potential impacts.

Prior to mobilization, the Project owner will conduct pre-construction surveys for burrowing owls at a level that establishes the occurrence and abundance of the species. Pre-construction surveys will also include burrowing mammal species, such as American badger, desert kit fox, and Yuma hispid cotton rat, and active nests of migratory birds during the nesting season (generally February 1 through August 31).

The Designated Biologist will make recommendations to the Project owner to avoid or minimize impacts to the special-status species based on completed pre-construction surveys.

5.2.3.8 Construction Monitoring to Avoid Harassment or Harm

The Project owner will perform monitoring throughout construction to ensure construction-related impacts remain at or below levels of significance set forth in the BRMIMP. The monitoring results will be compared to the pre-construction baseline surveys' indices and to other local population values.

The Project owner will provide a monitoring proposal and indices for comparison to pre-construction baseline survey work within the BRMIMP. Monitoring must include any special-status species located during the pre-construction baseline survey and any areas identified as suitable habitat. Protocol-level surveys will be completed for appropriate habitats within 1,000 feet of the plant site and within 1,000 feet of all linear facilities or within specified areas in the Salton Sea area during each year that construction is occurring and for the year following construction. The CPM, in consultation with the CDFW, the SBSSNWR, the USFWS, and any other appropriate agencies, will determine the acceptability of the monitoring protocols and survey areas.

5.2.3.9 Overhead Gen-tie Line Monitoring to Avoid Harassment or Harm

The Project owner will install an agency-approved marker on the grounding wire of the proposed gen-tie lines. These markers will be placed and maintained on the highest-bird-use portions of the proposed gen-tie lines. Monitoring of the entire proposed gen-tie line, and sections of unmarked but comparable gen-tie line in the BSA, will be implemented for the first two years of operation, and may continue for up to 10 years (to determine effectiveness of remedies) if impacts are found to be excessive by a working group of interested agency personnel. Remedial actions to address collision deaths will be included in a Bird Collision Deterrent Proposal and Monitoring Plan. The Project owner must implement the CPM-approved remedial actions wherever high bird use and evidence of bird collisions are found during post-construction monitoring, and measure the effectiveness of the remedial actions for reducing impacts for at least one year following their implementation.

5.2.3.10 Survey and Provide Habitat Compensation for Burrowing Owls

The Project owner will survey for burrowing owl activities on the BSA prior to site mobilization to assess owl presence. The Project owner will evaluate the potential impact to each burrowing owl occurrence using impact criteria reviewed by the CDFW and USFWS and approved by the CPM. The impact criteria will be based on type of activity, length of activity, distance maintained from the burrowing owls, and time of year. For impact determinations that require monitoring of burrowing owls, a qualified biologist approved by the CPM must do the monitoring.

The Project owner will protect in an amount that will ensure the successful relocation of each impacted pair of owls or impacted unpaired resident bird (as determined by the CPM-approved impact criteria). For each occupied burrowing owl burrow that must be destroyed, existing unsuitable burrows on other lands will be enhanced (for example, cleared of debris or enlarged) or new burrows installed at a ratio that will ensure the successful relocation of impacted burrowing owl. The actual requirement will be determined after the CPM reviews the burrowing owl pre-construction surveys and monitoring. Avoidance is preferred over mitigation of impacts.

5.2.3.11 Provide Habitat Compensation for Permanent Disturbance to Burrowing Owl Habitat

Foraging habitat that is permanently destroyed will be replaced at a ratio suitable for the protection of burrowing owls and managed for the protection of burrowing owls. Based on these ratios, the Project owner must protect and manage land for burrowing owls. The mitigation amount can be reduced if mitigation land for the same burrowing owls also is being provided under another Condition of Certification. (Note: Final burrowing owl mitigation needs can only be determined following Phase III (nesting) surveys and subsequent discussions with the resource agencies and CEC.)

5.2.3.12 Emergency Management to Avoid Harassment or Harm

The Project owner will prepare and submit an agency notification list for emergency events such as the rupture or spill of geothermal fluids at the facility. The Project owner will obtain and then follow the recommendations resulting from the agency notification for avoiding harassment or harm to biological resources.

5.2.3.13 Operational Management to Avoid Harassment or Harm

The operation of the power plant and gen-tie lines will be conducted to avoid harassment and harm to sensitive biological resources. At a minimum, maintenance and operations personnel will follow this guidance:

1. The Project owner will observe the areas under power gen-tie lines during the course of their duties to informally monitor for birds that have struck the gen-tie lines.
2. Advise all employees, contractors, and visitors of the need to adhere to speed limits.

5.2.4 Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local LORS applicable to biological resources are discussed in the following sections and summarized in Table 5.2-7

Table 5.2-7. Laws, Ordinances, Regulations, and Standards for Biological Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Clean Water Act (33 USC 1344)	Prohibits the discharge of dredged or fill material into the waters of the U.S. without a permit.	USACE	The BRGP is not anticipated to impact any waters of the U.S. (Section 5.2.2.2).
Federal ESA (16 USC 1531 et seq.)	Designates and protects federally threatened and endangered plants and animals and their critical habitat. Applicants for projects that could result in adverse impacts on any federally listed species are required to consult with and mitigate potential impacts in consultation with USFWS.	USFWS	The BRGP is not anticipated to impact any federally threatened or endangered plants or animals (Section 5.2.2.2).
MBTA (16 USC 703 to 711)	Protects all migratory birds, including nests and eggs.	USFWS	The BRGP will include mitigation measures to reduce impacts to resident and migratory birds to a less-than-significant level (Section 5.2.2.2).
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System	The mission of the National Wildlife Refuge System is to preserve a national network of lands and waters for the conservation and management of fish, wildlife, and plant resources of the U.S. for the benefit of present and future generations.	USFWS	The BRGP is not anticipated to impact any portion of the National Wildlife Refuge System (Section 5.2.2.2).
National Wildlife Refuge System Improvement Act of 1997	The legislation requires that a comprehensive conservation plan (also known as comprehensive management plan) be in place for each national wildlife refuge within 15 years after passage of this bill.	USFWS	The SBSSNWR does not have a comprehensive conservation plan completed at the time of this AFC. The BRGP is not anticipated to impact any portion of the National Wildlife Refuge System (Section 5.2.2.2).
Salton Sea Reclamation Act of 1998	Permit the continual use of the Salton Sea as a reservoir for irrigation drainage and reduce and stabilize the overall salinity of the Salton Sea; stabilize the surface elevation of the Salton Sea; reclaim, in the long term, healthy fish and wildlife resources and their habitats; and enhance the potential for recreational uses and economic developments of the Salton Sea.	DOI	The BRGP is not anticipated to impact any portion of the Salton Sea (Section 5.2.2.2).

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Lea Act (16 USC 695 to 695c; 62 Stat. 238)	Authorizes the Secretary of the Interior to acquire and develop waterfowl and other wildlife management areas in California, provided the state acquires equivalent acreage.	DOI	The BRGP is not anticipated to impact any portion of the National Wildlife Refuge System (Section 5.2.2.2).
Desert Renewable Energy Conservation Plan	Habitat Conservation Plan/Natural Community Conservation Plan and a Bureau of Land Management Land Use Plan Amendment covering both public and private lands across seven counties, including the Salton Sea area in Imperial County	BLM	The BRGP BSA is within the boundaries of the DRECP, but it is not located on Bureau of Land Management lands or Areas of Critical Environmental Concern.
State			
CESA (Fish and Game Code Section 2050 et seq.).	Species listed under this act cannot be "taken" or harmed, except under specific permit.	CEC	The BRGP will include mitigation measures to reduce impacts to State-listed species to a less-than-significant level (Section 5.2.2.2).
Title 14, CCR, Sections 670.2 and 670.5	Lists animals designated as threatened or endangered in California.	CDFW	The BRGP is not expected to affect any threatened or endangered animals in California (Section 5.2.2.2).
California Public Resources Code, Division 15, Chapter 6, Section 25527	Prohibits placing facilities within ecological preserves, wildlife refuges, estuaries, and unique or irreplaceable wildlife habitats of scientific or educational value.	CDFW	The BRGP is not located in an area protected by this code (Section 5.2.1.2).
Fish and Game Code Sections 3511, 4700, 5050, and 5515	Lists animal species that are FP in California.	CDFW	No FP animal species in California are expected to be impacted by the BRGP (Section 5.2.2.2).
Fish and Game Code Section 3503 and 3503.5	States that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.5 specifically protects birds of prey.	CDFW	The BRGP will include mitigation measures to reduce impacts to bird nests and eggs, including birds of prey, to a less-than-significant level (Section 5.2.2.2).
Fish and Game Code Section 3513	Makes it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any migratory bird.	CDFW	The BRGP in not anticipated to impact any migratory bird (Section 5.2.2.2).
Fish and Game Code Sections 1930 et seq.	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.	CDFW	The BRGP is not located in an area protected by this code (Section 5.2.1.2).

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Fish and Game Code Sections 2700 et seq.	Provides funding to the Wildlife Conservation Board and CDFW for acquisition, enhancement, restoration, and protection of areas that are most in need of proper conservation	CDFW	The BRGP is not located in an area protected by this code (Section 5.2.1.2).
Fish and Game Code Sections 1900 et seq.	The Native Plant Protection Act lists threatened, endangered, and rare plants listed by the State.	CDFW	No state threatened, endangered, or rare plants are expected to be impacted by the BRGP (Section 5.2.1.5).
California Fish and Game Code (Sections 1601 through 1607)	Prohibits alteration of any stream, including intermittent and seasonal channels and many artificial channels, without a permit from CDFW.	CDFW	No streams, including intermittent and seasonal channels, will be impacted by the BRGP (Section 5.2.2.2).
Clean Water Act (33 USC 1341)	Requires the issuance of a clean water certification or waiver for any dredge/fill activities permitted under Section 404.	RWQCB	The BRGP is not anticipated to impact any waters of the U.S. (Section 5.2.2.2).
Local			
Imperial County General Plan – Conservation and Open Space Element, Policy 1	Provide a framework for the preservation and enhancement of natural and created open space, which provides wildlife habitat values. Protect riparian habitat and other types of wetlands from loss or modification by dedicating open space easements with adequate buffer zones, and by other means to avoid impacts from adjacent land uses. Road crossings or other disturbances of riparian habitat should be minimized and allowed only when alternatives have been considered and determined infeasible.	Imperial County	The BRGP will not impact any areas protected by this plan (Section 5.2.1.2).
Imperial County General Plan – Conservation and Open Space Element, Policy 2	Landscaping should be required in all developments to prevent erosion on graded sites and, if the area is contiguous with undisturbed wildlife habitat, the plan should include revegetation with native plant species.	Imperial County	The BRGP will not impact any areas protected by this plan (Section 5.2.1.2).
Imperial County General Plan – Noise Element	Identifies that many riparian bird species are sensitive to excessive noise and, as such, they are considered a sensitive receptor.	Imperial County	The BRGP will include mitigation measures to reduce impacts to resident and migratory birds to a less-than-significant level (Section 5.2.2.2).

Note:

AFC = Application for Certification

5.2.4.1 Federal LORS

5.2.4.1.1 Clean Water Act of 1977

Title 33, United States Code (USC), Sections 1251 through 1376, and Code of Federal Regulations (CFR), Part 30, Section 330.5(a)(26), prohibit the discharge of dredged or fill material into the waters of the U.S. without a permit. The administering agency is the USACE.

5.2.4.1.2 Endangered Species Act of 1973

Title 16, USC, Sections 1531 et seq., and Title 50, CFR, Parts 17.1 et seq., designate and provide for the protection of threatened and endangered plant and animal species and their critical habitat. The administering agency is the USFWS.

5.2.4.1.3 Migratory Bird Treaty Act

Title 16, USC, Sections 703 through 712, prohibit the taking of migratory birds, including nests with viable eggs. The administering agency is the USFWS.

5.2.4.1.4 Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System

Executive Order (EO) 12996, March 25, 1996, states the mission of the National Wildlife Refuge System is to preserve a national network of lands and waters for the conservation and management of fish, wildlife, and plant resources of the U.S. for the benefit of present and future generations. The EO sets forth guiding principles for public access and involvement, habitat preservation, and local partnerships.

5.2.4.1.5 National Wildlife Refuge System Improvement Act of 1997

The Act amends the National Wildlife Refuge System Administration Act of 1966 to include a unifying mission for the Refuge System, a new process for determining compatible uses of refuges, and a requirement for preparing comprehensive conservation plans. The legislation requires that a comprehensive conservation plan (also known as comprehensive management plan) be in place for each national wildlife refuge within 15 years after passage of this bill. The plans must be revised at least every 15 years. Guidelines for producing a comprehensive conservation plan were published in the Federal Register on May 25, 2000 (65 Fed. Reg. 33,891). The Salton Sea does not have a comprehensive conservation plan completed at the time of this AFC.

5.2.4.1.6 Salton Sea Reclamation Act of 1998

The Salton Sea Reclamation Act of 1998 (Public Law 105-372; Sonny Bono Salton Sea Reclamation Act) directs the Secretary of the Interior to:

"[C]omplete all studies of various options that permit the continual use of the Salton Sea as a reservoir for irrigation drainage and:

- Reduce and stabilize the overall salinity of the Salton Sea;
- Stabilize the surface elevation of the Salton Sea;
- Reclaim, in the long term, healthy fish and wildlife resources and their habitats; and
- Enhance the potential for recreational uses and economic developments of the Salton Sea."

5.2.4.1.7 Lea Act

The Lea Act was enacted to help farmers who experience problems with crop damage from ducks and geese. The Act, enacted on May 18, 1948 (16 USC 695 to 695c; 62 Stat. 238), authorizes the Secretary of the Interior to acquire and develop waterfowl and other wildlife management areas in California, provided the state acquires equivalent acreage. Lands acquired under the Act as management areas are not subject to the prohibition against taking birds, nests, or eggs, and hunting may be regulated in a cooperative manner necessary to carry out the provisions of the Act and subject to the provisions of the Migratory Bird Treaty Act. The SBSSNWR currently rents land from IID in partial fulfillment of this Act.

5.2.4.1.8 Desert Renewable Energy Conservation Plan

The Desert Renewable Energy Conservation Plan (DRECP) was developed as a Habitat Conservation Plan/Natural Community Conservation Plan and a Bureau of Land Management Land Use Plan Amendment covering both public and private lands across seven counties, including the Salton Sea area in Imperial County (Conservation Biology Institute 2014). The BRGP BSA is within the boundaries of the DRECP, but it is not located on Bureau of Land Management lands or Areas of Critical Environmental Concern.

5.2.4.2 State LORS

With the exception of the Clean Water Act (CWA), Section 401 certification (which will be required from the Colorado River Basin Regional Water Quality Control Board for the USACE to issue the Section 404 permit), the administering agency for the state LORS is the CDFW.

5.2.4.2.1 California Endangered Species Act of 1984

CDFW Code Sections 2050 through 2098 protect California's rare, threatened, and endangered species. The Project owner will coordinate with CDFW to ensure conformance with CESA, and the CEC is expected to incorporate CDFW's requirements and concerns into the CEC COCs as needed.

5.2.4.2.2 California Code of Regulations

California Code of Regulations, Title 14, Division 1, Subdivision 3, Chapter 3, Sections 670.2 and 670.5, list plants and animals of California that are designated as rare, threatened, or endangered.

5.2.4.2.3 California Public Resources Code, Division 15, Chapter 6, Section 25527

This Public Resources Code (PRC) section prohibits placing facilities within ecological preserves, wildlife refuges, estuaries, and unique or irreplaceable wildlife habitats of scientific or educational value. The Project is not located in an area protected by this PRC section.

5.2.4.2.4 California Fish and Game Code, Fully Protected Species

The California Fish and Game Code (FGC) Sections 3511, 4700, 5050, and 5515 prohibit the taking of animals that are classified as fully protected in California.

5.2.4.2.5 California Fish and Game Code, Take, Possess, or Destroy Nests or Eggs

FGC Section 3503 protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically protects California's birds of prey and their eggs by making it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird.

5.2.4.2.6 California Fish and Game Code, Migratory Birds – Take or Possession

FGC Section 3513 protects California's migratory birds by making it unlawful to take or possess any migratory non-game bird as designated in the Migratory Bird Treaty Act or any part of such migratory non-game bird.

5.2.4.2.7 California Fish and Game Code, Significant Natural Areas

FGC Section 1930 et seq. designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.

5.2.4.2.8 California Fish and Game Code, Wildlife and Natural Areas

FGC Section 2700 et seq. provides funding to the Wildlife Conservation Board and CDFW for acquisition, enhancement, restoration, and protection of areas that are most in need of proper conservation. In the southern Salton Sea area, CDFW operates the Imperial Wildlife Area, consisting of three units: Wister, Hazard, and Finney-Ramer.

5.2.4.2.9 California Fish and Game Code, Native Plant Protection Act of 1977

FGC Section 1900 et seq. designates state rare, threatened, and endangered plants.

5.2.4.2.10 Streambed Alteration Agreement

FGC Section 1603 et seq. regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake designated by the CDFW in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. A Streambed Alteration Agreement may be required for impacts to ephemeral drainages along the gen-tie line route. Under new procedures, Streambed Alteration Agreement requirements, if applicable, would be incorporated in the CEC licensing process, rather than through a separate agreement with CDFW. The CEC would incorporate CDFW requirements in its COCs.

5.2.4.2.11 Regional Water Quality Control Board Section 401 Certification

Under federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a water body must request state certification that the proposed activity will not violate state and federal water quality standards.

5.2.4.3 Local LORS

5.2.4.3.1 Imperial County General Plan: Conservation and Open Space Element

The purpose of the Conservation and Open Space Element of *the Imperial County General Plan* is to promote the protection, maintenance, and use of the County's natural resources with particular emphasis on scarce resources, and to prevent wasteful exploitation, destruction, and neglect of the state's natural resources. The Conservation and Open Space Element contains specific biological resource objectives, including:

- Objective 2.1: Conserve wetlands, freshwater marshes, and riparian vegetation.
- Objective 2.2: Protect significant fish, wildlife, plants species, and their habitats.
- Objective 2.3: Protect unique, rare, and endangered plants and animals and their habitat.
- Objective 2.4: Use the environmental impact report process to identify, conserve, and enhance unique vegetation and wildlife resources.
- Objective 2.6: Attempt to identify, reduce, and eliminate all forms of pollution, which adversely impact vegetation and wildlife.
- Objective 2.8: Adopt noise standards, which protect sensitive noise receptors from adverse impacts.

The primary mechanism to implement the goals and objectives of the Conservation and Open Space Element is to incorporate environmental concerns into land use planning. Thus, this Element also incorporates the previous policies and then identifies the programs the County intends to undertake to promote them. Under the heading of Biological Resource Conservation, the County defines the following relevant land planning policies:

Policy 1

Provide a framework for the preservation and enhancement of natural and created open space, which provides wildlife habitat values. Protect riparian habitat and other types of wetlands from loss or modification by dedicating open space easements with adequate buffer zones, and by other means to avoid impacts from adjacent land uses. Road crossings or other disturbances of riparian habitat should be minimized and allowed only when alternatives have been considered and determined infeasible.

Policy 2

Landscaping should be required in all developments to prevent erosion on graded sites and, if the area is contiguous with undisturbed wildlife habitat, the plan should include revegetation with native plant species.

5.2.4.3.2 Imperial County General Plan: Noise Element

The *Imperial County General Plan* Noise Element identifies that many riparian bird species are sensitive to excessive noise and, as such, they are considered a sensitive receptor.

5.2.5 Agencies and Agency Contacts

Table 5.2-8 identifies agencies involved in Project biological resources-related resources permitting issues.

Table 5.2-8. Agency Contacts for Biological Resources

Issue	Agency	Contact Information
State-listed species	CDFW, Inland Deserts Region	Gail Sevrens 3602 Inland Empire Blvd, Suite C-220 Ontario, CA 91764 (909) 484-0167
Federally-listed species	USFWS	Rollie White 777 E. Tahquitz Canyon Way, Suite 208 Palm Springs, CA 92262 (760) 322-2070
Section 404	USACE	Los Angeles Regulatory District 915 Wilshire Blvd Ste 1101 Los Angeles, CA 90017 (213) 452-3921
Waters of the State	RWQCB – Colorado River Basin	Edward Muzik 73-720 Fred Waring Drive, Suite 100 Palm Desert, CA 92260 (760) 346-7491

5.2.6 Permitting

BRGP will not require any permits related to biological or aquatic resources.

5.2.7 References

Audubon California. 2022. https://ca.audubon.org/birds-0/burrowing-owl.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006.

California Consortium of Herbaria 2 (CCH2) Portal. 2022. https://www.cch2.org/portal/index.php. Accessed on February 15.

California Department of Fish and Wildlife (CDFW). n.d. Biologically Sensitive Areas of the Salton Sea. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=7845.

California Department of Fish and Wildlife (CDFW). 2012. Staff Report on Burrowing Owl Mitigation. March 7.

California Department of Fish and Wildlife (CDFW). 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities. March 20. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959&inline.

California Department of Fish and Wildlife (CDFW). 2022a. Biogeographic Information and Observation System. Available online: https://apps.wildlife.ca.gov/bios6/

California Department of Fish and Wildlife (CDFW). 2022b. History of the Salton Sink. Available online: https://nrmsecure.dfg.ca.gov/FileHandler.ashx?DocumentID=8655

California Department of Fish and Wildlife (CDFW). 2022c. Life History Account for California Gull. California Wildlife Habitat Relationship System. California Interagency Wildlife Task Group. Accessed December 10, 2022.

California Department of Fish and Wildlife (CDFW). 2022d. Life History Account for Long-Billed Curlew. California Wildlife Habitat Relationship System. California Interagency Wildlife Task Group. Accessed December 8, 2022. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1753

California Department of Fish and Wildlife (CDFW). 2022e. Special Animals List. California Natural Diversity Database (CNDDB). April. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline.

California Department of Fish and Wildlife (CDFW). 2022f. Special Vascular Plants, Bryophytes, and Lichens List. State of California Natural Resources Agency, Department of Fish and Wildlife, Biogeographic Data Branch, California Natural Diversity Database (CNDDB). April. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline.

California Department of Fish and Wildlife (CDFW). 2023. California Natural Diversity Database (CNDDB). Rare Find 5. By subscription only. Accessed February 17, 2023. https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data.

California Department of Food and Agriculture (CDFA). 2021. California Noxious Weeds. June 22. Available at: https://www.cdfa.ca.gov/plant/ipc/encycloweedia/weedinfo/winfo_table-sciname.html.

California Energy Commission (CEC). 2014. AE Southland Development, LLC's Opening Testimony Preliminary Identification of Contested Issues, and Witness and Exhibits Lists: FSA Comments. Huntington Beach Energy Project. Docket No. 12-AFC-02. June 30.

California Native Plant Society (CNPS). 2022a. Inventory of Rare and Endangered Plants of California.

California Invasive Plant Council (Cal-IPC). 2022. California Invasive Plant Inventory Database. California Invasive Plant Council, Berkeley. Available at: https://www.cal-ipc.org/.

California Natural Resources Agency (CNRA). 2021. Annual Report of the Salton Sea Management Project. Available online: https://saltonsea.ca.gov/wp-content/uploads/2021/03/2021-Annual-Report_3-5-21.pdf.

Conservation Biology Institute. 2014. Land Cover/Natural Vegetation Communities, Desert Renewable Energy Conservation Plan (DRECP). Available online: https://drecp.databasin.org/datasets/0a419342ec904b3c8fc710003f52ebe0/.

Conway, C. J. 2011. "Standardized North American Marsh Bird Monitoring Protocol." Waterbirds 34:319–346.

Curtis, K.E., and R.W. Lichvar. 2010. Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. ERDC/CRREL TN-10-1. Hanover, NH: U. S. Army Engineer Research and Development Center.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y 87 1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A176 912. http://www.cpe.rutgers.edu/Wetlands/1987-Army-Corps-Wetlands-Delineation-Manual.pdf

Imperial Irrigation District (IID). 2021. Imperial Irrigation District Public Water Map. https://mygis.iid.com/portal/apps/webappviewer/index.html?id=a33cfeb3714f4eb8a1c85320613a2d1b

Jacobs Engineering Group Inc. (Jacobs). 2022. *Black Rock Geothermal Project Biological Study Area Survey*. March.

Jepson Flora Project (eds.) 2022. Jepson eFlora. Available online: http://ucjeps.berkeley.edu/eflora/.

Lichvar, R.W. and S.M. McColley. 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. ERDC/CRREL TR-08-12. Hanover, NH: U. S. Army Engineer Research and Development Center.

NatureServe. 2004. Landcover Descriptions for the Southwest Regional Gap Analysis Project. September 10.

National Audubon Society (Audubon). 2022. Burrowing owl. Accessed on December 5. https://ca.audubon.org/birds-0/burrowing-owl

Penrod, K., P. Beier, E. Garding, and C. Cabañero. 2012. *A Linkage Network for the California Deserts*. Accessed at: https://drecp.databasin.org/datasets/85d73316b5ab4816b56ed21787ed78a2/ Accessed on February 22, 2023.

Rosenberg, D.K., L. A. Trulio, D. Catlin, D. Chromczack, J. A. Gervais, N. Ronan, and K. A. Haley. 2007. The ecology of the Burrowing Owl in California. Unpubl. report to Bureau of Land Management.

Sanders, Andrew, and Teresa Salvato, herbarium curator and staff. 2022. University of California Riverside Herbarium. Personal communication (call) with Morgan King, Jacobs. February 25 and March 22.

Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. *California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California*. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration.

Sliwa, K.M. and C.J. Conway. 2022. Distribution and Occupancy of Yuma Ridgway's Rail within Proposed Geothermal Development Areas in Imperial Valley, California. University of Idaho, Department of Fish and Wildlife Sciences. August 29.

U.S. Army Corps of Engineers (USACE). 2005. Regulatory Guidance Letter. RGL 05-05. Ordinary High Water Mark (OHWM) Identification. December. http://www.nap.usace.army.mil/Portals/39/docs/regulatory/rgls/rgl05-05.pdf

U.S. Army Corps of Engineers (USACE). 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). ERDC/EL TR-08-28. U.S. Army Engineer Research and Development Center, Vicksburg, MS.

U.S. Army Corps of Engineers (USACE). 2018. National Wetland Plant List, version 3.4. U.S. Army Corps of Engineers Engineer Research and Development Center Cold Regions Research and Engineering Laboratory, Hanover, NH. https://wetland-plants.sec.usace.army.mil/nwpl_static/v34/home/home.html

United States Fish and Wildlife Service (USFWS). 1973. The Endangered Species Act of 1973, as amended (16 U.S.C 1531 et seq.).

U.S. Fish and Wildlife Service (USFWS). 1996. Guidelines for conducting and reporting botanical inventories for federally listed, proposed and candidate plants. Sacramento, CA.

U.S. Fish and Wildlife Service (USFWS). 2018. Sonny Bono Salton Sea National Wildlife Refuge Wildlife List. April.

U.S. Fish and Wildlife Service (USFWS). 2021. Birds of Conservation Concern 2021. May 19. https://www.fws.gov/media/birds-conservation-concern-2021pdf.

U.S. Fish and Wildlife Service (USFWS). 2022a. Information for Planning and Consultation (IPaC) website. U.S. Department of the Interior, Washington, DC. Available online: https://ipac.ecosphere.fws.gov/.

U.S. Fish and Wildlife Service (USFWS). 2022b. National Wetlands Inventory (NWI) website. U.S. Department of the Interior, Washington, DC. Available online: http://www.fws.gov/wetlands/.

U.S. Geological Survey (USGS). 2022a. “USGS Science in Your Watershed.” October 3. https://water.usgs.gov/wsc/map_index.html

U.S. Geological Survey (USGS). 2022b. “National Hydrography Data Set (NHD).” February 25. http://nhd.usgs.gov/

Western Regional Climate Center (WRCC). 2022. “Brawley, California (041048). Climatological Summary.” October 3. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca1048

5.3 Cultural Resources

This section discusses the potential effects of the Black Rock Geothermal Project (Project) on cultural resources in the project vicinity. Section 5.3.1 describes the cultural resources environment that might be affected by the Project. Section 5.3.2 provides the research design used to guide the records and archival search and subsequent fieldwork phase of the cultural resource inventory. Section 5.3.3 presents an environmental analysis of construction and operation. Section 5.3.4 presents mitigation measures that will be implemented to avoid construction impacts. Section 5.3.5 discusses the laws, ordinances, regulations, and standards (LORS) applicable to the protection of cultural resources. Section 5.3.8 lists reference materials used in preparing this section.

This section is consistent with state regulatory requirements for cultural resources pursuant to the California Environmental Quality Act (CEQA). Cultural resources include prehistoric and historic archaeological sites; districts; objects; standing historic structures, buildings, districts, and objects; and locations of important historic events. The study scope was developed according to the California Energy Commission's (CEC's) cultural resources guidelines, and it complies with *Rules of Practice and Procedure and Power Plant Site Certification Regulations* (CEC, 2023).

Per CEC Data Adequacy requirements, Confidential Appendix 5.3A provides the cultural resources technical report (CRTR), including names and qualifications of personnel who contributed to this study; archival research material consisting of a complete copy of the California Historical Resources Information System (CHRIS) literature search results that include maps showing the locations of previous cultural resources studies and resources and California Department of Parks and Recreation (DPR) 523 forms for previously recorded resources occurring within a records search area (one mile radius buffer around all Project facilities); copies of correspondence with the Native American Heritage Commission, Native American Groups, and local historical societies; a map showing the location of the study area and all identified cultural resources within the study area; DPR 523 forms for newly recorded and updated resources, and copies of all that are either partially or entirely located within 0.25 mile of the Project.

Archaeological and architectural history study areas for the proposed Project were developed as follows. For the Project site, substation, borrow pits, and construction laydown/parking/construction camp locations, the archaeological study area includes the Project footprint plus a 200-foot buffer. For the proposed transmission line corridors, well pads, and pipelines, the study area includes the Project footprint with a 50-foot buffer. The architectural history study area includes all Project elements along with a 0.5-mile buffer. The archaeological study area encompasses approximately 1,936 acres and the architectural history study area is approximately 9,959 acres.

5.3.1 Affected Environment

The Project is east of the Salton Sea and northwest of the city of Calipatria in the northwest portion of Imperial County. Several factors, including topography, available water sources, and biological resources, affect the nature and distribution of prehistoric, ethnographic, and historic-period human activities in an area. This background provides a context for understanding the nature of the cultural resources that may be identified within the region. Much of the information provided in the following sections has been adapted from a report entitled *Cultural Resources Inventory for the Border Fuels Reduction Project, Imperial and San Diego Counties, California* (Tennyson et al. 2022).

The Project area lies in the Colorado Desert of Imperial County, the largest and most arid subdivision of the Sonoran Desert and one of the hottest and most arid environments in the United States (U.S.). The Project area is within the southern portion of a major physiographic and geologic feature of the Colorado Desert, the Salton Trough. The Salton Trough is an extensive topographic and structural depression extending from the Gulf of California about 130 miles northwest through the Coachella Valley to the summit of San Gorgonio Pass. The Gulf of California is separated from the trough by the roughly 11-meter tall (36 feet tall) delta of the Colorado River. The trough slopes gradually down to the north to about 226 feet below mean sea level (bmsl) at the Salton Sea, then rises gradually through the Coachella Valley.

5.3.1.1 Prehistoric Context

Schaefer (1994) was the first to develop a chronological sequence for the Colorado Desert area. The sequence he proposed strongly resembles the scheme in use for the San Diego region, while also incorporating archaeological information from the contiguous Mojave Desert region to the north. Schaefer's reliance on these two adjacent areas is in large part due to the well-defined cultural histories that have been developed for the Mojave Desert and San Diego regions. In contrast to these two areas, the basic cultural history of the Colorado Desert region has not changed dramatically since pioneering archaeologist Malcolm Rogers (1939, 1945, 1966) published his initial impressions of the desert's chronology and cultural development, including the San Diego region. Consequently, understanding the early prehistory of the Colorado Desert region still relies heavily on comparisons with, and information derived from, both the San Diego region and the Mojave Desert areas.

5.3.1.1.1 Paleoindian Period (ca. 12,000 to 10,000 B.P.)

The earliest well-documented prehistoric sites in Southern California belong to the Paleoindian Period (circa [ca.] 12,000–10,000 years before the present [B.P.]) during the Late Pleistocene. In the western U.S., most evidence for the presence of Paleoindian peoples derives from finds of large-fluted spear and projectile points (Fluted-Point Tradition) found at sites associated with big game hunting. Paleoindian sites have been documented in places such as Clovis and Folsom in the Great Basin and the northern Desert Southwest area including the Mojave Desert (Moratto, 1984). In the Mojave Desert, while absolute dating remains elusive, the Paleoindian Period is assumed to span approximately 12,000 to 10,000 B.P. (Sutton et al., 2007). Elsewhere in California, most of the evidence for the Fluted-Point Tradition derives principally from isolated occurrences of fluted points that have been found scattered across the state (Dillon, 2002; Rondeau et al., 2007). Only isolated occurrences of fluted points have been observed in the Colorado Desert (e.g., Davis et al., 1980; Kline, 2014) and in the San Diego area in mountains of southern San Diego County (Kline and Kline, 2007). Some finds have also been made to the south in Baja California (Des Lauriers, 2008; Hyland and Gutierrez, 1995).

The beginning of the San Dieguito Tradition or Complex, which is associated with artifact assemblages distinct from that of the Fluted Point Tradition, is also assumed to date to the Paleoindian Period. In California (Alta California), this tradition has been documented mostly in the coastal area of San Diego County (Carrico et al., 1993; Rogers 1966; Warren 1966, 1967; Warren and True 1961); and to a lesser degree in the Mojave Desert (Sutton et al. 2007) and Colorado Desert (Rogers, 1939, 1966; Schaefer, 1994; Warren, 1967). In the Mojave Desert, Sutton et al. (2007) assign the San Dieguito Complex to the early Archaic Period during the Early Holocene. Warren dates the San Dieguito Tradition as beginning circa 10,000 B.P. and ending sometime between 8500 and 7200 B.P. (Warren, 1967, 1968; Warren et al., 1998; Warren and Ore, 2011). It is characterized by an artifact inventory consisting almost entirely of flaked stone biface and scraping tools, but lacking the distinctive fluted points associated with the Fluted-Point Tradition. The subsistence system or emphasis of the San Dieguito Tradition, while not yet entirely agreed upon, appears to have been oriented towards hunting rather than gathering, based on the predominance of primarily hunting-associated tools in recovered artifact assemblages (Warren, 1967, 1968).

Evidence for the Fluted-Point Tradition in the general vicinity of the Project area is minimal with only two isolated flute points having been identified in the Colorado Desert (Davis et al., 1980; Kline, 2014) with a third point found in the mountains of San Diego County (Kline and Kline, 2007). In contrast, the San Dieguito Tradition is relatively well-documented in the San Diego area. The most substantial evidence for this tradition derives from a stratified archaeological site, the C.W. Harris Site (CA-SDI-149/316/4935B), in western San Diego County along the San Dieguito River. The Harris Site formed the original basis upon which the San Dieguito Tradition was defined (Rogers, 1939, 1966; Vaughan, 1982; Warren, 1966, 1967, 1968; Warren and True 1961). Diagnostic artifact types and categories associated with the San Dieguito Tradition include elongated bifacial knives, scraping tools, crescentics, and Silver Lake and leaf-shaped projectile points (Carrico et al., 1993; Knell and Becker, 2017; Rogers, 1966; Vaughn, 1982; Warren, 1966, 1967; Warren and Ore, 2011; Warren and True, 1961). The C.W. Harris Site also provided the oldest calibrated radiocarbon date (9968 B.P.) found in association with a subsurface San Dieguito artifact assemblage (Warren et al., 1998; Warren and Ore, 2011). Another slightly younger calibrated radiocarbon date of 9130 B.P. was also acquired from a San Dieguito-associated subsurface stratum at site CA-SDI-316 (Cooley, 2013). Finally, possible evidence for the San Dieguito Tradition has been discovered at a site in the southern mountains of San Diego County; the site assemblage included complete, elongated bifacial knives and/or projectile points that bear a strong resemblance to some of those recovered from the C.W. Harris Site (Pigniolo, 2005).

Although Rogers (1939, 1966) has described occurrences of sites and artifacts attributable to the San Dieguito Complex in the Mojave and Colorado Desert areas, the ability to accurately determine the antiquity of these artifacts and sites by radiometric dating methods has proven to be problematic (Schaefer and Laylander, 2007; Sutton et al., 2007; Warren, 1967). Consequently, the radiometric dating of the artifacts and their context at the C.W. Harris Site has for several decades been the principal means of ascertaining the antiquity of these similar desert assemblages (Warren, 1967). In the Mojave Desert area, the San Dieguito Complex has been largely subsumed under the Lake Mojave Complex (Sutton et al., 2007). Recently, calibrated radiocarbon dates from several Lake Mojave Complex associated sites have produced dates of similar antiquity to those from the C.W. Harris Site (Sutton et al*.,* 2007) (i.e., ca. 10,000-9000 B.P.). In the Mojave Desert area, these Lake Mojave Complex sites are frequently associated with glacial lakes that were still present at the end of the Pleistocene and the beginning of the Holocene. Such glacial-related lacustrine features were generally not present in the more southerly Colorado Desert area. However, given the discovery of Paleoindian Period and/or Lake Mojave Complex associated projectile points in the Salton Basin (Apple et al., 1997; Wahoff, 1999), it is possible that this basin, too, may have been inundated, at least periodically, during this earlier period.

5.3.1.1.2 Archaic Period (ca. 10,000 to 1,500 B.P.)

The Archaic Period (ca. 10,000–1500 B.P.) encompasses the interval between the relatively cool/wet conditions of the early Holocene and the appearance of assemblages characteristic of the Late Prehistoric. The Archaic Period is generally differentiated from the earlier Paleoindian Period by a shift from hunting-focused subsistence systems to a more generalized economy with an increased focus on gathering and the use of grinding tools and seed-processing technology. Consequently, typical artifact assemblages in the Mojave Desert—where sites dating to the early Archaic Period are common—contain dart points, but with increasing quantities of ground stone tools (such as manos and metates) occurring into the middle and latter parts of the period. As with the Paleoindian Period, little archaeological evidence has yet been encountered in the Colorado Desert area that can be definitely attributed to the early part of the Archaic Period (i.e., from ca. 8500–4000 B.P.) (Schaefer, 1994; Schaefer and Laylander, 2007). Although evidence of early Archaic occupation in the Colorado Desert has long been minimal—as noted above for the Paleoindian Period—possible evidence is the discovery of Paleoindian Period and/or Lake Mojave Complex associated projectile points in the Salton Basin (Apple et al*.,* 1997; Wahoff, 1999) and at site CA-SDI-7074 in the mountains of southeastern San Diego County (Williams, 2014), could change this paucity of evidence.

A possible early Archaic discovery in the Salton Basin occurred during an archaeological investigation at the Salton Sea Test Base (Apple et al., 1997; Wahoff, 1999). This discovery consisted of an assemblage of large projectile points that were stylistically associated with early Archaic-style projectile points in the Mojave Desert, including Pinto and Elko styles. Although archaeological investigations did not obtain any radiocarbon dates to verify the relative dating evidence, the styles of these points appear to be associated with the early Archaic Period. More recently, excavations at site CA-SDI-7074, in the eastern foothills of the Laguna Mountains, uncovered more than 100 subsurface thermal features, many of which were likely earth ovens associated with agave roasting activity (Williams, 2014). Although radiocarbon dating indicated that most of these oven features dated to the Late Prehistoric Period, five of the more deeply buried features were discovered to date between 9600 and 8590 B.P. These results not only indicate the use of agave as a food resource much earlier in time than was previously realized, but also suggest a reappraisal of the dating for the inception of the early Archaic Period in the area (Williams, 2014). Additional evidence for an early to mid-Archaic Period use at the site includes the recovery of a single Elko-style projectile point (Williams, 2014).

Limited evidence has been found for late Archaic (beginning ca. 4000 B.P.) occupation in the western Colorado Desert. One of the few studies that have documented use during this time was completed by

Love and Dahdul (2002) in the northern Coachella Valley of the Salton Basin. The contexts of several sites in the Coachella Valley, some possibly associated with ancient stands of Lake Cahuilla, were radiocarbon dated to circa 3000-2000 B.P. (Love and Dahdul, 2002; Schaefer and Laylander, 2007). Other evidence for the late Archaic use in the area includes deposits found at the Indian Hill Rockshelter (CA-SDI-2537) in Anza-Borrego Desert State Park (McDonald, 1992) and at another rock shelter in Tahquitz Canyon, near Palm Springs (Bean et al., 1995; Schaefer and Laylander, 2007). The Indian Hill Rockshelter, until recently, was the oldest radiocarbon-dated archaeological site in the area. The site contained distinctive dart-sized projectile points, ground stone implements, rock-lined caches, and inhumations, one of which was radiocarbon dated to 4070±100 years B.P. (McDonald, 1992; Schaefer 1994; Wilke and McDonald, 1989). The rock shelter in Tahquitz Canyon, although lacking radiocarbon dates, exhibited an assemblage similar to that found in the Indian Hill Rockshelter (Bean et al., 1995; Schaefer and Laylander, 2007).

Evidence for settlement patterning during the Archaic Period in the Colorado Desert area is minimal. However, some of the late Archaic sites in the Coachella Valley appear to have been contextually associated with intermittent ancient stands of Lake Cahuilla (Love and Dahdul, 2002). It seems likely, therefore, that this hydrological feature had a significant influence on settlement patterns in the western Colorado Desert during at least the late Archaic. Evidence of Archaic habitation at the Indian Hill and Tahquitz Canyon rock shelter sites indicate that adjacent mountain areas were also used by prehistoric groups during the middle to late Archaic.

5.3.1.1.3 Late Prehistoric Period (ca. 1,500 to 300 B.P.)

The Late Prehistoric and Protohistoric periods are represented in this region by the Patayan Complex. These periods date from approximately 1500 B.P. until the American expansion into the area at the turn of the nineteenth century. The Protohistoric Period encompasses a protracted 300-year-long period of sporadic European exploration and colonization that had little effect on Aboriginal lifeways in the Southern California deserts.

Compared to those shifts noted for the middle and late Archaic Period, the changes occurring at the onset of the Late Prehistoric Period were rather abrupt. The magnitude of these changes and the short period of time within which they took place seem to indicate a significant alteration in subsistence practices ca. 1500–1300 B.P. The changes observed in the archaeological record in the San Diego area during the Late Prehistoric Period include: a shift in settlement patterning indicative of population increases; a shift from hunting using the atlatl and dart to using the bow and arrow; a reduced emphasis on shellfish gathering along some areas of the coast (possibly as a result of silting-in of the coastal lagoons); the introduction and production of pottery; an increase in storage of principal foodstuffs, such as mesquite, acorns, and piñon nuts; a shift in burial practices from inhumation to cremation; and, along the Colorado River, a change in economic and settlement patterns that involved subsistence expansion and the adoption of floodplain horticulture (Gallegos, 2002; McDonald and Eighmey, 1998; Schaefer, 1994).

In the Coachella Valley and Salton Basin area, the Late Prehistoric Period is associated with the periodic infilling and emptying of Lake Cahuilla. This substantial hydrological feature is seen as recurrently altering the course of human settlement in the area during the period (Schaefer and Laylander, 2007). During times of lake absence, settlement appears to have been characterized by the occupation of semi-sedentary villages along major water courses and around springs with adjacent montane areas seasonally occupied to exploit mesquite, acorns, and piñon nuts. Tahquitz Canyon in the mountainous area west of the Salton Basin has been documented as having been an important population center during the Late Prehistoric Period (Bean et al., 1995).

Schiffer and McGuire (1982) and Waters (1982a) used a chronology originally proposed by Rogers (1945) to divide the Late Prehistoric Period in the Colorado Desert area based on the progression or changes in development of ceramic types. Referring to the period as “Patayan” (instead of the term “Yuman,” used by Rogers), three phases were defined that were correlated with fillings and desiccations of Lake Cahuilla. These phases include:

- **Patayan I** begins at approximately 1200 B.P. with the introduction of pottery into the Colorado Desert. Sites dating to this phase appear to be limited mostly to the Colorado River area.

- **Patayan II** coincides with an infilling of Lake Cahuilla around 950 B.P. As described previously, the lake covered much of the Imperial Valley and created an extensive lacustrine environment that is thought likely to have attracted people from the Colorado River area. New pottery types appear at this time as a result of local production along the lakeshore and technological changes in the Colorado River area. Subsequently, Lake Cahuilla experienced several fill/recession episodes before its final desiccation.
- **Patayan III** begins around 500 B.P. as the lake receded. Colorado Buff ware became the predominant pottery type during this time period across the Colorado Desert and along the Colorado River. Several Patayan II pottery types continue into the Patayan III (Waters, 1982a, 1982b).

This chronological scheme has served as a useful tool for organizing archaeological assemblages in the area. However, Schaefer and Laylander (2007) noted that data obtained from more recent archaeological investigations highlight some serious discrepancies with its use (e.g., Hildebrand 2003).

As previously noted, the beginning of the Late Prehistoric Period in the San Diego County area is marked by the appearance of several new tool technologies and subsistence shifts in the archaeological record. Movements of people during the last two millennia can account for at least some of these changes. Yuman-speaking people have occupied the Gila and Colorado river drainages of what is now western Arizona at least 2000 years ago (Moriarty, 1968); over time, these groups appear to have migrate westward through the Colorado Desert and the mountains of the Peninsular Ranges to the coast. An analysis by Moriarty (1966, 1967) of materials recovered from the Spindrift Site in La Jolla indicated a preceramic Yuman phase. Based on his analysis and a limited number of radiocarbon samples, Moriarty concluded that Yumans, lacking ceramic technology, migrated and occupied what is now the San Diego coastline circa 2000 B.P. Subsequently, by approximately 1200–1300 B.P., ceramic technology diffused into the coastal area from the eastern deserts. Although these Yuman speakers may have shared cultural traits with the people occupying what is now eastern San Diego County before 2000 B.P., their influence is better documented throughout present-day San Diego County after 1300 B.P. with the introduction of small points, ceramics, Obsidian Butte obsidian from the Salton Basin, and the practice of cremation of the dead.

Two distinct archaeological complexes have been proposed for the Late Prehistoric Period in what is now San Diego County. The Cuyamaca Complex is based on analysis by True (1970) of archaeological excavations undertaken in the Cuyamaca Rancho State Park and analysis of archaeological collections at the San Diego Museum of Man. Results of his analysis, True (1970) was able to define a Late Prehistoric Period Complex for southern San Diego County. This complex differs from the San Luis Rey Complex, which Meighan (1954) identified in the northern portion of the county. The two complexes are primarily differentiated by the presence or absence, or differences in the relative occurrence, of certain diagnostic artifacts in site assemblages. For example, Cuyamaca Complex sites generally contain both Cottonwood Triangular-style and Desert Side-notched arrow points, while Desert Side-notched points are quite rare or absent in San Luis Rey Complex sites (Pigniolo, 2001). Other examples include use of Obsidian Butte obsidian, which is far more common in Cuyamaca Complex sites than in San Luis Rey Complex sites and ceramics. While ceramics are present during the Late Prehistoric Period throughout the region, pottery occurs earlier in time and appears to be somewhat more specialized in form at Cuyamaca Complex sites. Burial practices at Cuyamaca Complex sites are almost exclusively cremations, often in special burial urns for interment. In contrast, archaeological evidence from San Luis Rey Complex sites indicates use of both inhumation and cremation. Based on ethnographic data, it is now generally accepted that the Cuyamaca Complex is associated with the Yuman Diegueño/Kumeyaay and the San Luis Rey Complex with the Shoshonean Luiseño/Juaneño.

Compared to Archaic Period sites, Late Prehistoric Period sites attributable to the San Luis Rey or Cuyamaca complexes, while not absent, are less common in the near-coastal areas of the county. As noted by Gallegos (1995):

> “for San Diego County, there is temporal patterning, as the earliest sites are situated in coastal valleys and around coastal lagoons. Late Prehistoric Period sites are also found in coastal settings but are more common along river valleys and interior locations.”

In contrast, numerous Late Prehistoric Period sites, attributable to the San Luis Rey or Cuyamaca complexes, have been identified in the inland foothill areas of the region (e.g., Carrico and Cooley, 2005; Chace and Hightower, 1979; Cooley and Barrie, 2004; McCown, 1945; McDonald et al., 1993; Raven-Jennings and Smith, 1999; Willey and Dolan, 2004).

5.3.1.1.4 Ancient Lake Cahuilla and Obsidian Butte

Wilke (1978) initially posited three lacustrine intervals in the Salton Trough representing an unknown number of stands of Lake Cahuilla during the past 2,100 years. Waters (1983) subsequently refined Wilke's original estimates of the lacustrine intervals and suggested that there had been four lacustrine intervals that reached the 12-meter amsl shoreline during the last 1,500 years (Waters, 1983). The results of additional archaeological research suggest that a fifth, more recent lacustrine interval of Lake Cahuilla occurred sometime between the Spanish explorations of the region in Common Era (CE) 1540 and 1775. Radiocarbon dating indicates that this high stand probably occurred between approximately CE 1685 and 1740 (Cleland, 1999:13).

The Lake Cahuilla chronology, in calendar years before present (cal) B.P.; before CE 1950), corrected for variations in radiocarbon, is as follows:

- **Lacustrine Interval 5**: 330-270 cal B.P.;
- **Lacustrine Interval 4**: 520-370 cal B.P.;
- **Lacustrine Interval 3**: 740-580 cal B.P.;
- **Lacustrine Interval 2**: 1010-740 cal B.P.;
- **Lacustrine Interval 1**: 1250-1010 cal B.P.

It should be noted that the dates for the duration of the lake high stands represent maximum spans. The stratigraphic record reveals that the next oldest lacustrine intervals are associated with radiocarbon assays from two distinct sedimentary strata dating to approximately 2285 and 2300 cal B.P. Stratigraphic evidence indicates that there were no episodes of filling of Lake Cahuilla between about 2300 and 1250 cal B.P. (Waters, 1983).

Each interval of filling the empty basin or evaporating all the impounded water likely occurred over several decades. As such, it is likely that during much of the past 2,300 years, the lake was neither full nor empty, but rather rising or falling between 84.8 meters bmsl and 12-meters amsl. A salient implication of this vertical dynamism is that the areal extent of Lake Cahuilla was highly variable over time. Native American settlement must have shifted often as the shoreline advanced or retreated. This variability in lake elevations is also important for determining when volcanic glass was available from the Obsidian Butte source. In late prehistoric times, especially after 950 B.P., toolstone from Obsidian Butte was widely used in Southern California. However, the source was inundated and its glass inaccessible whenever Lake Cahuilla's surface elevation was higher than 40 meters bmsl (Schaefer and Laylander, 2007). Expanding or receding, the lake would have prevented access to Obsidian Butte glass whenever the water level stood between 40 meters bmsl and 12 meters amsl. Ethnographic testimony attests to the importance of Obsidian Butte as a primary source of volcanic glass and a place of special importance to many local native populations persists to this day (Gates and Crawford, 2010).

5.3.1.2 Ethnographic Setting

Schaefer (2006) has previously indicated that the location of the Project area is in a boundary area of the traditional territories of two Tribal groups, the Yuman-speaking Tipai (Kamia) to the south and the Shoshonean-speaking Cahuilla to the north (Schaefer, 2006). Schaefer's use of the term "Tipai" has evolved in the literature, through time, as the one applicable to the people living in the area of eastern San Diego and Imperial counties.

The general early term applied for the Yuman-speakers in the area was "Diegueño," from the mission with which they came to be associated, the San Diego Mission de Alcalá. This term was later adopted by anthropologists (e.g., Kroeber 1925) and further divided into the southern and northern Diegueño.

Subsequently, Shipek (1982) initiated the use of a Yuman language term, "Kumeyaay," for the people formerly designated as the Diegueño. According to Carrico (1998):

> "The linguistic and language boundaries as seen by Shipek (1982) subsume the Yuman speakers into a single nomenclature, the Kumeyaay, a name applied previously to the mountain Tipai or Southern Diegueño by Lee (1937), while Almstedt (1974:1) noted that 'Ipai applied to the Northern Diegueño with Tipai and Kumeyaay for the Southern Diegueño. However, Luomala (1978:592) has suggested that while these groups consisted of over 30 patrilineal clans, no singular tribal name was used and she referred to the Yuman-speaking people as 'Ipai/Tipai…"

Other researchers designated the Kumeyaay living north of the San Diego River as 'Ipai (Northern Diegueño) and those living south of the river and into Baja California as Tipai (Southern Diegueño) (Hedges, 1975; Langdon 1975). Gifford (1931) designated the Kumeyaay living in the eastern San Diego and Imperial counties as the Kamia, who were distinguished by a desert orientation, with contacts and travel most frequently between eastern San Diego County and the Imperial Valley. This term has generally been replaced with the designation of eastern Kumeyaay or Tipai (Gifford, 1931; Hedges, 1975; Langdon, 1975; Luomala, 1978). Recently, however, Schaefer (2006) stated that:

> "The Kamia specifically were also directly related to the Tipai (southern Kumeyaay) of the mountains and coastal areas of San Diego County and northern Baja California. Their dialect, however, is closely related to the Cocopah and other delta Yumans."

According to Schaefer (2006), the Tipai (Kamia) and the Cahuilla "consider the cultural resources of the general area as part of their cultural and historical legacy." As such, both groups are described herein.

5.3.1.2.1 Cahuilla

The Cahuilla are a subgroup of the Takic family of the Uto-Aztecan stock and are therefore closely related linguistically to other "Shoshonean" speaking groups including the Gabrielino, Luiseño, and Serrano. These Takic-speaking groups are thought to represent a migration into the area occurring approximately 1500 B.P. (Schaefer, 2006). According to Schaefer (2006):

> What role these Takic speakers had in the development of the Patayan pattern in the Colorado Desert remains unclear, although it may have been considerable. The ancestors of the Colorado River Yumans are most often identified as the source of ceramics, cremation practices, agriculture, some architectural forms, and some stylistic and symbolic representations. The Takic migrations may coincide with the introduction of bow-and-arrow technology, but no direct association can be made. They may have contributed specific hunter and gatherer techniques as well as cosmological and symbolic elements to the Patayan cultural system.

The diversity of Cahuilla territory reflects the range of environmental habitats in inland Southern California. Topographically, their territory ranged from the summit of the San Bernardino Mountains to the Coachella Valley and Salton Sink. Ecological habitats included the full range of mountains, valleys, passes, foothills, and desert areas. Villages were typically situated in canyons or on alluvial fans near water and food resources, and a village's lineage owned the immediately surrounding land (Bean, 1972). Well-developed trails were used for hunting and travel between settlements. Village houses ranged from brush shelters to huts 15 to 20 feet long. Important plant foods exploited from the Cahuilla's diverse habitat included mesquite and screw beans, piñon nuts, and various cacti. Other important plant foods included acorns, various seeds, wild fruits and berries, tubers, roots, and greens. Women were instrumental in the collection and preparation of vegetal foods.

Cahuilla settlement and subsistence patterns were impacted by fill and recession episodes of Lake Cahuilla. When the lake was present, the desert area becoming a more productive resource area. Schaefer (2006:22) states that "Cahuilla mythology and oral tradition also indicate that when Lake Cahuilla dried up, it was the mountain people who resettled the desert floor. The time of Lake Cahuilla is also best documented in the oral traditions of the Cahuilla, both with regard to settlement patterns, song cycles, and the effects of Lake Cahuilla on patrilineal clan segmentation." According to Strong (1929) "The derivation of the term Cahuilla is obscure, and it is regarded by the Indians to be of Spanish origin."

The earliest Spanish contact with the Cahuilla may have been with the Juan Bautista de Anza expedition trips in 1774 and 1777. The route followed San Felipe Creek adjacent to Carrizo Creek and then through Borrego Springs, up into the San Jacinto Mountains (Pourade, 1962; Schaefer, 2006). The impact of the Spanish mission system and colonization was much less immediate and profound among the Cahuilla compared to Native American groups residing along the coast. It was not until 1819, after the establishment of the San Bernardino estancia and cattle ranch at San Gorgonio, that a more direct Spanish influence was felt. By 1823, members of the Romero Expedition documented that the Cahuilla at Toro were growing corn and melons and were already familiar with the use of horse and cattle, indicating a familiarity with Hispanic practices (Bean and Mason, 1962).

During the Spanish Period and into the Mexican Period, political leadership became more centralized as Juan Antonio from the Mountain Cahuilla and Chief Cabazon in the desert emerged as central figures (Strong, 1929). Juan Antonio's group played a significant role during the Mexican American War, siding with the Mexicans against the Luiseño who supported the American invasion (Phillips, 1975). Along with the rise of powerful chiefs and political restructuring, Mexican language, clothing, and food were incorporated into traditional culture during this era.

With the 1848 signing of the Treaty of Guadalupe Hidalgo, the U.S. Government promised to preserve the liberty and property of the inhabitants of California. In 1952, a treaty was drafted to settle land rights issues for the Cahuilla (as well as Serrano and Luiseño). The treaty was never ratified by Congress and the best farming and grazing lands were claimed by Euro-American settlers. In addition, Executive Orders enacted in the 1960s and 1970s resulted in the establishment of reservations that substantially reduced Cahuilla land. The result of these orders created a checkerboard of 48 sections of reservation lands spread across the eastern edge of the Santa Rosa and San Jacinto mountains and the Coachella Valley (CSRI 1983). Although various modifications have occurred over time, this has remained the permanent home of the Cahuilla to date.

5.3.1.2.2 Tipai/Ipai (Kamia)/Kumeyaay

The Tpai-Iipai/Kumeyaay were also hunter-gatherers who seasonally altered between the mountainous western portions of their territories and the eastern desert areas to maximize resource exploitation. Similar to the Cahuilla, the lifeways of the Tpai-Iipai/Kumeyaay were impacted by the fill and recession of Lake Cahuilla. Schaefer (2006:26) states that "Lake Cahuilla figures prominently in the Kamia's origin myth (Gifford, 1931:75–83) and except for the Cahuilla, represents the only other major recorded oral tradition regarding the ancient lake." The Tipai/Kamia were closely connected to the Quechan on the Colorado River and served as trading partners between the coastal and desert groups, using a travel route through the Mountain Springs Grade. These trading partners also were frequently politically allied against other groups to the north and south (Cook et al., 1997). The earliest Spanish contact may have been in 1785 by Pedro Fagés or during the Anza expedition journeys in 1774 and 1777 (Cook et al., 1997; Schaefer, 2006). By this time, the Tpai-Iipai/Kumeyaay were hostile to the Spaniards and were in alliance with other groups, actively resisting Spanish rule in the area. In 1775, this resistance culminated in open revolt when tribal members from at least 14 local villages banded together and attacked, and burned, the Mission San Diego de Alcalá (Carrico, 2008). The Tipai-Ipai/Kumeyaay continued to resist European and Anglo rule through the Mexican Period and into the American Period.

Although Mexico's governance of Alta California did not last long, it did help to cement the changes brought by the Spanish missionization and colonization of the area. One major alteration occurred in 1835 when the missions were secularized, and their large land holdings were made available to private citizens. Although some large grants of land were made prior to 1834, secularization of the mission's large grazing holdings ushered in the Rancho Era.

One impact was the dissolution of the mission as a residential and labor center for territorially disenfranchised Native Americans. Many mission neophytes had little option but to work on the new Mexican ranchos. Communities living farther from the ranchos were able to maintain their traditional lifeways for a bit longer. New ranches put new pressures on California's native populations, as grants were made in inland areas still occupied by the Kumeyaay, forcing them to acculturate or relocate farther into the backcountry. In rare instances, former mission neophytes were able to organize pueblos and attempt to live within the new confines of Mexican governance and culture. The most successful of these pueblos was the Pueblo of San Pasqual, located inland along the San Dieguito River Valley, founded by Kumeyaay who were no longer able to live at the Mission San Diego de Alcalá (Carrico, 2008; Farris, 1994).

During the American Period, railway systems began to connect the people and products of Southern California to the rest of the U.S. Increased American settlement and claims on the land for residential, mining, agricultural, and ranching purposes in the second half of the nineteenth century meant that many remaining lands sustaining Native American populations were marked, surveyed, or even fenced as private, again changing the landscape of what are now San Diego and Imperial counties. Native American reservations were established, ostensibly to provide land for Native American populations, but these holdings made available only the poorest of subsistence lands and forced many indigenous peoples to adopt a more sedentary lifestyle, reliant on the Anglo economic system as an alternative to moving to reservations (Carrico, 2008).

5.3.1.2.3 Quechan

According to Quechan oral tradition, their territorial range extended along the Colorado River from Blythe in the north to Mexico in the south. At the time of sustained European contact in the seventeenth century, the Quechan people numbered in the thousands. The largest concentration of Quechan traditionally lived at the confluence of the Colorado and Gila rivers, although they were strangely not reported in that area in 1540, when the Alacon and Diaz expeditions reached the confluence (Forbes, 1965; Forde, 1931). Nevertheless, in the following century, large Quechan villages existed in the area.

The Quechan economy was based on a combination of horticulture, fishing, and gathering. During the winter and spring, Quechan groups lived in seasonal village settlements located on terraces above the river floodplain. After the spring floods receded, small family groups dispersed to their agricultural plots along the river to plant crops. After the harvest in the fall, the Quechan gathered again in the large villages on the terraces, where stored agricultural foods, fishing, and limited gathering allowed them to live together through the winter (Bee, 1983; Forde, 1931). In all times but high flood, fishing in the Colorado River provided an important source of protein.

Numerous named villages were located along the terraces above the lower Colorado River flood zone. The village known as *Avi Kwotapai* was located on the west side of the Colorado River between Blythe and the Palo Verde Valley, and *Xenu mala vax* was on the east side of the river near present-day Ehrenhberg (Bee 1983).). Quechan and other Yuman-speaking groups report well-traveled trails that extend along the Colorado River, as well as trail networks between peaks and other significant landscape features (see discussions in Cleland and Apple [2003]). Primary ethnographic sources for the Quechan include Bee (1983), Castetter and Bell (1951), and Forde (1931).

The contemporary Quechan community is concentrated in the lands of the Fort Yuma-Quechan Reservation and has its main headquarters in Fort Yuma, Arizona. The reservation is approximately 45,000 acres and is located along the lower Colorado River in both Arizona and California just north of the U.S./Mexico border.

5.3.1.3 Historic Setting

The history of the region is generally divided into Spanish (1769–1821), Mexican (1821–1846), and American (1846–present) periods. The Spanish Period is marked by the establishment of a mission and presidio on a hill overlooking San Diego Bay in July 1769. The Spaniards introduced European crops, cattle, and other livestock. The Mexican Period began in 1821 when Mexico achieved independence from Spain. During the 1820s, a small village began to form at the base of Presidio Hill that became the Pueblo of San Diego (present-day Old Town). The town served as a market center and port for numerous ranchos in the region that were chiefly employed in cattle raising for the exportation of hides and tallow. In 1846, San Diego was occupied by American troops and officially became part of the U.S. when the Treaty of Guadalupe Hidalgo formalized the transfer of territory from Mexico to the U.S. in 1848 (Lavender 1972; Rice et al. 1996).

European contact with coastal southern California began as early as 1542, with the voyage of Juan Rodríguez Cabrillo. However, intensive interactions and contacts with interior areas only came after the establishment of the Spanish presidio and mission of San Diego in 1769. During the Spanish Period, exploratory probes into eastern San Diego County were made by Pedro Fagés and others, and the southern immigrant trail came into use by colonists from Sonora. Mission culture may have begun to impact Native culture on the western extreme of the Project area (Lavender 1972; Rice et al. 1996).

In the 1800s, most travel from Arizona to San Francisco by Mexican soldiers, and later by American settlers, followed Anza's route. While the historic activity in the area during the early nineteenth century was limited primarily to travel with little settlement or resource exploitation, more intensive activity began in the 1820s, with the onset of limited placer mining in the eastern Colorado Desert. Early Spanish prospectors named the Cargo Muchacho ("loaded boy") Mountains after the gold they found there (Lavender 1972; Rice et al. 1996).

Mexico obtained independence from Spain in 1821. Soon thereafter, California's administrators began to shift their focus away from the Franciscan mission system and toward Hispanic lay settlement of the province. Avenues for foreign trade were opened, and private land grants became more numerous and extended farther inland from the coast (Lavender 1972; Rice et al. 1996).

During the Mexican American War of 1846–1848, California was occupied and subsequently annexed by the U.S. From the 1840s through the 1880s, the U.S. Cavalry established a series of camps and forts throughout Arizona, Nevada, and the California desert to protect settlers and immigrants from hostile Tribes (Rice et al. 1996). Land ownership was complicated by this transition. The Treaty of Guadalupe-Hidalgo, signed in February 1848, obligated the U.S. Government to recognize legitimate land claims in Alta California. While Mexicans initially made up most of the population, the Gold Rush after 1849 stimulated large-scale immigration into the region. Despite large land holdings and a strong cattle industry, many Mexican landowners found themselves overextended when the northern California miners' demand for meat dwindled. To pay their taxes and bills, some were forced to offer up their lands at public auction (Garcia, 1975). Small farmers had difficulty maneuvering through the process and acquiring land (Garcia, 1975). Settlers increasingly squatted on land that belonged to Mexicans, citing their preemption rights, which was the tradition that squatters had the first opportunity to buy the unimproved, unclaimed land for a fair price before auction (Garcia, 1975). Squatters increasingly challenged the validity of Spanish-Mexican claims through the Board of Land Commissioners created by the California Land Claim Act of 1851 (Garcia, 1975). Most Californios did not retain their original land holdings by 1860, including Santiago Arguello, who was granted the former Mission San Diego land in 1846 and eventually lost $24,000 in property (Garcia, 1975).

Following the establishment of forts throughout the area, the California desert region again opened for exploration and settlement. As part of an effort to establish a railroad route from St. Louis to the Pacific Ocean, the U.S. Government conducted a series of surveys between 1853 and 1855 to identify feasible routes. One of the railroad survey parties, led by Lieutenant R.S. Williamson, included a young geologist, William Phipps Blake, who was the first to identify the Salton Trough as an ancient lakebed (Cory and Blake 1915; Rice et al. 1996) and recognized the fertility of the basin. Sporadic flooding occurred at least eight times from 1824 to 1904. It was during this time that the 1856 U.S. Government Land Office survey documented several historic trails within the region, as well as the Tipai settlement at San Sebastian Marsh (Warren et al., 1981; Warren and Roske, 1981).

By 1860, most of the land in San Diego region was unimproved farmland and some ranches (Garcia, 1975:15). Settlement of the area occurred through homesteading primarily, which was authorized by the Homestead Act during the Civil War. The Timber Act, passed in 1873, also spurred settlement. It required a 10-year cultivation period of healthy trees. Some speculators and ranchers used this law as a way to obtain land for purposes other than what the patent stated. In the 1870s and 1880s, small farming communities were quickly established throughout San Diego County as settlers took up homestead claims on government land or small holdings purchased from real estate developers.

Significant economic development of the Colorado Desert region began in the 1870s and came to fruition in the early part of the twentieth century. Development was dependent largely on transportation and the availability of potable water. The first of these came in 1872 with the construction of the Southern Pacific Railroad from Los Angeles to present-day Indio, and eventually to Yuma. The early townsite of Indio, the midpoint between Los Angeles and Yuma, was created to provide living quarters for train crews and railroad workers. The first trains ran on May 29, 1876 (Pittman, 1995:36). The Southern Pacific continued east, paralleling an 1857 road along the eastern side of the Salton Trough. Railroad stops were built at Walters (now called Mecca), Woodspur (Coachella), and Thermal, among others. The same large dunes that had hindered de Anza's expedition hindered construction of the railroad.

The Southern Pacific Railroad was finally forced to build along the eastern edge of what came to be known as the Imperial Sand Dunes. Railroad sidings in the area with names such as Glamis, Amos, and Ogilby developed into small company towns. The second Transcontinental Railroad was completed when the Southern Pacific and Atchison, Topeka, and Santa Fe Railroads were linked at Deming in New Mexico Territory on March 8, 1881, providing settlers relatively quick and easy access to the region. The citizens of Imperial Valley petitioned the Southern Pacific Company to build a branch line south, connecting the valley to the main Southern Pacific Railroad. In 1903, the line was completed from Old Beach (Niland) to Imperial. By 1904, the line had been extended to Calexico (Heath, 1945). A branch line ran from El Centro to Seeley, connecting the Southern Pacific to the San Diego and Arizona Eastern Railroad (Farr, 1918). The San Diego and Arizona Eastern Railroad ran from 1919 to 1983, connecting San Diego and Imperial counties (Crawford, n.d.).

The completion of the railroad resulted in an unprecedented real estate boom for the city and county of San Diego. The population of San Diego swelled by 700 percent from 5,000 in 1885 to 40,000 in 1889 (Hector et al., 2004). Most of the growth was concentrated in the coastal areas and adjacent inland valleys, west of the present Project area, but Imperial County began to experience significant development during the first decade of the twentieth century, with the inauguration of an irrigation system tapping the waters of the Colorado River.

5.3.1.3.1 Imperial County

Imperial County was founded on August 15, 1907. It was the last county to be organized in California and measures 4,087 square miles (O'Dell 1957). Largely unoccupied by Euro-Americans through much of the early nineteenth century, the historic development of the western portion of the Imperial County has been influenced by three major water bodies, the Salton Sea, the Alamo River, and the New River. All three landforms lie within five miles of the Project area and are the result of a humanmade accident that occurred between 1905 and 1907. A discussion of each of these geographic features is provided below.

Beginning in the early twentieth century, population in the county began to increase with the completion of the Alamo Canal, which directed water from the Colorado River, into Mexico, and back into California (O'Dell 1957). By 1905, there were about 67,000 irrigated acres farmed by recent settlers to the valley (Hendricks 1971; Bright 1998). Over the next 20 years, many farmers moved into the county, drawn by the growing agricultural industry, which took off with the construction of the Hoover Dam in 1936 and the All-American Canal in 1940.

Cotton became a major industry in the vicinity of the Project area with 50,000 acres of land in the county devoted to its cultivation in 1914 (McGroarty 1914). Alfalfa was another important crop, but as production exceeded demand, it became too expensive to export. As a result, dairy farming became a growing industry, with 2,000 dairies opening in the valley to make use of the surplus alfalfa (Anderholt 1989). Historically, most of the land within the Project area has been owned by small-scale farms, some of which have been in operation since the early twentieth century (Section 5.3.1.3.3). Although Imperial

County is rich in a variety of mineral resources (e.g., clays, gypsum, and marble), mining does not appear to have developed as an important industry in the Project area.

5.3.1.3.2 Salton Sea

The Salton Sea is in the location of the historic Lake Cahuilla, which the Colorado River periodically emptied for centuries (San Diego Union-Tribune, 2015). In 1905, high spring flooding on the Colorado River spilled over a California Development Company canal, overflowing through the New River and Alamo channels, and flooding the Imperial Valley. The entire volume of the Colorado River rushed down into the Salton Sea until engineers were able to stop the flow of water in 1907, 2 years after the initial breach. By this time, the Salton Sea was a 400 square meter body of water – larger than Lake Tahoe (Picone, 2021)

The Salton Sea is an endorheic lake, which means the waters never discharge into the ocean and either seep into the earth or evaporate. As a result, the lake has a higher saline level than the Pacific Ocean and is constantly increasing in salinity from evaporation (Picone, 2021). While the saline levels were lower in the 1950s and 1960s, the Salton Sea was a popular tourist destination where millions of visitors would come to the warm waters every year, sometimes drawing more tourists than Yosemite (Picone, 2021). In the 1950s, the California Department of Fish and Game stocked the lake with fish in a successful effort to draw fisherman. A yacht club opened, and many high-profile Hollywood stars visited, including Sonny Bono, who learned how to water ski on the sea (San Diego Union-Tribune 2015). By the 1970s, tourism came to a halt as rising salinity, shoreline flooding, and fertilizer runoff from nearby farms caused algal blooms and elevated bacterial levels. This caused a mass die off of the sea's fish, and in turn, the local bird populations (Picone, 2021). Today, the Salton Sea remains a busy stopping spot for migratory birds. The main tourist draw is the Sonny Bono Salton Sea National Wildlife Refuge (NWR) on the southeastern shores, drawing as many as 25,000 visitors a year (San Diego Union-Tribune, 2015).

5.3.1.3.3 Canal System

The Alamo Canal, completed in 1901 by the California Development Company, was the first canal to serve Imperial County. By 1905, Imperial County had 80 miles of canals and 700 miles of distribution canals. Most of the water was redirected from the Colorado River, providing water to 12 water districts that served Imperial Valley. Prior to 1936, the water supply for the Imperial Valley was silt laden. The canal system quickly became clogged and dredging the system was difficult and expensive. The California Development Company did not have the financial resources to keep the system clear. As described above, construction of a new control gate in 1905, coinciding with unusually heavy floods, led the Colorado River to overflow its banks and flood the Imperial Valley. A total of 13,000 acres of irrigable land was destroyed as a result with an additional 30,000 acres left without a water supply. All crops were lost and by 1909, the California Development Company was bankrupt.

The Imperial Irrigation District (IID) was formed in 1911 under a state charter to acquire properties of the bankrupt California Development Company. By 1922, the IID had acquired 13 water companies and between 1930 and 1940, the All-American Canal was built to replace the Alamo Canal (Dowd, 1956:88). The All-American Canal provided reliable water to the valley from the Colorado River and by 1942, became the sole source of imported water for the Imperial Valley.

Three major distribution canals channel water throughout the valley: East Highline, Central Main, and Westside Main canals (CH2M Hill, 2001). The three canals service different portions of the valley: the East Highline Canal serves IID's area east of the Alamo River, the Central Main Canal serves the area between the Alamo River and the New River; and the Westside Main Canal serves the area west of the New River. The East Highline Canal Reach 1 and Reach 2 segments, which run from the Alamo Canal at Laurence Heading in Mexico north to Niland, were initially constructed in ca. 1914. Following its construction, a network of irrigation lateral canals was constructed off the East Highline Canal at 0.5-mile intervals running in a westward direction (CH2M Hill, 2001). Between 1923 and 1927, the East Highline Canal was extended to the area north of Niland (Dudek and Rincon Consultants, 2022).

The Vail Canal System, which also receives water diverted from the East Highline Canal (IID, 1959), was also likely constructed in the early twentieth century during a period of drainage expansion in the late 1920s and 1930s. The Vail Canal was built on land owned by the Vail family and is associated with Vail Ranch. The Vail family had constructed several large ranches throughout southern California (Tennyson and Apple, 2009). The most famous member of the family was Walter Lennox Vail, who had owned land near the Project area (CEC, 2003).

Much of the irrigation water that is transported through the East Highline, Central Main, and Westside Main canal systems drain into the Alamo River and New River, which flow west and north from the Mexicali Valley in Baja California to the Salton Sea. The modern river courses were created in 1905-1907 by high spring flooding on the Colorado River. Washing out portions of the Alamo Canal, the flood water coursed into the Salton Basin and created the Alamo and New River channels (Dowd, 1956). The Alamo and New rivers eventually became one of the main outlets to the Salton Sea with extensive drainage systems constructed by the IID in the early decades of the twentieth century (Dowd, 1956).

In total, approximately 1,667 miles of canals and laterals distribute irrigation water within IID's service area. The 123 miles long Coachella Canal branches from the All-American Canal to serve the Coachella Valley. Today, 3,000 miles of irrigation and drainage canals irrigate more than 600,000 acres of land in the Imperial and Coachella valleys with water from the Colorado River, yielding nearly $1 billion in crops (Bureau of Reclamation n.d.).

5.3.2 Research Design for the Cultural Resources Inventory

A research design is an explicit statement of the theoretical and methodological approaches to be followed in a cultural resources study (OHP, 1990). Inventory studies, such as this one, rely on data from archaeological and historical resources visible on or above the ground surface with supplemental information provided by archival research and literature review (OHP, 1991). In such studies, the focus of the research design is to ensure the adequacy of the identification effort. Should any identified resources within the Project area have sufficient age and integrity to warrant consideration for CRHR eligibility, then relevant research questions and data requirements may be posed to evaluate the significance of the resource and make recommendations regarding determinations of eligibility.

For the purposes of this study, two related research domains were identified: 1) history of early Euro-American settlement and exploration; and 2) twentieth century irrigation infrastructure and canal systems. Research regarding the development of settlements of the Imperial Valley is important for understanding whether cultural resources in the area should be considered significant. Use of the valley was, at first, associated with transportation. Due to the remoteness and limited accessibility of resources, permanent settlements were few and far between. However, the construction of irrigation infrastructure and canal systems in the early decades of the twentieth century greatly increased the agricultural potential of the area. This resulted in an influx of settlers who established farms and ranches throughout the area.

The following questions may be considered when examining the nature and extent of early settlement and irrigation agriculture within the study area.

- What evidence of historic period agriculture, ranching, and homesteading is present in the Project area?
- Do historical archaeological sites in the Project area represent early historical settlement, such as homestead structures or features, or historical agricultural pursuits within the Project area?
- What specific activities were performed at these sites? Did these activities change over time?
- What is the age of these sites? How long were these settlements occupied and when were they abandoned?
- How do agriculture, ranching, and homesteading sites in the Project area reflect or diverge from regional or national trends?
- What was the socioeconomic status, ethnicity, or national origin of the homesteaders?

Data Requirements (among the data needed to address the research questions posed above):

- Chronological data from temporally diagnostic artifacts that can be used to assess the age of the sites;
- Artifact assemblages and features to identify the types of activities that were associated with each site;
- Artifacts (e.g., culinary artifacts, food preparation items, food containers and remains, clothing/grooming, personal hygiene, and medicinal items), that may be used to examine the social, ethnic, or economic background of the residents of the sites; and
- Documentary information in the form of U.S. Geological Survey (USGS) historical maps, land patent records, master title plat maps, and County assessor records to address questions of land ownership.

5.3.2.1 Resource Definitions

The *Instructions for Recording Historical Resources* (OHP, 1995) has adopted the National Register of Historic Places (NRHP) resource categories as a basis for the classification of California's historical resources. The NRHP categories that have been defined by the National Park Service (NPS 1990) include the following:

- **Building:** A building, such as a house, barn, church, hotel, or similar construction, is created principally to shelter any form of human activity. "Building" may also be used to refer to a historically and functionally related unit, such as a courthouse and jail or a house and barn.
- **Structure:** The term "structure" is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter.
- **Object:** The term "object" is used to distinguish from buildings and structures those constructions that are primarily artistic in nature or are relatively small in scale and simply constructed. Although it may be, by nature or design, movable, an object is associated with a specific setting or environment.
- **Site:** A site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value regardless of the value of any existing structure.
- **District:** A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.

For the purposes of this study, a "site" was defined as a location that has material evidence of past life, activities, and culture. The California standard is to record any cultural resources over 45 years of age, despite the NRHP threshold of 50 years of age. In general, an archaeological site should exhibit at least one of the following:

- One or more features;
- Five or more artifacts in clear association within a 25 square meters (five by five meter) area; or
- Fewer than five artifacts that have data potential or are "diagnostic" (i.e., fluted points).

Examples of archaeological sites commonly found in the Project vicinity include prehistoric lithic scatters and quarries and historic-period refuse scatters, roads, canals, and agricultural remnants. Resources separated by more than 30 meters or located on different landforms were recorded as distinct sites or as isolates, unless other indicators suggested a close association. Isolates were defined as fewer than five artifacts that are greater than 45 years old.

Previously recorded cultural resources were also revisited during this survey. Their condition was assessed, and an update was made to the DPR record if determined necessary. All newly recorded cultural resources were fully recorded and are described in this report. Maps showing the locations of all identified cultural resources within the archaeological and architectural history study areas area included in Appendices B and D of the CRTR. DPR forms for these resources have also been submitted in conjunction with the (CRTR-Appendix E).

5.3.2.2 Survey Methods

5.3.2.2.1 Archaeological Survey

An intensive pedestrian survey of the archaeological study area[1] was completed by archaeologists between August 9 and September 2, 2022, November 7 and 11, 2022, January 30-31, 2023, and March 31, 2023. The archaeological survey methods followed standard archaeological methods consisting of parallel pedestrian transects spaced at 10 to 15-meter (33 to 50-feet) intervals. Crew members also opportunistically examined any subsurface exposures, including rodent burrows and cut banks. Survey crews navigated the transects using georeferenced maps on iPad tablets and handheld global position system (GPS) units. Archaeological resources were recorded with an iSX-Blue data collector GPS unit with sub-meter accuracy. Areas that were inaccessible to the surveyors were noted and described (i.e., landform type, reason for inaccessibility).

The archaeological study area was documented with digital photographs that included general views of the topography, vegetation density, and other images. A photograph log was maintained to include photograph number, date, orientation, photograph description, and comments. The surveyors carefully inspected all areas likely to contain or exhibit sensitive cultural resources to ensure discovery and documentation of cultural resources located within the survey area. In particular, the survey crews carefully inspected rocky outcroppings, banks, clearings, and other habitable flat spots.

All archaeological materials and features of an eligible age were recorded during the survey in accordance with OHP (1995) guidelines. Archaeological materials and features that could not be accurately dated in the field were also recorded. Historic period archaeological indicators include the remnants of buildings, objects, and structures, or concentrations of materials at least 45 years in age, such as domestic refuse (e.g., glass bottles, ceramics, toys, buttons, and leather shoes), refuse from other pursuits such as agriculture (e.g., metal tanks, farm machinery parts, and horse shoes) or structural materials (e.g., nails, glass window panes, corrugated metal, wood posts or planks, metal pipes and fittings, and railroad spurs). Prehistoric site indicators include areas of darker soil with concentrations of ash, charcoal, animal bone (burned or unburned), shell, flaked stone, ground-stone, pottery, or even human bone.

When archaeological remains were found during the survey, site boundaries were defined by surveying out in widening concentric circles until artifacts were no longer encountered. Artifacts or features that were within 30 meters of each other, or that were clearly related, were combined into the same isolate or site. All resources were digitally recorded in the field directly into a FileMaker database using an iPad.

5.3.2.2.2 Architectural History Survey

An initial architectural survey was conducted between August 22 and 24, 2022. A follow up architectural survey was conducted between November 8 and 9, 2022. Prior to conducting the survey, records search results and historical aerial images and maps were inspected to identify the locations of potential historic built-environment resources in the survey area. During the field work effort, each of the locations identified by the desktop analysis was visited to determine if standing buildings or structures were present in these areas. Additionally, a windshield survey of the entire architectural study area was completed to ensure that there were no additional historic built-environment resources in the study area that had not be identified by the desktop analysis.

As part of the documentation effort, high resolution photographs were taken of each identified property that had standing buildings or structures at least 45 years old. Field notes were also taken to document the characteristics of each built-environment resource and their current condition. To determine whether

[1] Archaeological and architectural history study areas for the proposed Project site, substation, borrow pits, and construction laydown/parking/construction camp locations includes the Project footprint plus a 200-foot buffer. For the proposed transmission line corridors, well pads, and pipelines, the study area includes the Project footprint with a 50-foot buffer. The architectural history study area includes all Project elements along with a 0.5-mile buffer.

the properties might be associated with a historic district, attention was paid to the setting, level of architectural cohesion, and historic integrity of the area.

5.3.2.3 Resources Inventory

A cultural resources inventory, which included archival research, an intensive pedestrian archaeological survey, an architectural history reconnaissance survey, and Native American Coordination were conducted for the Project. The study areas for the Project were determined in accordance with the latest CEC *Rules of Practice and Procedure & Power Plant Site Certification Regulations* (CEC, 2023) for assessing potential impacts on archaeological and architectural resources. The results of the resource inventory are presented in the following sections. Figure 5.3-1a to Figure 5.3-1e shows the archaeological study area and architectural history study area. The archaeological study area includes the Project footprint plus a 200-foot buffer; for the proposed transmission line corridors, well pads, and pipelines, the study area includes the Project footprint with a 50-foot buffer. The architectural history study area includes all Project elements along with a 0.5-mile buffer.

5.3.2.3.1 Archival Research

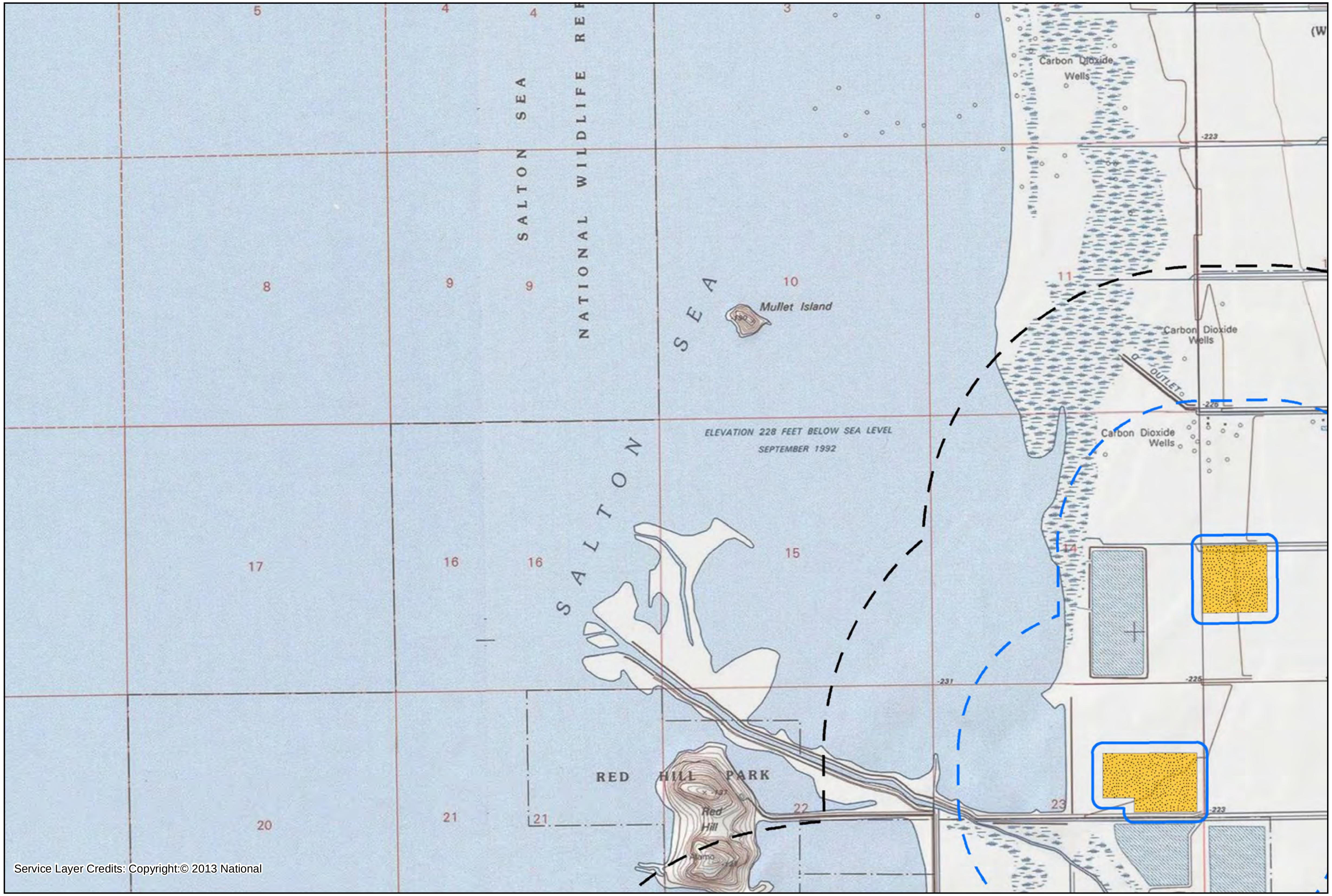
A literature review and records search were conducted at the South Coastal Information Center (SCIC), housed at San Diego State University, on March 23, 2022. This inventory effort included the Project area along with a corresponding buffer, collectively termed the records search area. A 1.0-mile radius buffer was included around all Project facilities. The objective of the SCIC records search was to identify prehistoric or historical cultural resources that have been previously recorded within the records search area during prior cultural resource investigations.

As part of the cultural resources inventory, archival research and a review of historical maps and aerial images was performed to characterize the developmental history of the Project area and surrounding area. A summary of the results of the record search and background research is provided below. Sources consulted as part of this effort include Bureau of Land Management (BLM) land patents, General Land Office (GLO) maps, property records, and building permits to obtain information on the construction and age of historic properties. In addition, newspapers and genealogical databases were examined to acquire data on the owners of the historic properties. Finally, online historical records were also accessed for information on the construction and operation of the IID.

The Project site and adjacent parcels were examined during archival research. Historical maps of the USGS Historical Topographic Maps Collection and aerials at NETR Historic Aerials online were examined. Historical aerials were compared with current aerials to determine whether any structures or features located within the architectural history study area are 45 years old or older. Aerials examined included the following years: 1953, 1984, 1996, 2002, 2010, and 2018.

Topographic maps examined included the following:

- 1944 Calipatria, California quadrangle 15-minute USGS topographic map
- 1976 Calipatria, California quadrangle 15-minute USGS topographic map
- 1940 Iris, California quadrangle 15-minute USGS topographic map
- 1945 Iris, California quadrangle 15-minute USGS topographic map
- 1956 Obsidian Butte, California quadrangle 7.5-minute USGS topographic map
- 1992 Obsidian Butte, California quadrangle 7.5-minute USGS topographic map
- 1954 Salton Sea, California quadrangle 1 by 2 degree USGS topographic map
- 1955 Salton Sea, California quadrangle 1 by 2 degree USGS topographic map
- 1959 Salton Sea, California quadrangle 1 by 2 degree USGS topographic map
- 1963 Salton Sea, California quadrangle 1 by 2 degree USGS topographic map
- 1965 Salton Sea, California quadrangle 1 by 2 degree USGS topographic map



USGS 7.5' Quadrangle:
Niland, Ca (1960)
T11S R13E, Secs 11-16 & 20-29
UTM Zone 11N, NAD 83
SBBM

- Archaeological Study Area
- Architectural Study Area
- Black Rock Project
- Components Shared with Morton B and Elmore North Projects
- Record Search Area

Project Component

- Well Pad
- Water Supply
- Switching Station
- Pulling Sites
- Plant
- Pipelines
- Laydown and Parking
- Gen-Tie Pole
- Construction Camp
- Borrow Pit

0 feet 2,500
0 meters 800
1:24,000

Project Detail

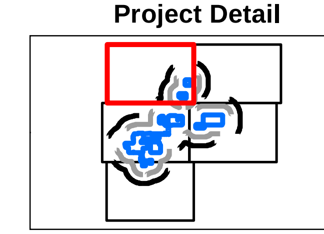
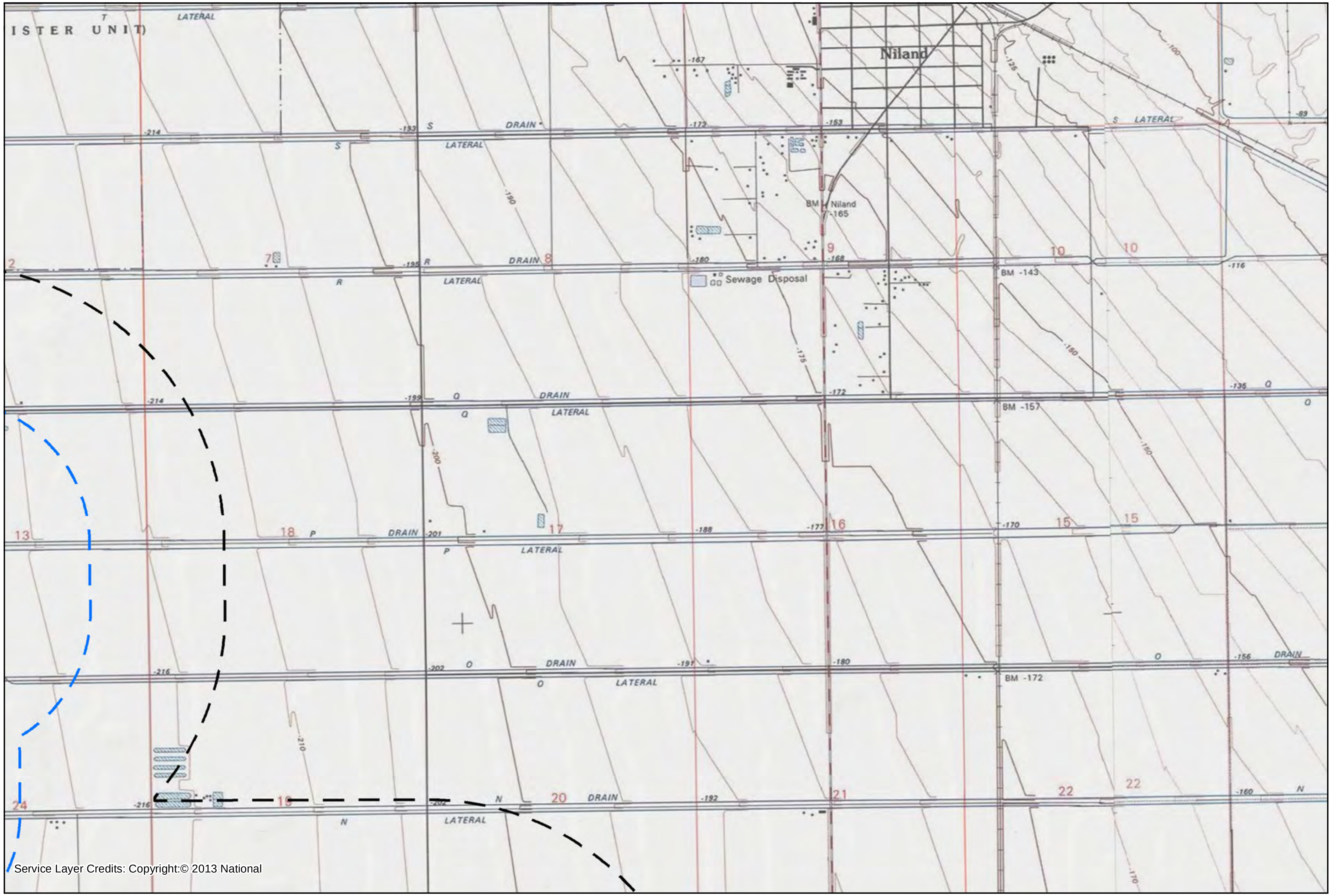


Figure 5.3-1a
Cultural Study Area,
Black Rock Geothermal Project
Imperial County, California

Jacobs



PALEO WEST

USGS 7.5' Quadrangle:
Niland, Ca (1960)
T11S R13E, Secs 12-13 &
24-25; T11S R14E, Secs 7,
18-20 & 28-30
UTM Zone 11N, NAD 83
SBBM

Archaeological Study Area
Architectural Study Area
Black Rock Project
Components Shared with Morton Bay and Elmore North Projects
Record Search Area

Project Component

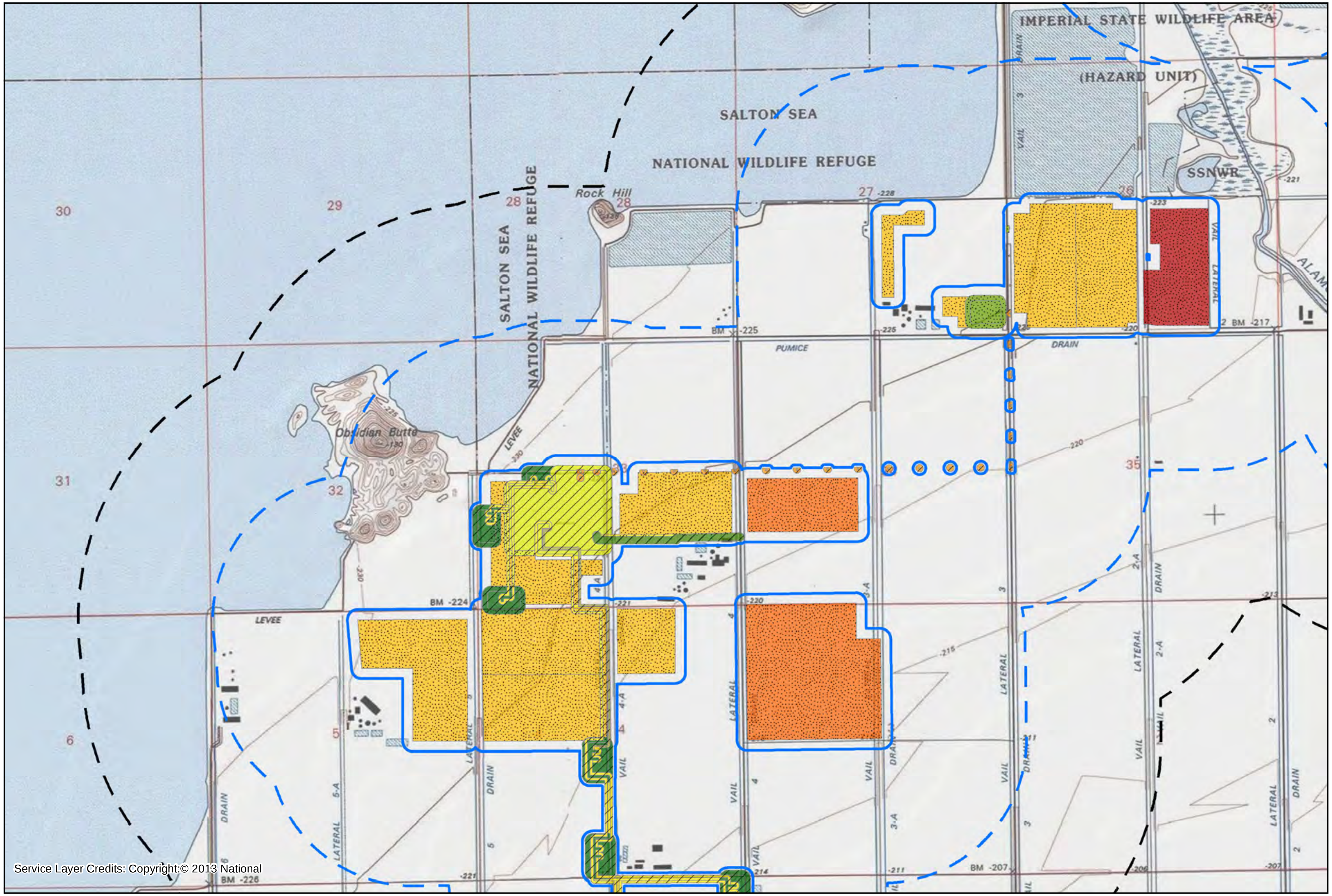
Well Pad
Water Supply
Switching Station
Pulling Sites
Plant
Pipelines
Laydown and Parking
Gen-Tie Pole
Construction Camp
Borrow Pit

0 feet 2,500
0 meters 800
1:24,000

Project Detail

Figure 5.3-1b
Cultural Study Area,
Black Rock Geothermal Project
Imperial County, California

Jacobs



PALEO WEST

USGS 7.5' Quadrangle:
Obsidian Butte, Ca (1960) &
Niland, Ca (1960)
T11S R13E, Secs 26-29 &
31-35; T12S R13E, Secs 2-11
UTM Zone 11N, NAD 83
SBBM

Archaeological Study Area
Architectural Study Area
Black Rock Project
Components Shared with Morton B
and Elmore North Projects
Record Search Area

Project Component

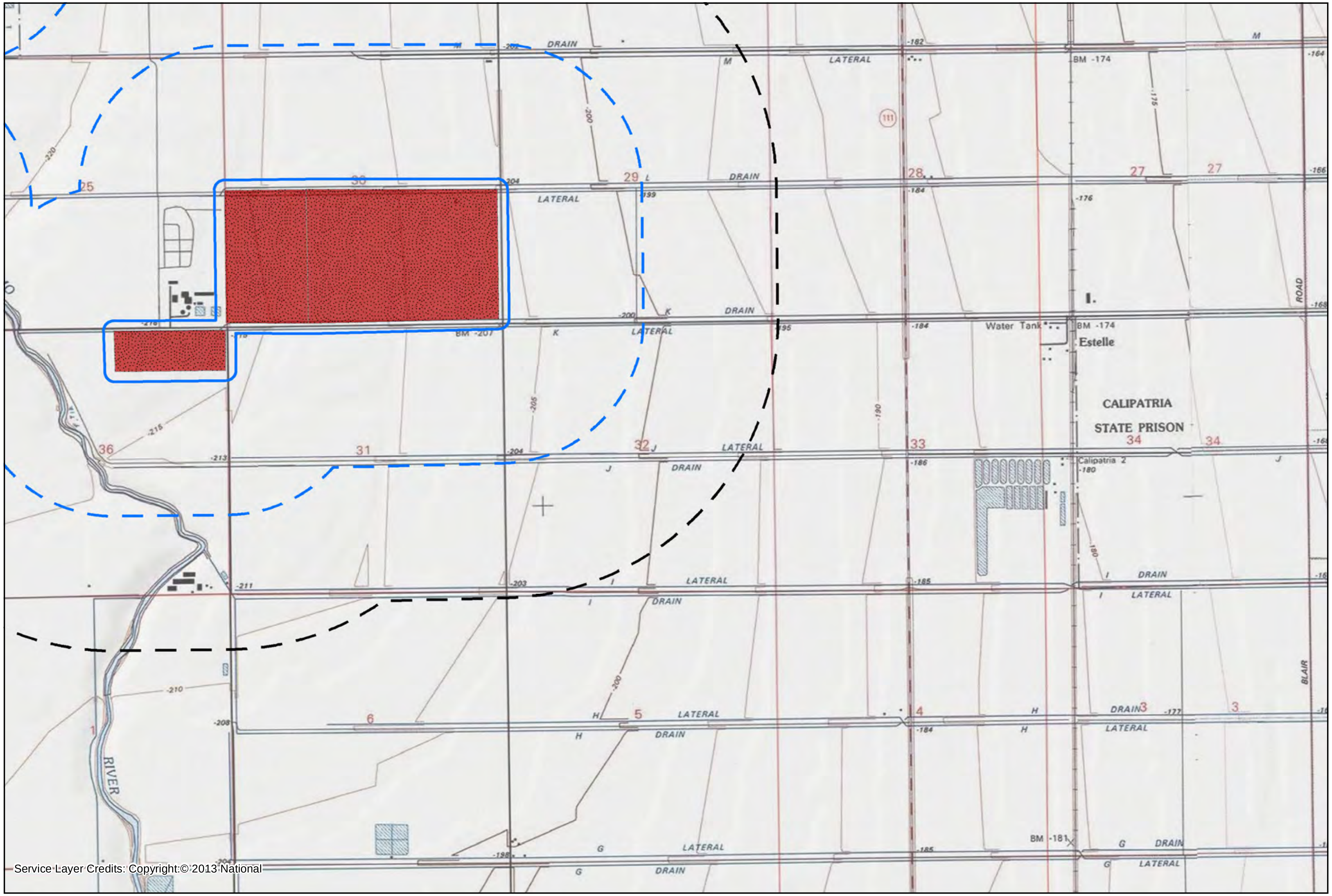
Well Pad
Water Supply
Switching Station
Pulling Sites
Plant
Pipelines
Laydown and Parking
Gen-Tie Pole
Construction Camp
Borrow Pit

0 feet 2,500
0 meters 800
1:24,000

Project Detail

Figure 5.3-1c
Cultural Study Area,
Black Rock Geothermal Project
Imperial County, California

Jacobs



PALEO WEST

USGS 7.5' Quadrangle:
Niland, Ca (1960)
T11S R13E, Secs 25 & 36;
T12S R13E, Sec 1; T11S
R14E, Secs 28-33; T12S
R14E, Secs 5-6
UTM Zone 11N, NAD 83
SBBM

Archaeological Study Area
Architectural Study Area
Black Rock Project
Components Shared with Morton B and Elmore North Projects
Record Search Area

Project Component

Well Pad
Water Supply
Switching Station
Pulling Sites
Plant
Pipelines
Laydown and Parking
Gen-Tie Pole
Construction Camp
Borrow Pit

0 feet 2,500
0 meters 800
1:24,000

Project Detail

Figure 5.3-1d
Cultural Study Area,
Black Rock Geothermal Project
Imperial County, California

Jacobs

USGS 7.5' Quadrangle:
Obsidian Butte, Ca (1960) &
Niland, Ca (1960)
T12S R13E, Secs 7-11 & 15-17
UTM Zone 11N, NAD 83 SBBM

Archaeological Study Area
Architectural Study Area
Black Rock Project
Components Shared with Morton B and Elmore North Projects
Record Search Area

Project Component

Well Pad
Water Supply
Switching Station
Pulling Sites
Plant
Pipelines
Laydown and Parking
Gen-Tie Pole
Construction Camp
Borrow Pit

0 feet 2,500
0 meters 800
1:24,000

Project Detail

Figure 5.3-1e
Cultural Study Area,
Black Rock Geothermal Project
Imperial County, California

According to information available in the CHRIS files, 35 previous investigations have been conducted and documented within the records search area since 1977 (Table 5.3-1). Twenty-two of these studies were conducted within 0.25 mile of the Project area, of which 18 studies intersect the Project area. None of these studies have been completed within the last five years. Copies of all reports are provided in the CRTR-Appendix F.

Table 5.3-1. Cultural Resources Reports within the Records Search Area

Report Authors and Date	CHRIS Catalogue NADB Numbers
Studies conducted within the Project area	
Von Werlhof and Von Werlhof, 1978	IM-00140
Imperial County Planning Department, 1979	IM-00183
Westec Services, Inc., 1980	IM-00225
Westec Services, Inc., 1981	IM-00230
Westec Services, Inc., 1981	IM-00234
Westec Services, Inc., 1981	IM-00236
Westec Services, Inc., 1981	IM-00237
Westec Services, Inc., 1981	IM-00254
Westec Services, Inc., 1981	IM-00255
RTP Environmental Associates Inc., 1994	IM-00509
RTP Environmental Associates Inc., 1994	IM-00512
Von Werlhof, 1980	IM-00636
ASM Affiliates, 2007	IM-01096
Laylander, Stringer-Bowsher, Schaefer, 2008	IM-01385
ESA Associates, 2011	IM-01461
ESA Community Development, 2012	IM-01493
NA, 2012	IM-01642
Ehringer, 2011	IM-01710
Studies conducted outside the Project area	
Von Werlhorf et al., 1977*	IM-00109
Von Werlhof, 1978	IM-00160
Imperial County Planning Department, 1978	IM-00163
County Of Imperial Planning Department, 1984	IM-00320
Tetra Tech, Inc., 2000*	IM-01181
McGown, Lucille Ronan, et al., 2001*	IM-01255
Wirth Associates, Inc, 1980	IM-01306
Schaefer, Gunderman, and Laylander, 2010	IM-01470
Imperial County Planning Department, 2010	IM-01484
Ecology And Environment, Inc., 2012	IM-01494
Ecology And Environment, Inc., 2012*	IM-01505
Imperial Wells Power LLC, 2013	IM-01520
Giacinto, 2011	IM-01559
Stanford and Lachman, 2016	IM-01640
NA, 2016	IM-01643
Castells, 2016	IM-01695
NA, 2017	IM-01697

Source: CHRIS South Central Coastal Information Center. See Appendix 5.3A for full bibliographic references.
* Indicated a study within 0.25 miles of the Project area
NADB = National Archaeological Database

As a result of these studies, 13 cultural resources have been previously documented within the records search area (see Table 5.3-2). These resources include three prehistoric sites, six historic period sites, and four historic built-environment resources. None of the previously recorded cultural resources intersect the Project area. One historic built-environment resource (P-13-018312) lies outside of the Project area but within the architectural history study area.

Table 5.3-2. Previously Recorded Resources within the Records Search Area

Primary Number	Trinomial	Type	Age	Description
P-13-000452	CA-IMP-452	Site	Prehistoric	Obsidian Butte; a lithic quarry
P-13-003251	CA-IMP-3251H	Site	Historic	Pond of water
P-13-003254	CA-IMP-3254	Site	Historic	Salt deposit; no longer extant
P-13-003255	CA-IMP-3255	Site	Historic	Saltwater pond
P-13-003256	CA-IMP-3256	Site	Historic	Mud volcanos
P-13-003257	CA-IMP-3257	Site	Historic	Mud volcanos
P-13-003258	CA-IMP-3258	Site	Historic	Mud volcanos
P-13-008176	NA	Site	Prehistoric	Lithic quarry
P-13-009110	CA-IMP-8395	Site	Historic	Carbon dioxide wells
P-13-013841	NA	Structure	Historic	Cement-lined canal
P-13-014278	NA	Structure	Historic	Segment of O Lateral canal
P-13-014279	NA	Structure	Historic	Segment of N Drain of East Highline Canal
P-13-018312	*NA*	*Building*	*Historic*	*906 West Sinclair Road, Calipatria; Sonny Bono Salton Sea NWR Headquarters*

Notes:

Italics indicate resources in the architectural history study area.
NA – Non-Applicable

P-13-018312 (906 West Sinclair)

This resource consists of a historic-era building that was associated with the operation of the Sonny Bono Salton Sea NWR (Speulda-Drews, 2021). Known as Quarters 7, the building was constructed in 1951 on an isolated parcel at the northern end of the refuge. Quarters 7 was designed by U.S. Fish and Wildlife Service (USFWS) lar, Vernon Acker. The single-story, rectangular plan with attached garage reflected the post-World War II architectural trend of the minimalist ranch. The evaluation of Quarters 7 by Speulda-Drews (2021) concluded that the building was not eligible for the NRHP under any criteria. Quarters 7 does not appear to have been evaluated for listing on the CRHR.

5.3.2.3.2 Archaeological Field Survey

The archaeological study area is composed of agricultural fields, human-made ponds, a riparian landscape adjacent to the Alamo River, and mud flats. The topography is flat except for human made canals and berms. Soils were fine- to medium-grained alluvial sandy loam that are light tan in color and composed of quartz and granitic material. Due to the extensive agricultural and geothermal development in this portion of the valley, little natural vegetation was observed in the archaeological study area. The only area that was characterized by non-agricultural plant species was along the Alamo River, which contained salt-cedar (*Tamarix chinensis*), common reed (*Phragmites australis*), arroweed (*Pluchea serica*), and various types of saltbush (*Atriplex* spp.). Noted disturbances include expansive agricultural fields, berms, canals, and ponds excavated for irrigation and hunting, and the construction and maintenance of numerous dirt, graveled, and paved roads. The surface of the graveled roads included a mix of imported gravel and local gravel with obsidian from the nearby Obsidian Butte.

Ground visibility across the archaeological survey area was variable. Although excellent visibility (close to 100%) was found in many areas, moderate visibility (25-75%) was noted near ponds and in some of the fallow agricultural fields. Areas with no visibility (less than 10%) were associated with some active agricultural fields. With the exception of 54 acres of land that were inaccessible (i.e., fenced off or underwater), all of the archaeological survey area was inventoried for archaeological resources. No archaeological resources were identified in the archaeological study area.

5.3.2.3.3 Architectural History Survey

Results from the architectural history survey identified a total of 11 built-environment resources 45 years old or older in the architectural history study area (Table 5.3-3). These include three previously recorded built-environmental resources (two irrigation-related structures and one building) and eight newly recorded built-environment resources (seven irrigation-related structures and a channelized segment of a river). A description and evaluation of each of these resources is provided below.

Table 5.3-3. Built Environment Resources in the Architectural History Survey Area

Address	Build Date	Resource Type	Description	Previous Evaluation
P-13-018312 (West Sinclair Road)	1951	Building	NWR Administrative building (Quarters 7)	Recommended not eligible for the NRHP; not evaluated for CRHR
River Alamo and Ponds	1949	Structure	Channelized portion of river with four associated ponds	-
J Lateral	ca. 1914	Structure	East-west running irrigation channel and drainage	-
K Lateral	ca. 1914	Structure	East-west running irrigation channel and drainage	-
L Lateral	ca. 1914	Structure	East-west running irrigation channel and drainage	-
M Lateral	ca. 1914	Structure	East-west running irrigation channel and drainage	-
P-13-014279 (N Lateral)	ca. 1914	Structure	East-west running irrigation channel and drainage	Recommended not eligible for the NRHP; not evaluated for CRHR
P-13-014278 (O Lateral)	ca. 1914	Structure	East-west running irrigation channel and drainage	Recommended not eligible for the NRHP; not evaluated for CRHR
P Lateral	ca. 1914	Structure	East-west running irrigation channel and drainage	-
Q Lateral	ca. 1914	Structure	East-west running irrigation channel and drainage	-
Vail Canal System	ca. 1914	Structure	Canal system consisting of a supply channel, laterals, and associated drains	Segment outside of study area recommended not eligible for the NRHP; not evaluated for CRHR

P-13-018312 (906 West Sinclair Road)

P-13-018312 is a previously recorded historic period building, known as Quarters 7, at the Sonny Bono Salton Sea NRW Headquarters (Speulda-Drews, 2021). The Salton Sea NWR was established in 1930. By the late 1940s, staffing levels and activities at the refuge had reached the point where additional infrastructure was needed. Designed by USFWS architect, Vernon Acker, Quarters 7 was built in 1951 and housed the administrative headquarters for the Salton Sea NWR between the mid-1960s to the early 1980s. The building is characterized by single-story, rectangular plan with attached garage that reflects the post-World War II architectural trend of the minimalist ranch. Although additional buildings and structures were built on the parcel over the years, Quarters 7 is the only building on the property that is more than 45 years old.

During the revisit to P-13-018312 the current condition of the Quarters 7 building was documented. The building exhibits stucco siding and a standing-seam metal roof with an eave overhang and solar panels. An aluminum door is located its south elevation, along with a series of aluminum-framed windows. The building appears to have undergone several notable alterations since its original recordation by Speulda-Drews in 2021. Most notably, the shiplap siding had been replaced with stucco and new vinyl and aluminum windows have been installed.

California Register of Historical Resources Evaluation

Quarters 7 was previously evaluated for listing on the NRHP by the USFWS (Speulda-Drews, 2021). The resource was determined not eligible for the NRHP under any criteria. Additionally, the evaluation concluded that the Quarters 7 lacked integrity of setting, design, materials, and feeling because it had been significantly altered, with new, larger buildings constructed on the site.

Although the USFWS did not evaluate P-13-018312 for listing on the CRHR, the information provided in Speulda-Drews' (2021) significance evaluation can be used as a basis to assess the eligibility of the building as a historical resource under CEQA. Speulda-Drews (2021) noted that the building cannot be associated with any event or theme that has made a significant contribution to history. It is the only building that still remains on the property from the 1950s and is now surrounded by a complex of modern buildings and structures. As such, it does not convey a close association with the 1950s period and does not meet CRHR Criterion 1. The building was designed by Vernon Acker, an architect working for the USFWS between 1949 and 1959. Acker is not a recognized architect or an important person in California's past. As such, the building does not meet the CRHR Criterion 2. As built, Quarters 7 exemplified a minimalist ranch design with California outside living elements of a concrete patio and cut-out roof with ramada over the rear entry. However, the building has been significantly altered so that it no longer reflects features of a California-inspired minimalist ranch. Therefore, the property does not meet CRHR Criterion 3. Finally, the property has not and will likely not yield information important to history or prehistory and therefore it does not meet CRHR Criterion 4. As previously documented, the building lacks integrity of setting, design, materials, and feeling.

Based on these findings, P-13-018312 is recommended not eligible for inclusion in the CRHR.

Channelized Segment of Alamo River and Ponds

This resource consists of a 3.8-mile-long channelized segment of the Alamo River and associated ponds and levee remnants that are located north of the bridge at Sinclair Road and the Salton Sea. The river channel is unlined with steep-sided banks. The width of the channel ranges from approximately 40 to 90 feet with an unknown depth. Thick riparian vegetation grows along either side of the river channel and adjacent banks. There are four ponds that lie west of the river (Pond 1-4). The northernmost pond (Pond 1) is roughly circular in shape and measures 790 by 700 feet in size. Pond 2 is approximately 0.5 mile to the southeast of Pond 1 and measures 1,097 by 640 feet with an irregular shape. Pond 3 lies 350 feet south of Pond 2 and is roughly oval in shape and measures 693 by 1,135 feet in size. The south pond, Pond 4, is 370 feet southeast of Pond 3 and is roughly rectangular in shape; it measures 395 by 268 feet in area. The ponds appear to hold water on a seasonal basis with only one feature (Pond 2) found to contain standing water at the time of the architectural history survey.

The Alamo River is 52 miles in length and flows west and north from the Mexicali Valley in Baja California to drain into the Salton Sea. Prior to the twentieth century, the river was one of the natural overflow channels of the Colorado River that drained into the historic Lake Cahuilla. In 1900, a canal intake and headgates were built by the California Development Company at Pilot Knob to divert water off the Colorado River. Known as the Alamo Canal, the canal was excavated to the international boundary line and on into Mexico for a distance of four to five miles; it then swung to the west for two or 3miles to a connection with the old Alamo River channel (Dowd, 1956). In 1905, high spring flooding on the Colorado

River spilled over the Alamo Canal, overflowing through the old Alamo River channel, and flooding the Imperial Valley (Dowd, 1956). Flood water from the Colorado River rushed down through the river into the Salton Sea until engineers were able to stop the flow of water in 1907, two years after the initial breach. The flooding event resulted in the deepening of the Alamo River channel as much as 20 to 30 feet in some places (Dowd, 1956).

The Alamo River eventually became one of the main drainage outlets to the Salton Sea for the extensive drainage system which was later constructed by the IID (Dowd 1956:36). In 1949, the IID began efforts to channelize portions of the Alamo River Channel as part of the North End Improvement Plan (IID, 1949). The purpose of the plan was to improve drainage and increase the agricultural productivity in the Vail Canal system. The work involved dredging a new river channel north of Sinclair Road to eliminate bends in the river; levees were also constructed as part of the IID project to control bank erosion (Schaefer et al., 2010). The four ponds appear to be the result of the channelization and represent the bends in the river that were cut off during dredging activities.

<u>California Register of Historical Resources Evaluation</u>

The channelization of the Alamo River by the IID served to improve the Vail Canal irrigation system and increase the agricultural productivity of the area. The activities of the IID are associated with the continued development of irrigation infrastructure and canal systems in the Imperial Valley. However, the channelized portion of the Alamo River and associated ponds and levees occurred in the late 1940s, several decades after the construction of the Vail Canal system. As such, the channelization of this section of the Alamo River cannot be directly linked to any specific events that made a significant contribution to the broad patterns of our history. Additionally, the channelization of the river was funded and constructed by the IID and cannot be attributed to a specific individual. Therefore, the resource does not meet CRHR Criterion 1 or 2. The resource is simple in design and construction and does not represent an engineering feat; therefore, it does not meet CRHR Criterion 3. Finally, additional study of the channelized river and ponds are unlikely to yield information important to history or prehistory and therefore it does not meet CRHR Criterion 4.

Based on these findings, the channeled portion of the Alamo River and associated ponds are recommended not eligible for inclusion in the CRHR.

J Lateral

The J Lateral is an approximately 9.5-mile-long irrigation canal and associated drain that runs in an east-west direction along either side of East Hoober Road. The J Lateral is part of a large lateral distribution system that originates from the East Highline Canal Reach 2, which was initially constructed ca. 1914. The lateral canal is an open, concrete- and dirt-lined, trapezoidal-shaped channel that has a top width of approximately eight to 10 feet, a bottom width of approximately two feet, and a depth of approximately four feet. Based on contractor's date stamp, it appears that portions of the J Lateral were lined with concrete in 1963. The lateral has numerous checks/drops, which consist of a single gate with one chute and cement walls that operate with a jack-type lifting mechanism resting on a wooden cross beam. The checks/drops have curved cement headwalls on their upstream side and straight cement headwalls on their downstream side.

For most of its length, the J Lateral is flanked by a dirt-lined drain that measures approximately eight feet in width at its top and up to four feet in width at its base with depths ranging from six to eight feet. The drainage system associated with the J Lateral post-dates the construction of the irrigation canal. Although the exact date of construction cannot be ascertained, it was likely constructed in the late 1920s or 1930s (Dowd, 1956).

<u>California Register of Historical Resources Evaluation</u>

The J Lateral is a part of the IID's East Highline Canal Reach 2 system, which was initially constructed ca. 1914. The construction and operation of the East Highline Canal and its associated laterals can be considered an important event in the early settlement of the Imperial Valley. The extensive canal systems that were built in the early twentieth century significantly increased the agricultural productivity of the area east of the Alamo River. Because the J Lateral can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. The J Lateral was funded and constructed by the IID and cannot be attributed to a specific individual. Because it cannot be associated with the lives of persons important in our past, it does not meet CRHR Criterion 2. The J Lateral and associated drain are simple in design and construction and utilitarian in nature, and their construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the J Lateral does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the J Lateral has not changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the J Lateral. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations including lining portions of the laterals with concrete and the replacement of gates and hardware. As a result of these alterations, J Lateral lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, J Lateral is recommended not eligible for inclusion in the CRHR.

K Lateral

The K Lateral is an approximately 6.1-mile-long irrigation canal and associated drain that runs in an east-west direction along either side of Sinclair Road. The K Lateral is part of a large lateral distribution system that originates from the East Highline Canal Reach 2, which was initially constructed ca. 1914. The lateral canal is an open, concrete- and dirt-lined, trapezoidal-shaped channel that has a top width of approximately eight to 10 feet, a bottom width of approximately two feet, and a depth of approximately four feet. The lateral has numerous checks/drops, which consist of a single gate with one chute and cement walls that operate with a jack-type lifting mechanism resting on a wooden cross beam. The checks/drops have curved cement headwalls on their upstream side and straight cement headwalls on their downstream side.

For approximately half of its length, the K Lateral is flanked by a dirt-lined drain that measures approximately eight feet in width at its top and up to four feet in width at its base with depths ranging from six to eight ft. The drainage system associated with the K Lateral post-dates the construction of the irrigation canal. Although the exact date of construction cannot be ascertained, it was likely constructed in the late 1920s or 1930s (Dowd, 1956).

California Register of Historical Resources Evaluation

The K Lateral is a part of the IID's East Highline Canal Reach 2 system, which was initially constructed ca. 1914. The construction and operation of the East Highline Canal and its associated laterals can be considered an important event in the early settlement of the Imperial Valley. The extensive canal systems that were built in the early twentieth century significantly increased the agricultural productivity of the area east of the Alamo River. Because the K Lateral can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. The K Lateral was funded and constructed by the IID and cannot be attributed to a specific individual. Because it cannot be associated with the lives of persons important in our past, it does not meet CRHR Criterion 2. The K Lateral and associated drain are simple in design and construction and utilitarian in nature, and their construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the K Lateral does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the K Lateral has not changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the K Lateral. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations including lining portions of the laterals with concrete and the replacement of gates and hardware. As a result of these alterations, K Lateral lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, K Lateral is recommended not eligible for inclusion in the CRHR.

L Lateral

The L Lateral is an approximately 9.2-mile-long irrigation canal and associated drain that runs in an east-west direction along either side of Merkley Road between Brandt Road and Ease Highline Canal Road. The L Lateral is part of a large lateral distribution system that originates from the East Highline Canal Reach 2, which was constructed ca. 1914. The lateral canal is an open, concrete- and dirt-lined, trapezoidal-shaped channel that has a top width of approximately eight to ten feet, a bottom width of approximately two feet, and a depth of approximately four feet. Based on contractor's date stamp, it appears that portions of the L Lateral were concrete lined in 1969. The lateral has numerous checks/drops, which consist of a single gate with one chute and cement walls that operate with a jack-type lifting mechanism resting on a wooden cross beam. The checks/drops have curved cement headwalls on their upstream side and straight cement headwalls on their downstream side.

For most of its length, the L Lateral is flanked on its northern side by a dirt-lined drain that measures approximately 8feet in width at its top and up to 4feet in width at its base with depths ranging from six to eight ft. The drainage system associated with the L Lateral post-dates the construction of the irrigation canal. Although the exact date of construction cannot be ascertained, it was likely constructed in the late 1920s or 1930s (Dowd, 1956).

<u>California Register of Historical Resources Evaluation</u>

The L Lateral is a part of the IID's East Highline Canal Reach 2 system, which was constructed ca. 1914. The construction and operation of the East Highline Canal and its associated laterals can be considered an important event in the early settlement of the Imperial Valley. The extensive canal systems that were built in the early twentieth century significantly increased the agricultural productivity of the area east of the Alamo River. Because the L Lateral can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. The L Lateral was funded and constructed by the IID and cannot be attributed to a specific individual. Because it cannot be associated with the lives of persons important in our past, it does not meet CRHR Criterion 2. The L Lateral and associated drain are simple in design and construction and utilitarian in nature, and their construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the L Lateral does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the L Lateral has not changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the L Lateral. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations including lining portions of the laterals with concrete and the replacement of gates and hardware. As a result of these alterations, L Lateral lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, L Lateral is recommended not eligible for inclusion in the CRHR.

M Lateral

The M Lateral is an approximately 8.8-mile-long irrigation canal and associated drain that runs in an east-west direction along either side of Simpson Road. The M Lateral is part of a large lateral distribution system that originates from the East Highline Canal, which was constructed ca. 1914. The lateral canal is an open, concrete- and dirt-lined, trapezoidal-shaped channel that has a top width of approximately eight to 10 feet, a bottom width of approximately two feet, and a depth of approximately four feet. Based on a contractor's date stamp, it appears that portions of the M Lateral were concrete lined in 1973. The lateral has numerous checks/drops, which consist of a single gate with one chute and cement walls that operate with a jack-type lifting mechanism resting on a wooden cross beam. The checks/drops have curved cement headwalls on their upstream side and straight cement headwalls on their downstream side.

For most of its length, the M Lateral is flanked by a dirt-lined drain that measures approximately eight feet in width at its top and up to four feet in width at its base with depths ranging from six to eight feet. The drainage system associated with the M Lateral post-dates the construction of the irrigation canal. Although the exact date of construction cannot be ascertained, it was likely constructed in the late 1920s or 1930s (Dowd, 1956).

<u>California Register of Historical Resources Evaluation</u>

The M Lateral is a part of the IID's East Highline Canal Reach 2 system, which was initially constructed ca. 1914. The construction and operation of the East Highline Canal and its associated laterals can be considered an important event in the early settlement of the Imperial Valley. The extensive canal systems that were built in the early twentieth century significantly increased the agricultural productivity of the area east of the Alamo River. Because the M Lateral can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. The M Lateral was funded and constructed by the IID and cannot be attributed to a specific individual. Because it cannot be associated with the lives of persons important in our past, it does not meet CRHR Criterion 2. The M Lateral and associated drain are simple in design and construction and utilitarian in nature, and their construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the M Lateral does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the M Lateral has not changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the M Lateral. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations including lining portions of the laterals with concrete and the replacement of gates and hardware. As a result of these alterations, M Lateral lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, M Lateral is recommended not eligible for inclusion in the CRHR.

P-13-014279 (N Lateral)

P-13-014279 was previously recorded as an approximately 1.0-mile-long segment of the N Drain that runs parallel to West Schrimpf Road (Schaefer et al., 2010). The N Drain is part of a large irrigation system that originates from the East Highline Canal, which was constructed ca. 1914. Recorders noted concrete outlets associated with the drain exhibited a 1980 contractor date stamp. The resource was previously evaluated and recommended not eligible for listing in the NRHP (Schaefer et al., 2010).

The previously recorded section of P-13-014279 during the architectural history survey was revisited and found it had not changed significantly since the previous documentation in 2010. However, the resource boundary was expanded to include the entire length of the drainage channel along with the associated irrigation lateral. Originating at the East Highline Canal, the N Lateral runs in an east-west direction along West Schrimpf Road for a distance of 8.9 miles to terminate at the Alamo River.

The lateral canal is an open, concrete- and dirt-lined, trapezoidal-shaped channel that has a top width of approximately eight to ten feet, a bottom width of approximately two feet, and a depth of approximately four feet. Based on the date stamp, it appears that portions of the N Lateral were concrete lined in 1974. The lateral has numerous checks/drops, which consist of a single gate with one chute and cement walls that operate with a jack-type lifting mechanism resting on a wooden cross beam. The checks/drops have curved cement headwalls on their upstream side and straight cement headwalls on their downstream side.

Along most of its length, the irrigation canal is flanked by the N Drain, a dirt-lined drain that measures approximately eight feet in width at its top and up to four feet in width at its base with depths ranging from six to eight feet. The drainage system associated with the N Lateral post-dates the construction of the irrigation canal. Although the exact date of construction cannot be ascertained, it was likely constructed in the late 1920s or 1930s (Dowd, 1956).

California Register of Historical Resources Evaluation

The previously recorded segment of the N Drain was recommended not eligible for listing in the NRHP. However, the resource was not evaluated for the CRHR. As part of the current cultural resources assessment, the entire N Lateral system was evaluated, including the associated N Drain, for listing as a historical resource on the CRHR.

The irrigation distribution system is a part of the IID's East Highline Canal Reach 2 system, which was initially constructed ca 1914. The construction and operation of the East Highline Canal and its associated laterals can be considered an important event in the early settlement of the Imperial Valley. The extensive canal systems that were built in the early twentieth century significantly increased the agricultural productivity of the area east of the Alamo River. Because the N Lateral can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. The N Lateral was funded and constructed by the IID and cannot be attributed to a specific individual. Because it cannot be associated with the lives of persons important in our past, it does not meet CRHR Criterion 2. The N Lateral and associated drain are simple in design and construction and utilitarian in nature, and their construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the N Lateral does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the N Lateral has not changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the N Lateral. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations including lining portions of the laterals and drain outlets with concrete and the replacement of gates and hardware. As a result of these alterations, N Lateral lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, N Lateral is recommended not eligible for inclusion in the CRHR.

P-13-014278 (O Lateral)

P-13-014278 was previously recorded as an approximately 1.0-mi-long segment of the O Lateral that runs parallel to McDonald Road (Schaefer et al., 2010). The O Lateral is part of a large irrigation distribution system that originates from the East Highline Canal Reach 2, which was constructed ca. 1914. A concrete date stamp of "Ryerson 1981" was found suggesting that the concrete lining of the canal, along with drops, checks, and turnouts, was constructed in the early 1980s. The resource was previously evaluated and recommended not eligible for listing in the NRHP (Schaefer et al., 2010).

The previously recorded section of P-13-014278 was revisited during the architectural history survey and found to have not changed significantly since the previous documentation in 2010. However, the resource boundary was expanded to include the entire length of the irrigation lateral along with the associated drainage channel. Originating at the East Highline Canal Reach 2, the O Lateral runs in an east-west direction along McDonald Road for a distance of 7.3 miles to terminate at the Alamo River.

The lateral canal is an open, concrete- and dirt-lined, trapezoidal-shaped channel that has a top width of approximately eight to ten feet, a bottom width of approximately two feet, and a depth of approximately four feet. Based on concrete date stamp, it appears that portions of the N Lateral were concrete lined in 1981 and 2011. The lateral has numerous checks/drops, which consist of a single gate with one chute and cement walls that operate with a jack-type lifting mechanism resting on a wooden cross beam. The checks/drops have curved cement headwalls on their upstream side and straight cement headwalls on their downstream side.

For most of its length, the O Lateral is flanked on its northern side by a dirt-lined drain that measures approximately eight feet in width at its top and up to four feet in width at its base with depths ranging from six to eight ft. The drainage system associated with the O Lateral post-dates the construction of the irrigation canal. Although the exact date of construction cannot be ascertained, it was likely constructed in the late 1920s or 1930s (Dowd, 1956).

California Register of Historical Resources Evaluation

The previously recorded segment of the O Lateral was recommended not eligible for listing in the NRHP. However, the resource was not evaluated for the CRHR. As part of the current cultural resources assessment, the entire O Lateral system, including the associated drainage, was evaluated for listing as a historical resource on the CRHR.

The irrigation distribution system is a part of the IID's East Highline Canal Reach 2 system, which was constructed ca. 1914. The construction and operation of the East Highline Canal and its associated laterals can be considered an important event in the early settlement of the Imperial Valley. The extensive canal systems that were built in the early twentieth century significantly increased the agricultural productivity of the area east of the Alamo River. Because the O Lateral can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. The O Lateral was funded and constructed by the IID and cannot be attributed to a specific individual. Because it cannot be associated with the lives of persons important in our past, it does not meet CRHR Criterion 2. The O Lateral and associated drain are simple in design and construction and utilitarian in nature, and their construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the O Lateral does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the O Lateral has not changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the O Lateral. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations in the 1980s including the concrete lining of the canal, along with drops, checks, and turnouts. As a result of these alterations, O Lateral lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, O Lateral is recommended not eligible for inclusion in the CRHR.

P Lateral

The P Lateral is an approximately 7.8-mile-long irrigation canal and associated drain that runs in an east-west direction along either side of Hazard Road between Davis Road and Wiest Road. The P Lateral is part of a large lateral distribution system that originates from the East Highline Canal Reach 2, which was initially constructed ca. 1914. The lateral canal is an open, concrete- and dirt-lined, trapezoidal-shaped channel that has a top width of approximately eight to ten feet, a bottom width of approximately two feet, and a depth of approximately four feet. The lateral has numerous checks/drops, which consist of a single gate with one chute and cement walls that operate with a jack-type lifting mechanism resting on a wooden cross beam. The checks/drops have curved cement headwalls on their upstream side and straight cement headwalls on their downstream side.

For most of its length, the P Lateral is flanked by a dirt-lined drain that measures approximately eight feet in width at its top and up to four feet in width at its base with depths ranging from six to eight ft. The drainage system associated with the P Lateral post-dates the construction of the irrigation canal. Although the exact date of construction cannot be ascertained, it was likely constructed in the late 1920s or 1930s (Dowd, 1956).

California Register of Historical Resources Evaluation

The P Lateral is a part of the IID's East Highline Canal Reach 2 system, which was initially constructed ca. 1914. The construction and operation of the East Highline Canal and its associated laterals can be considered an important event in the early settlement of the Imperial Valley. The extensive canal systems that were built in the early twentieth century significantly increased the agricultural productivity of the area east of the Alamo River. Because the P Lateral can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. The P Lateral was funded and constructed by the IID and cannot be attributed to a specific individual. Because it cannot be associated with the lives of persons important in our past, it does not meet CRHR Criterion 2. The P Lateral and associated drain are simple in design and construction and utilitarian in nature, and their construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the P Lateral does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the P Lateral has not changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the P Lateral. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations including lining portions of the laterals with concrete and the replacement of gates and hardware. As a result of these alterations, P Lateral lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, P Lateral is recommended not eligible for inclusion in the CRHR.

Q Lateral

The Q Lateral is an approximately 6.8-mile-long irrigation canal and associated drain that runs in an east-west direction along either side of Pound Road between Hazzard Road and Alcott Road. The Q Lateral is part of a large lateral distribution system that originates from the East Highline Canal Reach 2, which was initially constructed ca. 1914. The lateral canal is an open, concrete- and dirt-lined, trapezoidal-shaped channel that has a top width of approximately eight to 10 feet, a bottom width of approximately two feet, and a depth of approximately four feet. The lateral has numerous checks/drops, which consist of a single gate with one chute and cement walls that operate with a jack-type lifting mechanism resting on a wooden cross beam. The checks/drops have curved cement headwalls on their upstream side and straight cement headwalls on their downstream side.

For most of its length, the Q Lateral is flanked by a dirt-lined drain that measures approximately eight feet in width at its top and up to four feet in width at its base with depths ranging from six to eight feet. The drainage system associated with the Q Lateral post-dates the construction of the irrigation canal. Although the exact date of construction cannot be ascertained, it was likely constructed in the late 1920s or 1930s (Dowd 1956).

California Register of Historical Resources Evaluation

The Q Lateral is a part of the IID's East Highline Canal Reach 2 system, which was initially constructed ca. 1914. The construction and operation of the East Highline Canal and its associated laterals can be considered an important event in the early settlement of the Imperial Valley. The extensive canal systems that were built in the early twentieth century significantly increased the agricultural productivity of the area east of the Alamo River. Because the Q Lateral can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. The Q Lateral was funded and constructed by the IID and cannot be attributed to a specific individual. Because it cannot be associated with the lives of persons important in our past, it does not meet CRHR Criterion 2. The Q Lateral and associated drain are simple in design and construction and utilitarian in nature, and their construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the Q Lateral does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the Q Lateral has not changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the Q Lateral. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations including lining portions of the laterals with concrete and the replacement of gates and hardware. As a result of these alterations, Q Lateral lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, Q Lateral is recommended not eligible for inclusion in the CRHR.

Vail Canal System

The Vail Canal System consists of a supply canal and network of laterals and drains that provide irrigation water from the East Highline Canal Reach 2 to the area southeast of the Salton Sea. The system irrigates more than 25,000 acres of land west of the Alamo River and north of the New River (IID, 1949). The water in this canal system originates from the Kakoo Singh Reservoir, which is located immediately west of the East Highline Canal and south of East Albright Road (IID, 2000). Water diverted from the reservoir travels in a westward direction within the Vail Supply Canal paralleling East Albright Road for a distance of 10.5 miles. The supply canal then crosses Alamo River at the North End Dam and continues westward for another 7.0 miles to terminate at New River. The portion of the supply canal west of the Alamo River runs along Vail Road.

The Vail Supply Canal exhibits an open, concrete-lined, trapezoidal shape that is approximately 20 feet in width with an unknown depth. A series of concrete-reinforced siphons, drop structures, canal checks, and other miscellaneous structures lies along its course. Ten laterals (Vail Laterals 1, 2, 2-A, 3, 3-A, 4, 4-A, 5, 6, and 7) divert water off the supply canal west of the Alamo River. The laterals extend north from the supply canal at 0.5-mile intervals and range in length from 2.4 to 5.5 miles. Although originally constructed of dirt, Vail Laterals 1-5 and 7 were modified sometime in the latter half of the twentieth century and now are lined with concrete. Lateral 6 appears to be one of the few canals in the system to retain its original dirt-lined construction. The trapezoidal-shaped laterals have top widths ranging from approximately eight to 10 feet, a bottom width of approximately two feet, and a depth of approximately four feet. The laterals have checks/drops, which consist of a single gate that operates with a jack-type lifting mechanism resting on a wooden cross beam.

Most of the laterals have associated dirt-lined drains that serve to transport wastewater from irrigated fields. The drains measure approximately eight feet in width at its top and up to four feet in width at its base with depths ranging from six to eight feet. These lateral drains empty into several larger drainages, including the Vail Cut Off Drain and Pumice Drain, which flow into the Salton Sea. A smaller number of lateral drains empty directly into the Salton Sea or Alamo River.

Although the construction date for the Vail Canal System is not known, it was likely built soon after the completion of the East Highline Canal Reach 2 in the early decades of the twentieth century. Some researchers attribute the construction of the canal system to the Vail family, which owned a ranch in the area (Tennyson and Apple, 2009). However, it is not clear if the canal was built by the Vail family or if it was named the Vail Canal System because its vicinity to the family's ranch. IDD annual reports dating to the late 1940s indicate that by that time, the Vail Canal System is under the jurisdiction of the IID (1946).

The Vail Canal System has experienced several modifications over the years. The drainage system that is associated with the canal system was constructed in the late 1920s or 1930s (Dowd, 1956). Additionally, as part of the North End Improvement Plan, a number of the water facilities in the canal system were revamped in the late 1940s and early 1950s (IID, 1949). These improvements included the construction of several siphons, drop structures, canal checks, and other miscellaneous structures to improve the capacity of the canal distribution system. Finally, various concrete structures have been documented along the laterals that exhibit contractor's stamps dating to the 1990s and 2000s suggesting more recent upgrades to the canal system.

California Register of Historical Resources Evaluation

The Vail Canal System is a part of the IID's East Highline Canal Reach 2 operating system. Although the exact date of construction of the Vail Canal System is not known, it was likely built ca. 1914, soon after the completion of the East Highline Canal Reach 2. The construction and operation of the East Highline Canal and the Vail Canal System can be considered an important event in the early settlement of the Imperial Valley. Water transported through the Vail Canal System irrigated 25,000 acres of land and as such, it significantly increased the agricultural productivity of the area west of the Alamo River and north of New Reiver. Because the Vail Canal System can be directly associated with historical events that have made a significant contribution to the broad patterns of our history, it is recommended eligible under Criterion 1. It is not known if the Vail family or the IID was responsible for planning and constructing of the Vail Supply Canal and laterals. Because the construction of the Vail Canal System cannot be associated with a specific person who was important in our past, it does not meet CRHR Criterion 2. The Vail Canal System is simple in design and construction and utilitarian in nature, and its construction does not represent any innovative design or building technique. Therefore, the resource does not exhibit any distinctive characteristics or engineering merits that would suggest it is significant under Criterion 3. Finally, the Vail Canal System does not have the potential to yield any information important to the study of twentieth century channel construction and is therefore not eligible under Criterion 4.

The alignment of the Vail Canal System does not appear to have changed since its construction in the early part of the twentieth century and as such, the resource retains integrity of location. Furthermore, although the area has experienced some development over the years, agricultural fields are still prevalent within the immediate vicinity of the canal system. Therefore, the resource also retains integrity of setting and feeling. However, the resource has experienced extensive alterations including lining portions of the laterals with concrete and the replacement of gates and hardware. As a result of these alterations, the Vail Canal System lacks integrity of design, workmanship, and materials and has lost its ability to convey its significance under Criterion 1 as an irrigation system.

Based on these findings, Vail Canal System is recommended not eligible for inclusion in the CRHR.

5.3.2.3.4 Native American Coordination

A Sacred Lands File (SLF) search request was sent to the Native American Heritage Commission (NAHC) on August 8, 2022, for the Project site (CRTR-Appendix C). The objective of the SLF search was to determine if the NAHC had any knowledge of Native American cultural resources (e.g., traditional use or gathering area and place of religious or sacred activity) within the immediate vicinity of the Project area. Due to a processing delay at the NAHC, initial outreach letters based on SLF results from a nearby project were sent out on August 9, 2022. The NAHC responded on October 13, 2022, with a positive result. In addition, they recommended 27 individuals representing 17 local tribal groups be contacted to request information on sensitive Native American cultural resources in the vicinity of the Project area.

Information request letters to these individuals were sent on August 9, 2022, and December 7, 2022, via the U.S. Postal Service and email. The letter requested information on cultural resources within the Black Rock Geothermal Project site. A round of follow up calls and emails were subsequently conducted on August 25, 2022, December 7, 2022, and December 21, 2022, to those Tribes and Tribal contacts who had yet to respond to the letter request.

To date, the following responses have been received:

Ray Teran of the Viejas Band of Kumeyaay Indians responded via email on August 10, 2022, and stated that the Project has cultural significance that is tied to the Tribe, and that cultural resources have been located within or adjacent to the Project area. The Tribe requests that a Kumeyaay Cultural Monitor be on site for ground disturbing activities and to be informed of any new discoveries such as inadvertent discovery of cultural artifacts, cremation sites, or human remains. Lastly, Mr. Teran stated that if another Tribe closer to the Project area requests to perform cultural monitoring, then the Viejas would defer to them.

Ms. Lisa Cumper, the Tribal Historic Preservation Officer for the Jamul Indian Village, responded via email on August 23, 2022, stating that the Project materials had been received and that she would respond with her comments at a later time. Ms. Cumper responded again on November 16, 2022, stating that portions of the Project within Obsidian Butte are positive for cultural sensitivity.

Ms. Courtney Coyle, attorney for Ms. Carmen Lucas (Kwaaymii Laguna Band of Mission Indians) responded via email on August 25, 2022, requesting additional information regarding the Project location and the scope of work to be conducted. Ms. Coyle's request was forwarded to the CEC on August 29, 2022. On September 8, 2022, Ms. Coyle was informed her email had been forwarded to the CEC.

Ms. Carmen Lucas (Kwaaymii Laguna Band of Mission Indians) responded via telephone on August 29, 2022 and stated that she has serious concerns with the Project. She noted that the entire Project area is considered sacred with many cultural resources present in the vicinity. Resources and cultural landscapes in the area include Obsidian Butte, multiple mudholes, and the Ancient Lake Cahuilla cultural landscape. Ms. Lucas explained that obsidian from Obsidian Butte is found across southern California, including as far west as La Jolla, and that mudholes represent the heartbeat of mother earth. Ms. Lucas expects adverse impacts would occur to Obsidian Butte, the mudholes in the area, and the Ancient Lake Cahuilla cultural landscape. She expressed opposition to all three projects.

Ms. Lacy Padilla, Operations Manager for the Agua Caliente Band of Cahuilla Indians, responded via email on January 9, 2022, stating that the project lies within the Tribe's Traditional Use Area. Ms. Padilla requested a copy of the cultural resources report and associated documentation, and the presence of an approved cultural resources monitor during ground disturbing activities. Ms. Padilla was contacted and informed the documentation requested would be provided when available.

Mr. Joseph Ontiveros, Cultural Resources Director for the Soboba Band of Luiseño Indians, responded via telephone on December 12, 2022, and stated that the Tribe defers to more local Tribes, including Torres-Martinez Desert Cahuilla Indians and Quechan Tribe of the Fort Yuma Reservation.

The results of the NAHC SLF search, the list of contacts, a sample outreach letter, a contact/response matrix, and copies of correspondence are included in CRTR Appendix C.

5.3.3 Environmental Analysis

This section describes the environmental impacts of Project construction and operation.

5.3.3.1 Summary of Results

The cultural resources assessment included background and archival research, development of a historic context and research design, an intensive pedestrian survey of the archaeological study area and a reconnaissance survey of the architectural history study area, and resources documentation and evaluation. As a result of these efforts, 11 historic period cultural resources were identified in the study area, all of which are built-environment resources (Table 5.3-4). Five of these resources (K Lateral, L Lateral, P-13-014279 [N Lateral], P Lateral, and Vail Canal System) intersect the Project area. None of the identified resources are recommended eligible for listing on the CRHR.

Table 5.3-4. Summary of Cultural Resources in Project Study Area

Name	Resource Type	Description	CRHR Recommendation
P-13-018312 (West Sinclair Road)	Building	NWR Administrative building (Quarters 7)	Not eligible
River Alamo and Ponds	Structure	Channelized portion of river with four associated ponds	Not eligible
J Lateral	Structure	East-west running irrigation channel and drainage	Not eligible
K Lateral	Structure	East-west running irrigation channel and drainage	Not eligible
L Lateral	Structure	East-west running irrigation channel and drainage	Not eligible
M Lateral	Structure	East-west running irrigation channel and drainage	Not eligible
P-13-014279 (N Lateral)	Structure	East-west running irrigation channel and drainage	Not eligible
P-13-014278 (O Lateral)	Structure	East-west running irrigation channel and drainage	Not eligible
P Lateral	Structure	East-west running irrigation channel and drainage	Not eligible
Q Lateral	Structure	East-west running irrigation channel and drainage	Not eligible
Vail Canal System	Structure	Canal system consisting of a supply channel, laterals, and associated drains	Not eligible

Note:

Bold indicates historic built-environment resources that intersect the Project area.

No prehistoric cultural resources were identified within the Project study area. Due to the paucity of available freshwater sources in the vicinity, the low density of known prehistoric archaeological sites in the immediate area, and the presence of extensive farmlands, the sensitivity of the Project area for containing intact buried prehistoric archaeological resources is considered moderate. Furthermore, the lack of intensive development of the Project area during the historic period suggests the potential to encounter buried historic archaeological resources during Project construction is relatively low. Therefore, potential impacts from construction and operation are expected to be less than significant.

5.3.3.2 Significance Criteria

Appendix G, Environmental Checklist Form of the CEQA guidelines, addresses significance criteria with respect to cultural resources (PRC Sections 21000 et seq.). Appendix G (V) (a, b, d) indicates that an impact may be significant if the project will have the following effects:

- Cause a substantial adverse change in the significance of a historical resource
- Cause a substantial adverse change in the significance of an archaeological resource
- Disturb any human remains, including those interred outside formal cemeteries

None of the historical period architectural resources identified in the field surveys were recommended eligible for the CRHR. As such, the Project will not result in a substantial adverse change in the significance of a historical resource. No archaeological sites or human remains were documented in the Project area.

Therefore, the Project will not result in a substantial adverse change in the significance of known archaeological resources or human remains. Impacts to previously unidentified cultural resources or human remains are possible during construction and/or operation. With the incorporation of mitigation measures described in Section 5.3.4, construction impacts to archaeological resources and human remains are expected to be less than significant.

5.3.4 Mitigation Measures

No archaeological sites were found during the survey of the Project area. However, nine previously recorded archaeological sites were identified in the records search (three prehistoric archaeological sites and six historic archaeological sites). Thus, it appears that the Project area has a low to moderate sensitivity for containing buried archaeological remains.

As a result, the following measures are recommended, based on state and agency regulations and guidelines, to mitigate any potential adverse impacts that could occur if there were an inadvertent discovery of buried cultural resources. These measures include the following:

- Designation of a Cultural Resources Specialist (CRS) to investigate any cultural resource finds made during construction
- Implementation of a construction worker training program to ensure implementation of procedures to be followed if cultural resources are discovered during construction, including steps to be taken for unanticipated discovery of cultural materials.
- Procedures for halting construction in the event of an inadvertent discovery of archaeological deposits or human remains
- Procedures for evaluating an inadvertent archaeological discovery
- Procedures to mitigate adverse impacts on any inadvertent archaeological discovery determined significant

5.3.5 Laws, Ordinances, Regulations, and Standards

The LORS discussed in this section pertain to ordinances, plans, and policies of federal, state, and local governments. Table 5.3-5 presents a summary of the applicable LORS.

Table 5.3-5. Summary of Laws, Ordinances, Regulations, and Standards for Cultural Resources

LORS	Requirements Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
Section 106, NHPA	Applies if the project would require a federal permit (such as a PSD permit). The lead federal agency must take into account the effect of issuing the permit on significant cultural resources.	California Office of Historic Preservation	N/A
State			
Warren-Alquist Act	Requires cultural resources be considered in consideration of an AFC.	CEC	Section 5.3.5.6
CEQA Guidelines	Project construction may encounter archaeological and/or historical resources.	CEC	Section 5.3.2.1
Health and Safety Code Section 7050.5	Construction may encounter Native American graves; coroner calls the NAHC.	State of California	Section 5.3.5

LORS	Requirements Applicability	Administering Agency	Application for Certification Section Explaining Conformance
PRC Section 5097.98	Construction may encounter Native American graves; NAHC assigns Most Likely Descendant.	State of California	Section 5.3.5
PRC Section 5097.5/5097.9	Would apply only if some project land were acquired by the state (currently no state land).	State of California	N/A
Local			
Imperial County General Plan	Does not set requirements for cultural resources.	County of Imperial	N/A

5.3.5.1 California Environmental Quality Act

The proposed Project is subject to compliance with CEQA, as amended. Compliance with CEQA statutes and guidelines requires both public and private projects with financing or approval from a public agency to assess the Project's impact on cultural resources (Public Resources Code [PRC] Sections 21082, 21083.2 and 21084 and California Code of Regulations [CCR] 10564.5). The first step in the process is to identify cultural resources that may be impacted by the Project and then determine whether the resources are "historically significant" resources.

CEQA defines historically significant resources as "resources listed or eligible for listing in the California Register of Historical Resources (CRHR)" (PRC Section 5024.1). A cultural resource may be considered historically significant if the resource is 45 years old or older, possesses integrity of location, design, setting, materials, workmanship, feeling, and association.[2] In addition, it must meet at least one of the following criteria for listing in the CRHR:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,
4. Has yielded, or may be likely to yield, information important in prehistory or history (PRC Section 5024.1).

Cultural resources are buildings, sites, humanly modified landscapes, traditional cultural properties, structures, or objects that may have historical, architectural, cultural, or scientific importance. CEQA states that if a project will have a significant impact on important cultural resources, deemed "historically significant," then project alternatives and mitigation measures must be considered.

Historical resources eligible for listing in the CRHR must also retain enough of their historic character or appearance (integrity) to be recognizable as historical resources and to convey the reasons for their significance. For the purposes of eligibility for the CRHR, integrity is defined as "the authenticity of a historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance" (Office of Historic Preservation [OHP], 2001). The evaluation of integrity must be grounded in an understanding of a resource's physical features and how they relate to the concept of integrity. Determining which of these aspects are most important to a resource requires

[2] The Office of Historic Preservation (OHP) guidelines recognize a 45-year-old criteria threshold for documenting and evaluating cultural resources (assumes a 5-year lag between resource identification and the date that planning decisions are made) (OHP 1995:2). The age threshold is an operational guideline and not specific to CEQA statutory or regulatory codes.

knowing why, where, and when a resource is significant. To retain historic integrity, a resource must possess several, and usually most, aspects of integrity:

1. **Location** is the place where the historical resource was constructed or the place where the historic event occurred.
2. **Design** is the combination of elements that create the form, plan, space, structure, and style of a resource.
3. **Setting** is the physical environment of a historical resource and refers to the character of the site and the relationship to surrounding features and open space. Setting often refers to the basic physical conditions under which a resource was built and the functions it was intended to serve. These features can be either natural or manmade, including vegetation, paths, fences, and relationships between other features or open space.
4. **Materials** are the physical elements that were combined or deposited during a particular period or time, and in a particular pattern or configuration to form a historical resource.
5. **Workmanship** is the physical evidence of crafts of a particular culture or people during any given period of history or prehistory and can be applied to the resource, or to individual components.
6. **Feeling** is a resource's expression of the aesthetic or historic sense of a particular period. It results from the presence of physical features that, when taken together, convey the resource's historic character.
7. **Association** is the direct link between the important historic event or person and a historical resource.

5.3.5.2 Impacts Assessment Criteria

PRC Section 21084.1 states that significant impacts may occur if "a project may cause a substantial adverse change in the significance of an historical resource." CEQA Guidelines use the terms effects and impacts interchangeably. Section 15064.5(b)(1) provides that a substantial adverse change to a historic resource occurs if there is "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired." As outlined in 14 CCR Section 15064.5(b)(2), the significance of a historical resource is materially impaired when a project:

A. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR; or

B. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to Section 5020.1(k) of the PRC or its identification in a historical resources survey meeting the requirements of Section 5024.1(g) of the PRC, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or

C. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the CRHR as determined by a lead agency for purposes of CEQA.

CEQA defines three types of effects:

1. **Direct** or primary effects that are caused by a project and occur at the same time and place.
2. **Indirect** or secondary effects that are reasonably foreseeable and caused by a project but occur at a different time or place.

3. **Cumulative** impacts that are two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.

5.3.5.3 Assessing Visual Impacts

The process to determine significant impacts includes not only direct impacts, but potential indirect visual impacts. The CEQA definition of a substantial adverse change includes "alteration such that the significance of an historical resource or its immediate surroundings would be materially impaired." Although demolition and destruction are obvious significant impacts, it is more difficult to assess when change, alteration, or relocation crosses the threshold of substantial adverse change. Therefore, for an alteration to be considered a substantial adverse change, it must be shown that the integrity and/or significance of the historical resource would be materially impaired by the change in views towards or from a historic resource.

Adverse visual impacts may be created when an undertaking is visible within the viewshed of the historical resource, when it blocks a view toward the historical resource, or when it introduces an element that is incompatible with the criteria under which the resource is eligible. Simply because a project will be visible from a historical resource does not mean it automatically will create a significant impact. Thus, it is necessary to evaluate the visual changes and alterations a proposed project may introduce to the resource.

An adverse impact may be obstructive, which is to say it may block the view to or from a historical resource; it may also not be obstructive and still create an adverse impact in that it introduces elements so incompatible with the criterion or criteria under which a historical resource is eligible for listing that it diminishes the resource's significance to a substantial degree.

5.3.5.4 Mitigation of Adverse Impacts

Mitigation of adverse impacts is required if a proposed project will cause substantial adverse change to a historical resource (14 CCR Section 15064.5[b]). Mitigation measures must be enforceable through permit conditions, agreements, or other legal means and are proportional to the expected impacts. The measures seek to reduce impacts entirely or to a level considered not significant (14 CCR Section 15126.4). Mitigation measures for historical resources may include but are not limited to:

1. Altering a proposed project to avoid damaging effects on any historical resource in a significant manner, such as by not taking a certain action or parts of an action.
2. Rectifying impacts through maintenance, repair, stabilization, rehabilitation, restoration, preservation, conservation, or reconstruction of the historical resource in a manner consistent with the SOI Standards for the Treatment of Historic Properties.
3. Documentation of the historical resource, by way of historic narrative and photographs or architectural drawings meeting California OHP recommendations prior to demolition.
4. Deeding the site into a permanent conservation easement.
5. Abandonment of the proposed project.

CEQA Section 15064.5(b)(3) states that a project that follows the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (SOI Standards) shall be considered as mitigated to a level of less than a significant impact on the historical resource.

5.3.5.5 Assembly Bill 52

Signed into law in September 2014, California Assembly Bill 52 (AB 52) created a new class of resources – tribal cultural resources – for consideration under CEQA. Tribal cultural resources may include sites, features, places, cultural landscapes, sacred places, or objects with cultural value to a California Native

American tribe that are listed or determined to be eligible for listing on the CRHR, included in a local register of historical resources, or a resource determined by the lead CEQA agency, in its discretion and supported by substantial evidence, to be significant and eligible for listing on the CRHR. AB 52 requires that the lead CEQA agency consult with California Native American tribes that have requested consultation for projects that may affect Tribal cultural resources. The lead CEQA agency shall begin consultation with participating Native American Tribes prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report. Under AB 52, a project that has potential to cause a substantial adverse change to a Tribal cultural resource constitutes a significant effect on the environment unless mitigation reduces such effects to a less than significant level.

5.3.5.6 Warren-Alquist Act

The 1975 Warren-Alquist Act (PRC Section 25000 et seq.) established the California Energy Resources Conservation and Development Commission, now known as the CEC. The CEC is the primary energy policy and planning agency in California. The agency is responsible for permitting and licensing geothermal power plants 50 megawatts or larger. The CEC has developed guidelines that outline the environmental information that is required to be submitted for applications of certification for geothermal power plants.

5.3.6 Agencies and Agency Contacts

Table 5.3-6 lists the state agencies involved in cultural resources management for the Project and a contact person at each agency.

Table 5.3-6. Agency Contacts for Cultural Resources

Issue	Agency	Contact
Native American traditional cultural properties	Native American Heritage Commission	Cynthia Gomez, Executive Secretary Native American Heritage Commission 1550 Harbor Boulevard, Suite 100 West Sacramento, CA 95691 (916) 373-3710
Inadvertent Discovery of Human Remains	Imperial County Coroner	328 Applestill Road El Centro, CA 92243 (442) 265-2105
Inadvertent Discovery of Cultural Resources	CEC	Compliance Project Manager
Federal agency NHPA Section 106 compliance	California Office of Historic Preservation	Julian Polanco State Historic Preservation Officer 1423 23rd Street, Suite 100 Sacramento, CA 95816 (916) 445-7000

NHPA = National Historic Preservation Act

5.3.7 Permits and Permit Schedule

Other than certification by the CEC, no state, federal, or local permits are required by the Project for the management of cultural resources. Consultation with the State Historic Preservation Officer will not be required under Section 106 of the NHPA because the Project will not require a Prevention of Significant Determination or a federal permit.

5.3.8 References

Almstedt, Ruth. 1974. *Bibliography of the Diegueño Indians*. Ballena Press, Ramona. Referenced in Carrico, Richard L. 1998. "Ethnohistoric Period." In *Prehistoric and Historic Archaeology of Metropolitan San Diego:*

A Historic Properties Background Study. Draft document prepared by ASM Affiliates, Inc. for Metropolitan Wastewater Public Works, San Diego, California.

Anderholt, Joseph J. 1989. *Desert Dairies: Catalyst for the Development of Imperial Valley*. Imperial County Historical Society.

Apple, Rebecca, Andrew York, James H. Cleland, and Stephen Van Wormer. 1997. *Archaeological Survey and Evaluation Program for the Salton Sea Test Base, Imperial County, California.* Report prepared for the Department of the Navy SOUTHWESTDIV, Naval Facilities Engineering Command, San Diego, California. Prepared by KEA Environmental, Inc., San Diego, California.

Bean, Lowell J. 1972. *Mukat's People: The Cahuilla Indians of Southern California*. University of California Press, Berkeley.

Bean, Lowell John, and William Marvin Mason. 1962. *Diaries and Accounts of the Romero Expeditions in Arizona and California, 1823-1826*. Desert Museum, Palm Springs, California.

Bean, Lowell John, Jerry Schaefer, and Sylvia Brakke Vane. 1995. *Archaeological, Ethnographic, and Ethnohistoric Investigations at Tahquitz Canyon, Palm Springs, California.* Prepared by Cultural Systems Research, Inc., Menlo Park, California, for Riverside County Flood Control and Water Conservation District.

Bee, Robert L. 1983. The Quechan. In Southwest, edited by Alfonso Ortiz, pp. 86–98. *Handbook of North American Indians*, Vol. 10, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Bright, William. 1998. *1500 California Place Names: Their Origin and Meaning*. University of California Press, Berkeley.

Bureau of Reclamation. n.d. Boulder Canyon Project - All-American Canal System. Webpage accessed September 9, 2022. Online at:.

California Energy Commission (CEC). 2003. Final Staff Assessment on Salton Sea Unit 6 Project Application for Certification (02-AFC-2) Imperial County.

California Energy Commission (CEC).2023. *Rules of Practice and Procedure and Power Plant Site Certification Regulations*. California Energy Commission, Sacramento, California. Accessed September 30, 2022 at https://govt.westlaw.com/calregs/Document/IDB161A835CCE11EC9220000D3A7C4BC3?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)#co_anchor_ID944EAE06BF711ED82AE8E3988EB6418

Carrico, Richard L. 1998. Ethnohistoric Period. In *Prehistoric and Historic Archaeology of Metropolitan San Diego: A Historic Properties Background Study.* Draft document prepared by ASM Affiliates, Inc. for Metropolitan Wastewater Public Works, San Diego, California.

Carrico, Richard L. 2008. *Strangers in a Stolen Land: Indians of San Diego County from Prehistory to the New Deal.* Sunbelt Publications, San Diego.

Carrico, Richard L., and Theodore G. Cooley. 2005. *Cultural Resources Report of the Survey and Testing Programs for the Oak Country Estates Development in Ramona, San Diego County, California*. Report prepared by, and on file at, ICF Jones & Stokes, San Diego.

Carrico, Richard L., Theodore G. Cooley, and Joyce M. Clevenger. 1993. *Archaeological Excavation at the Harris Site Complex, San Diego County, California*. Report prepared by ERC Environmental and Energy Services, San Diego. On file at the South Coastal Information Center, San Diego State University.

Castetter, Edward F., and Willis H. Bell. 1951. *Yuman Indian Agriculture: Primitive Subsistence on the Lowe Colorado and Gila Rivers*. University of New Mexico Press, Albuquerque.

CH2M Hill. 2001. Habitat Conservation Plan IID Water Conservation and Transfer Project. Chapter 2. Electronic document accessed September 9, 2022. Online at: https://www.iid.com/home/showpublisheddocument/1492/635648001335730000

Chace, Paul G., and Janet Hightower. *1979. The Archaeology of the Nelson Site SDI-5680 near Poway and a Test Assessment Program of the Cultural Remains of the C.B.N. Corporation Property (E.A.D. Log #78-14-19)*. Report on file at the South Coastal Information Center (SCIC), San Diego State University.

Cleland, James H. 1999. From Paleo-Indian to Protohistoric: The Chronology of Human Occupation of the Salton Sea Test Base. KEA Environmental, Inc. Proceedings of the Society for California Archaeology 12:10-14. Fresno, California.

Cleland, James H., and Rebecca M. Apple (eds). 2003. *A View Across the Cultural Landscape of the Lower Colorado Desert: Cultural Resource Investigations for the North Baja Pipeline Projec*t, Prepared by EDAW for Tetra Tech FW and North Baja Pipeline LLC.

Cook, John R., Michael Baksh, and Stephen R. Van Wormer. 1997. *Jacumba Valley Ranch Cultural Resources Inventory and Evaluation (Appendix F Cultural Resources Draft Environmental Impact Report for Jacumba Valley Ranch Specific Plan [SP91-003, P91-012, Log #89-22-3]).* Report prepared by Mooney & Associates for Jacumba Valley Ranch, San Diego, California.

Cooley, Theodore G. 2013. *Investigations at Archaeological Site CA-SDI-316 relating to the San Dieguito and other Cultural Patterns at the C. W. Harris Site (CA-SDI-149)*. Paper presented at the Annual Meeting of the Society for California Archaeology, Berkeley.

Cooley, Theodore G., and Laura J. Barrie. 2004. Archaeological Excavation at the Village of *Pa'Mu*, Ramona Valley, California. *Proceedings of the Society for California Archaeology* 17:43–56.

Cory, Harry Thomas, and William Phipps Blake. 1915. *The Imperial Valley & the Salton Sink.* John J. Newbegin, San Francisco.

Crawford, Richard. 2010. The San Diego Aqueduct. San Diego Union-Tribune, August 7. Accessed on September 22, 2022 at http://www.sandiegoyesterday.com/wp-content/uploads/2010/08/San-Diego-Aqueduct.pdf.

Crosswhite, Frank S., and Carol D. Crosswhite. 1982. The Sonora Desert. In *Reference Handbook on the Deserts of North America,* edited by Gordon L. Bender, pp. 117–163. Greenwood Press, Westport, Connecticut.

CSRI (Cultural Systems Research, Inc.). 1983. *Paniktum Hemki: A Study of Cahuilla Cultural Resources in Andreas and Murray Canyons.* Cultural Systems Research, Inc., Menlo Park, California.

Davis, Emma Lou, Kathryn R. Brown, and Jacqueline Nichols. 1980. *Evaluation of Early Human Activity and Remains in the California Desert*. Great Basin Foundation, Cultural Resources Publication Anthropology–History, U.S. Bureau of Land Management, California Desert District.

Des Lauriers, Matthew R. 2008. A Paleoindian Fluted Point from Isla Cedros, Baja, California. *Journal of Island & Coastal Archaeology* 3:271–276.

Dillon, Brian D. 2002. California Paleo-Indians: Lack of Evidence, or Evidence of a Lack? In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, edited by William J. Wallace and Francis A. Riddell. Contributions of the University of California Archaeological Research Facility, No. 60. Berkeley, California.

Dowd, M.J. 1956. *IID – The First 40 Years*. Imperial Irrigation District, El Centro, California.

Dudek and Rincon Consultants Inc. 2022. *Supplemental Cultural Resources Assessment for the East Highline Reservoir and Intake Channel Project in El Centro, Imperial County, California*. Prepared for the Imperial Irrigation District, Imperial, CA.

Farr, Finis. 1918. *The History of Imperial County, California*. Elms & Franks. Berkeley, California.

Farris, Glenn J. 1994. José Panto, Capitan of the Indian Pueblo of San Pascual, San Diego County.

Forbes, Jack D. 1965. *Warriors of the Colorado: The Yumans of the Quechan Nation and Their Neighbors*. University of Oklahoma Press, Norman.

Forde, C.D. 1931. *Ethnography of the Yuma Indians*. University of California Publications in American Archaeology and Ethnology 28(4):83–278. Berkeley.

Gallegos, Dennis R. 1995. A Review and Synthesis of the Archaeological Record for the Lower San Diego River Valley. *Proceedings of the Society for California Archaeology* 8:195–206.

Gallegos, Dennis R. 2002. Southern California in Transition: Late Holocene Occupation of Southern California. In *Catalysts to Complexity: Late Holocene Societies of the Southern California Coast*, edited by J. M. Erlandson and T. L. Jones, pp. 27–40. Perspectives in California Archaeology, Vol. 6, J. E. Arnold, series editor. Institute of Archaeology, University of California, Los Angeles.

Garcia, Mario T. 1975. Merchants and Dons: San Diego's Attempt at Modernization, 1850-1860. *The Journal of San Diego History* 21(1):52-80.

Gates, Thomas, and Kristina Crawford. 2010. Ethnographic Assessment of the Importance of Obsidian Butte to the Native American Community, Imperial Valley, California. North State Resources, Inc., Chico, California. Prepared for the California Energy Commission, Sacramento, California.

Gifford, Edward W. 1931. The Kamia of Imperial Valley. *Bureau of American Ethnology Bulletin* 97. Washington, D.C.

Heath, Erle. 1945. Seventy-Five Years of Progress. A Historical Sketch of the Southern Pacific 1869–1944. Southern Pacific Bureau of News. San Francisco.

Hector, Susan M., Sinéad Ní Ghabhláin, Mark S. Becker, and Ken Moslak. 2004. *Archaeological Evaluation of 19 Sites on Marine Corps Air Station Miramar, San Diego County, California*. ASM Affiliates, Inc. Prepared for U.S. Marine Corps, Miramar, California.

Hedges, Kenneth. 1975. Notes on the Kumeyaay: A Problem of Identification. *The Journal of California Anthropology* 2(1):71–83.

Hendricks, William O. 1971. Developing San Diego’s Desert Empire. *Journal of San Diego History* 17(3):1-11.

Hildebrand, J. G. 2003. Ceramics Excavated from the Lower Colorado River Region by the North Baja Pipeline Project. In *A View Across the Cultural Landscape of the Lower Colorado Desert: Cultural Resource Investigations for the North Baja Pipeline Projec*t, edited by J. H. Cleland and R. M. Apple, pp. 245–259. Prepared by EDAW for Tetra Tech FW and North Baja Pipeline LLC.

Hyland, Justin R., and Maria De La Luz Gutierrez. 1995. An Obsidian Fluted Point from Central Baja California. *The Journal of California and Great Basin Anthropology* 17(1): 126–128.

Imperial Irrigation District (IID). 1946. *Annual Report of the President of the Board of Directors, Imperial Irrigation District*. Imperial Irrigation District, El Centro, CA

Imperial Irrigation District (IID). 1949. *Annual Report of the President of the Board of Directors, Imperial Irrigation District*. Imperial Irrigation District, El Centro, CA

Imperial Irrigation District (IDD) (continued). 1959. *Annual Report of the President of the Board of Directors, Imperial Irrigation District For the Calendar Year Ended December 31, 1959*. Imperial Irrigation District, El Centro, CA

Imperial Irrigation District (IID). 2000. Imperial Irrigation District and Metropolitan Water District of Southern California Water Conservation Program, Final Program Construction Report. Accessed September 30, 2022 at https://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/iid_sdcwa/iid/exhibits/iid17.pdf

Kline, George E. 2104. The McCoy Fluted Point in Context with the Solar Development of the Chuckwalla Valley: CA-RIV-23891. *Proceedings of the Society for California Archaeology* 28:80-85.

Kline, George E., and Victoria L. Kline. 2007. Fluted Point Recovered from San Diego County Excavation. *Proceedings of the Society for California Archaeology* 20:55–59.

Knell, Edward J., and Mark S. Becker. 2017. Early Holocene San Dieguito Complex Lithic Technological Strategies at the C.W. Harris Site, San Diego, California. *Journal of California and Great Basin Anthropology* 37(2):183-201.

Kroeber, A.L. 1925. *Handbook of the Indians of California*. Bulletin 78, Bureau of American Ethnology of the Smithsonian Institution, Washington, D.C. Reprinted in 1976 by Dover Publications, Inc., New York.

Langdon, Margaret. 1975. Kamia and Kumeyaay: A Linguistic Perspective. *The Journal of California Archaeology* 2(1):64–70.

Lavender, David. 1972. *California, Land of New Beginnings.* University of Nebraska Press, Lincoln.

Lee, Melicent. 1937. *Indians of the Oaks.* Ginn and Company, Boston.

Love, Bruce, and Mariam Dahdul. 2002. Desert Chronologies and the Archaic Period in the Coachella Valley. *Pacific Coast Archaeological Society Quarterly* 38 (2 and 3):65–86.

Luomala, Katherine. 1978. Tipai-Ipai. In *California*, edited by R. F. Heizer, pp. 592–609. *Handbook of North American Indians*, Vol. 8, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

McCown, Benjamin E. 1945. An Archaeological Survey of the San Vicente Lake Bed, San Diego County, California. *American Antiquity* 10: 255–264.

McDonald, Alison Meg. 1992. *Indian Hill Rockshelter and Aboriginal Cultural Adaption in Anza-Borrego Desert State Park, Southeastern California*. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Riverside.

McDonald, Meg, and James D. Eighmey. 1998. Late Period Prehistory in San Diego. In *Prehistoric and Historic Archaeology of Metropolitan San Diego: A Historic Properties Background Study*. Draft report prepared by ASM Affiliates and submitted to Metropolitan Wastewater, San Diego.

McDonald, Meg, Jerry Schaefer, and Carol Serr. 1993. Phase II Archaeological Evaluation of CA-SDI12,809 a Late Prehistoric Site in the Otay River Valley, San Diego County, California. Report prepared for Caltrans District 11 by Brian F. Mooney Associates, San Diego, CA.

McGroarty, John Steven. 1914. *Southern California: Comprising the Counties of Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura*. Southern California Panama Expositions Commission.

Meighan, Clement W. 1954. The Late Complex in Southern California Prehistory. *Southwestern Journal of Anthropology* 10(2): 215–227.

Moratto, Michael. 1984. California *Archaeology*. Academic Press, New York.

Moriarty, James R. 1966. Cultural Phase Divisions Suggested by Typological Change Coordinated with Stratigraphically Controlled Radiocarbon Dating in San Diego. *The Anthropological Journal of Canada* 4(4): 20–30.

Moriarty, James R. 1967. Transitional Pre-Desert Phase in San Diego County. *Science* (155): 37–62.

Moriarty, James R. 1968. The Environmental Variations of the Yuman Area of Southern California, Parts I and II. *Anthropological Journal of Canada* 6(2): 1–20 and 6(3): 9–23.

National Park Service. 1990. How to Apply the National Register Criteria for Evaluation. *National Register Bulletin 15*. Washington, D.C.

NETROnline. 2022. Aerial images of the Project Area and Vicinity. Accessed September 20, 2022 at https://www.historicaerials.com/viewer.

O'Dell, Scott. 1957. *Country of the Sun: Southern California; An Informal History and Guide*. Thomas Y. Crowell Company, New York.

Office of Historic Preservation (OHP). 1990. *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format. for Recording Historical Resources.* Accessed on December 18, 2021 at https://ohp.parks.ca.gov/pages/1054/files/armr-remediated.pdf.

Office of Historic Preservation (OHP). 1991. Guidelines for Archaeological Research Designs. Preservation Planning Bulletin 5. Department of Parks and Recreation, Sacramento. Accessed on September 30, 2022 at https://ohp.parks.ca.gov/pages/1069/files/arch%20research%20design.pdf

Office of Historic Preservation (OHP). 1995. *Instructions for Recording Historical Resources.* Office of Historic Preservation, Sacramento. Accessed on September 30, 2022 at https://scic.sdsu.edu/_resources/docs/manual95.pdf.

Office of Historic Preservation (OHP). 2001. *Technical Assistance Series #1: California Environmental Quality Act (CEQA) and Historical Resources.* Accessed on September 30, 2022 at https://scic.sdsu.edu/_resources/docs/manual95.pdf.

Phillips, George Harwood. 1975. Chiefs and Challengers, Indian Resistance and Cooperation in Southern California. University of California Press, Berkeley.

Picone, Kiri. 2021. "Salton Sea: The Rise and Fall of a Toxic California Lake." All That's Interesting. Available: https://allthatsinteresting.com/salton-sea-history. Accessed September 9, 2022.

Pigniolo, Andrew R. 2001. Points, Patterns, and People: Distribution of the Desert Side-Notched Point in San Diego. *Proceedings of the Society for California Archaeology* 14:27–40.

Pigniolo, Andrew R. 2005. A Different Context: San Dieguito in the Mountains of Southern California. *Proceedings of the Society for California Archaeology* 18:255-262.

Pittman, Ruth. 1995. *Roadside History of California*. Mountain Press Publishing Company, Missoula, Montana.

Pourade, Richard F. 1962. *The History of San Diego: The Early Explorers*. The Union-Tribune Publishing Company, San Diego.

Raven-Jennings, Shelly, and Brian F. Smith. 1999. Report of Excavations at CA SDI-4608: Subsistence and Technology Transitions during the Mid-to-Late Holocene in San Diego County. Report prepared by Brian F. Smith and Associates for the City of Poway. Report on file at the South Coastal Information Center (SCIC), San Diego State University, San Diego.

Rice, Richard B., William A. Bullough, and Richard J. Orsi. 1996. *The Elusive Eden, A New History of California*. The McGraw-Hill Companies, Inc.: New York.

Rogers, Malcolm J. 1939. Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas. San Diego Museum of Man Papers No. 3.

Rogers, Malcolm J. 1945. An Outline of Yuman Prehistory. *Southwestern Journal of Prehistory* 1(2):167–198.

Rogers, Malcolm J. 1966. *Ancient Hunters of the Far West*. Union Tribune Publishing Company, San Diego, California.

Rondeau, Michael F., James Cassidy, and Terry L. Jones. 2007. Colonization Technologies: Fluted Projectile Points and the First Californians. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar. AltaMira Press, Lanham, Maryland.

San Diego Union-Tribune. 2015. "History o the Salton Sea." Available at: https://www.sandiegouniontribune.com/sdut-history-of-the-salton-sea-2015jun02-story.html#:~:text=The%20Salton%20Sea%20was%20created,soon%20became%20a%20desert%20playground. Accessed September 9, 2022.

Schaefer, Jerry. 1994. The Challenge of Archaeological Research in the Colorado Desert: Recent Approaches and Discoveries. *Journal of California and Great Basin Anthropology* 16 (1):60–80.

Schaefer, Jerry. 2006. *A Class I Cultural Resources Inventory of the Truckhaven Geothermal Leasing Area, Imperial County, California.* Report prepared for Ecology and Environmental, Inc., San Diego, California. Prepared by ASM Affiliates, Inc., Carlsbad, California.

Schaefer, Jerry, Shelby Gunderman, and Don Laylander. 2010. *Cultural Resource Study for the Hudson Ranch II Project, Imperial County, California.* Report on file with the South Coastal Information Center.

Schaefer, Jerry, and Don Laylander. 2007. The Colorado Desert: Ancient Adaptations to Wetlands and Wastelands. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar. Altamira Press, Lanham, Maryland.

Schiffer, Michael B., and Randall H. McGuire. 1982. Problems in Cultural History. In *Hohokam and Patayan: Prehistory of Southwestern Arizona*, edited by Randall H. McGuire and Michael B. Schiffer, pp. 153–222. Academic Press, New York.

Shipek, Florence C. 1982. Kumeyaay Socio-Political Structure. Journal of California and Great Basin Anthropology 4:2.

Speulda-Drews, Lou Ann. 2021. Department of Parks and Recreation 523 for P-13-018312, Quarters 7, Sonny Bono Salton Sea National Wildlife Refuge. On file at the South Central Information Center, San Diego State University, San Diego.

Strong, William D. 1929. Aboriginal Society in Southern California. *University of California Publications in American Archaeology and Ethnology* 26(1):1-358. Reprinted, 1972, Malki Museum Press, Banning, California.

Sutton, Mark Q., Mark E. Basgall, Jill K. Gardner, and Mark W. Allen. 2007. "Advances in Understanding Mojave Desert Prehistory." In *California Prehistory, Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 229-246. AltaMira Press, Lanham.

Tennyson, Matthew and Rebecca Apple. 2009. *Amended Salton Sea Unit 6 Project Cultural Resources Survey Report, Imperial County, California.* Report on file at South Coastal Information Center

Tennyson, Matthew, Theodore Cooley, and Kim Johnson. 2022. *Cultural Resources Inventory for the Border Fuels Reduction Project, Imperial and San Diego Counties, California*. Prepared for the Bureau of Land Management, California Desert District Office. PaleoWest Archaeology, San Diego, California.

True, Delbert L. 1970. *Investigation of a Late Prehistoric Complex in Cuyamaca Rancho State Park, San Diego County, California*. Monograph 1. Archaeological Survey, University of California, Los Angeles.

U.S. Geological Survey, Washington, D.C. (USGS). 1944. *Calipatria, California* (1:62,500) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1976. *Calipatria, California* (1:62,500) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1940. *Iris, California* (1:62,500) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1945. *Iris, California* (1:62,500) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1956. *Obsidian Butte, California* (1:24,000) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1992. *Obsidian Butte, California* (1:24,000) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1954. *Salton Sea, California* (1:125,000) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1955. *Salton Sea, California* (1:125,000) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1959. *Salton Sea, California* (1:125,000) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1963. *Salton Sea, California* (1:125,000) topographic quadrangle.

U.S. Geological Survey, Washington, D.C. (USGS). 1965. *Salton Sea, California* (1:125,000) topographic quadrangle.

Vaughan, Sheila J. 1982. *A Replicative Systems Analysis of the San Dieguito Component at the C.W. Harris Site*. Master's thesis, Department of Anthropology, University of Nevada, Las Vegas.

Wahoff, Tanya L. 1999. Flaked Lithic Tools from Recent Investigations on the Salton Sea Test Base. *Proceedings of the Society for California Archaeology* 12:20–27.

Warren, Claude N. 1966. The San Dieguito Type Site: M. J. Rogers' 1938 Excavation on the San Dieguito River. *San Diego Museum Paper*, No. 6, San Diego, California.

Warren, Claude N. 1967. The San Dieguito Complex: A Review and Hypothesis. *American Antiquity* 32(2):168–185.

Warren, Claude N. 1968. Cultural Tradition and Ecological Adaptation on the Southern California Coast. In *Archaic Prehistory in the Western United States*, edited by C. Irwin-Williams, pp. 1–14. *Eastern New Mexico University Contributions in Anthropology* No. 1. Portales, New Mexico.

Warren, Claude N., and Delbert L. True. 1961. The San Dieguito Complex and Its Place in San Diego County Prehistory. *Archaeology Survey Annual Report*, 1960–1961, pp. 246–291. University of California, Los Angeles.

Warren, Claude N., Gretchen Siegler, and Frank Dittmer. 1998. Paleoindian and Early Archaic Periods. In *Draft Historical Properties Background Study, City of San Diego Clean Water Program*. On file at AECOM, San Diego, California.

Warren, Elizabeth von Till, Robert H. Crabtree, Claude N. Warren, Martha Knack, and Richard

McCarty. 1981. *A Cultural Resources Overview of the Colorado Desert Planning Units*. USDI Bureau of Land Management, Riverside, California.

Warren, Elizabeth von Till, and Ralph J. Roske. 1981. Cultural Resources of the California Desert, 1776-1980: Historic Trails and Wagon Roads. USDI Bureau of Land Management, California Desert District, Riverside.

Waters, Michael R. 1982a. Lowland Patayan Ceramic Tradition. In *Hohokam and Patayan: Prehistory of Southwestern Arizona*, edited by Randall H. McGuire and Michael B. Schiffer, pp. 275–297. Academic Press, New York.

Waters, Michael R. 1982b. The Lowland Patayan Ceramic Typology. In *Hohokam and Patayan*, edited by Randall H. McGuire and Michael B. Schiffer, pp. 537–570. Academic Press, New York.

Waters, Michael R. 1983. Late Holocene Lacustrine Chronology and Archaeology of Ancient Lake Cahuilla. *Quaternary Research* 19:373–387.

Wilke, Philip J. 1978. *Late Prehistoric Human Ecology at Lake Cahuilla, Coachella Valley, California.* Contributions of the University of California Archaeological Research Facility, No. 38. Berkeley, California.

Wilke, Phillip J., and Meg McDonald. 1989. Prehistoric Use of Rock-Lined Cache Pits: California Deserts and Southwest. *Journal of California and Great Basin Anthropology* 11(1):50–73.

Willey, Loraine M., and Christy Dolan. 2004. *Above and Below the Valley: Report on Data Recovery at San Vicente Reservoir, San Diego County, California.* Report prepared by EDAW for the San Diego County Water Authority. On file at the South Coastal Information Center (SCIC), San Diego State University, San Diego.

Williams, Brian. 2014. *Archeological Research Analysis at SDI-7074 within San Diego Gas & Electric Company's East County Substation Project (ECSP), San Diego County, California*. Report prepared by ASM Affiliates, submitted to the Bureau of Land Management, El Centro, CA, and SDG&E, Alpine, CA.

5.4 Geological Hazards and Resources

This section presents an evaluation of the Black Rock Geothermal Project (BRGP or Project) in terms of potential exposure to geological hazards and potential to affect geologic resources of commercial, recreational, or scientific value. Section 5.4.1 describes the existing environment that could be affected, including regional and local geology and geological hazards. Section 5.4.2 identifies potential environmental effects from Project development. Section 5.4.3 discusses potential cumulative effects. Section 5.4.4 discusses mitigation measures. Section 5.4.5 presents the laws, ordinances, regulations, and standards (LORS) applicable to geological hazards and resources. Section 5.4.6 identifies regulatory agencies and agency contacts. Section 5.4.7 describes the required permits. Section 5.4.8 provides the references used to develop this section.

5.4.1 Affected Environment

The BRGP site is located within the Salton Sea Known Geothermal Resource Area (KGRA) in Imperial County, California. The Project site is located in the Imperial County Geothermal Renewable Energy Overlay Zone, established in Imperial County's Renewable Energy and Transmission Element (Title 9, Division 17, Geothermal Ordinance), where approximately 10 geothermal production facilities currently exist, and similar new large-scale geothermal developments are planned. This region of the Imperial Valley is used predominantly for agriculture, geothermal power production, and solar power.

5.4.1.1 Local Setting and Regional Geology

The Project site is located at the southwest corner of McKendry Road and Boyle Road approximately eight miles southwest of the town of Niland and approximately six miles northwest of the town of Calipatria. The Project site is in an active agricultural field currently planted with Bermuda grass crop. The Project site is bounded on the east by a concrete-lined irrigation water delivery canal and Boyle Road (dirt) and on the north by McKendry Road (gravel). Agricultural fields are located to the south, west, north, and east of the site. The Vulcan and Hoch Geothermal Power Plants are located adjacent to the southeast corner of the Project site. The Salton Sea is located more than 3,000 feet northwest of the Project site. The site is located in a south-central portion of the Salton Trough, a topographic and structural depression within the Colorado Desert geomorphic province. This area is shown on Figure 5.4-1. Geologic features in the Project vicinity are shown on Figure 5.4-2.

The Colorado Desert geomorphic province is a low-lying barren desert basin between active branches of the alluvium-covered San Andreas Fault, with the southern extension of the Mojave Desert province in the east. It is bound to the east by the Chocolate Mountains, to the west by the Peninsular Ranges, and extends south into Mexico. This province includes a large portion of Imperial County and a small portion of central Riverside County. The Colorado Desert is divided into two main valleys, the deep Imperial Valley to the south and the narrower and shallower Coachella Valley to the north. A significant portion of both valleys lies below mean sea level (msl), with the lowest elevation found in the Salton Basin at 235 feet below msl. The area is characterized by the ancient beach lines and silt deposits of extinct Lake Cahuilla (California Geological Survey [CGS] 2002a).

The three main fault zones that comprise the San Andreas Fault system in this region represent clear tectonic boundaries around the Salton Trough. The Orocopia and Chocolate Mountains represent the broken edges of the North American plate along the eastern margin of the Salton Trough and are included in the southern Basin and Range physiographic province (Frost et al. 1997). The eastern edge of the Pacific plate is composed of intermediate composition granitic rocks of the Peninsular Ranges physiographic province. This eastern edge of the plate, which forms the western portion of the Salton Trough, has been offset along multiple strands of the San Andreas system, including the Elsinore and San Jacinto faults. The Salton Trough occupies the structurally weak zone between the strong, solid edges of the Pacific and North American plates. A zone of high seismicity connects the San Andreas Fault north of the Salton Sea and the Imperial Fault south of the City of Brawley. The structurally low area is referred to as the Brawley Seismic Zone, and it may be the result of a tensional or releasing step between the San Andreas and Imperial faults.

5.4.1.1.1 Faulting and Seismicity

The Project site and its linear facilities are located in one of the most seismically active portions of California. The region has experienced numerous earthquakes in the past and will continue to do so in the future. The location of the Project facilities in relation to faults in the region is shown in Figure 5.4-1. No known active faults with surface expressions have been identified at the Project site.

San Andreas Fault Zone

The San Andreas Fault Zone extends from the Gulf of California in Mexico to the Mendocino coast in northern California and accommodates the majority of movement between the Pacific and North American plates. Several active faults along the section of the San Andreas in closest proximity to the Project site are not generally considered to be independent seismic sources, but rather to experience movement triggered by seismic events on the San Andreas. The California Department of Conservation (DOC) describes the slip rate as greater than 25 millimeters per year and maximum moment magnitude of 7.2.

Brawley Seismic Zone

The proposed plant site, well pads, and linear facilities are located within the Brawley Seismic Zone, which is between the northern end of the Imperial Fault and the southern end of the San Andreas Fault. It is a tectonically active area. The Brawley Seismic Zone was first recognized because of the number of earthquake swarms produced from 1973 through 1979 (Johnson and Hutton 1982). Analysis of these swarms suggests they are triggered by creep events on the Imperial Fault (Johnson 1982). The Brawley Seismic Zone is characterized by earthquake swarms, with magnitudes up to 5.2. The U.S. Geological Survey (USGS) describes the slip rate as greater than 5.0 millimeters per year and maximum moment magnitude of 6.4.

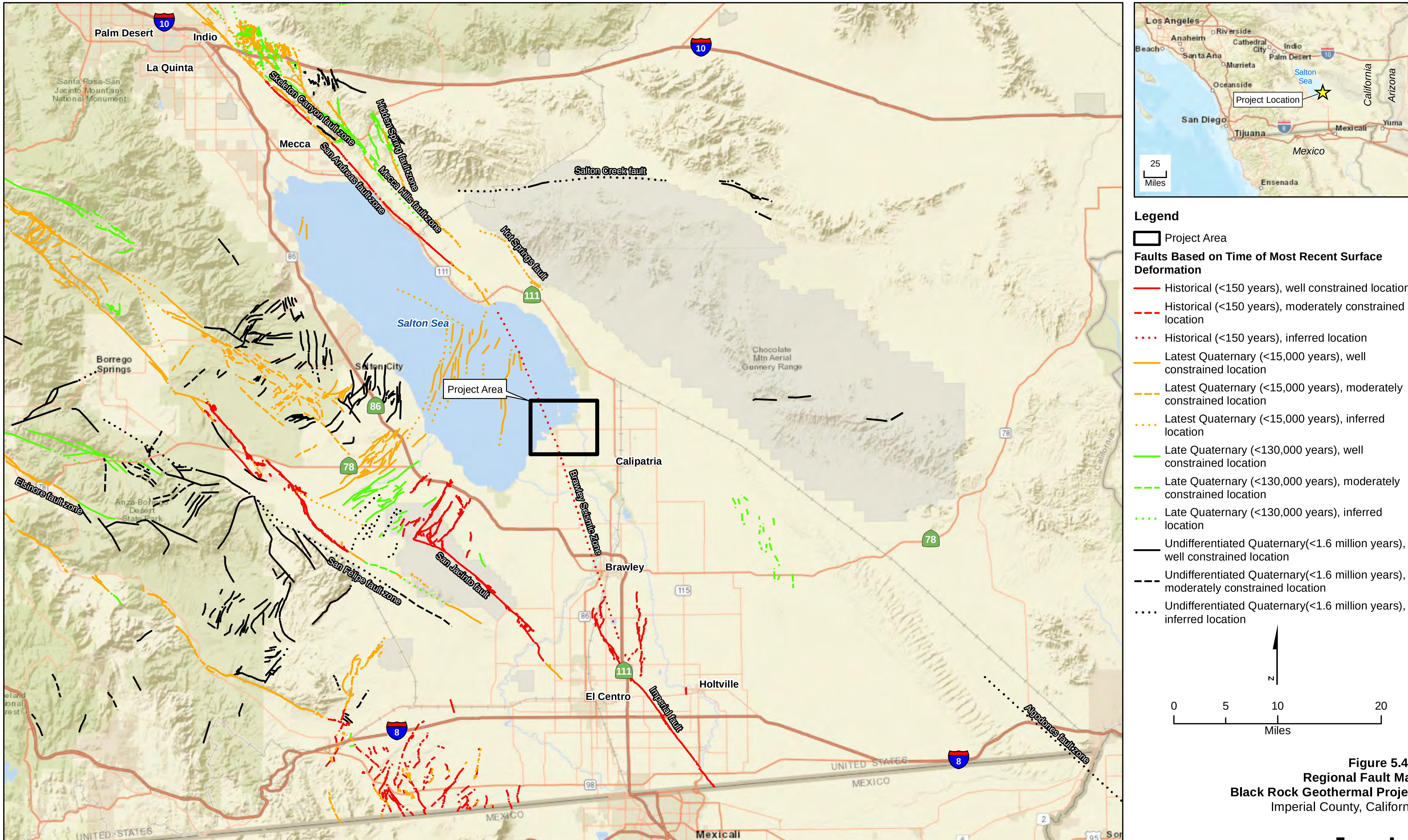
San Jacinto Fault Zone

The San Jacinto Fault Zone is located approximately 16 miles west of the Project site. This zone is a major tectonic and seismic structure, striking northwest for more than 130 miles. The San Jacinto fault zone is a component of the larger San Andreas Fault system. The southern segment of the San Jacinto Fault Zone is composed of the Coyote Creek Fault, the Superstition Hills Fault, and the Superstition Mountain Fault. The Coyote Creek strand of the Fault Zone extends from just north of Borrego Springs to the northeast end of the Fish Creek Mountains, north of Plaster City. The most recent large earthquakes to occur on the San Jacinto Fault system was the 1954 Arroyo Salada earthquake. The California Division of Mines and Geology fault parameters for the San Jacinto Fault Zone are given for each segment as follows:

- Coyote Creek – four millimeters per year slip rate and maximum moment magnitude of 6.8
- Superstition Hills – five millimeters per year slip rate and maximum moment magnitude of 6.6
- Superstition Mountain – five millimeters per year slip rate and maximum moment magnitude of 6.6.

Imperial/Brawley Fault

The Imperial Fault Zone is approximately 16.5 miles southeast of the Project site. This northwest-trending fault is approximately 40 miles long and extends southeastward from an area just southwest of the City of Brawley to the town of Saltillo, Mexico. DOC fault parameters for the Imperial Fault indicate a slip rate of 20 millimeters per year and a maximum moment magnitude of 7.0.



Legend

Project Area

Faults Based on Time of Most Recent Surface Deformation

- Historical (<150 years), well constrained location
- Historical (<150 years), moderately constrained location
- Historical (<150 years), inferred location
- Latest Quaternary (<15,000 years), well constrained location
- Latest Quaternary (<15,000 years), moderately constrained location
- Latest Quaternary (<15,000 years), inferred location
- Late Quaternary (<130,000 years), well constrained location
- Late Quaternary (<130,000 years), moderately constrained location
- Late Quaternary (<130,000 years), inferred location
- Undifferentiated Quaternary(<1.6 million years), well constrained location
- Undifferentiated Quaternary(<1.6 million years), moderately constrained location
- Undifferentiated Quaternary(<1.6 million years), inferred location

N

0 5 10 20
Miles

Figure 5.4-1
Regional Fault Map
Black Rock Geothermal Project
Imperial County, California

Jacobs

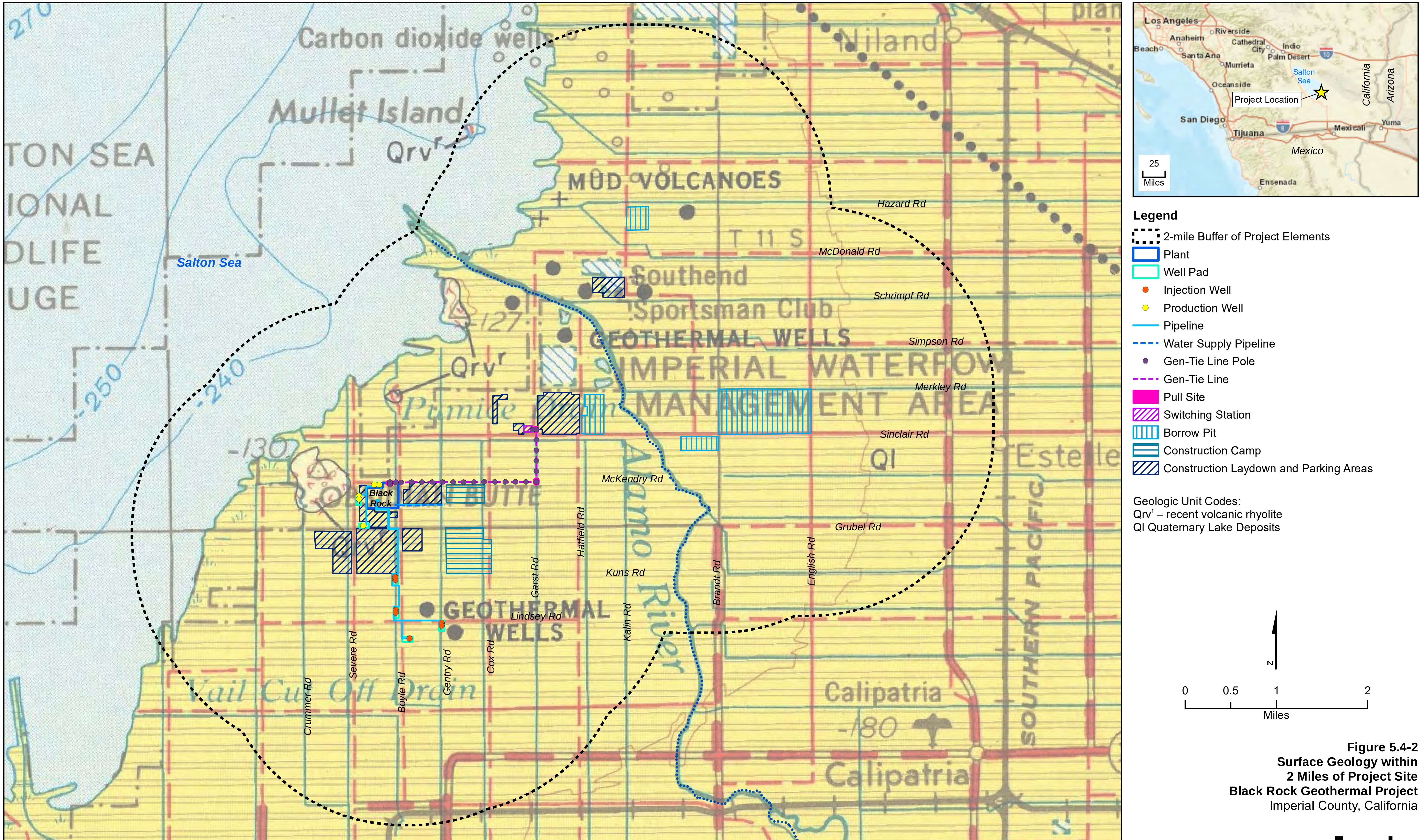


Figure 5.4-2
Surface Geology within 2 Miles of Project Site
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Geology\Black_Rock\Two_Mile_Geo_230223.mxd

5.4.1.1.2 Strong Ground Motion

The Project site is not located within an active fault zone as defined by the Alquist-Priolo Act. However, it is in an area that is subject to ground shaking from earthquakes generated on faults associated with the San Andreas Fault Zone to the east, Brawley Fault Zone to the south and San Jacinto and Imperial Fault Zones to the west. Shaking from an earthquake can result in structural damage and can trigger other geologic hazards such as liquefaction. Ground shaking is controlled by the earthquake magnitude, duration, and distance from the source. Ground conditions also will influence impacts from strong ground motions. Seismic waves attenuate with distance from their sources, so estimated bedrock accelerations are highest in areas closest to the source. Local soil conditions may amplify or dampen seismic waves as they travel from the underlying bedrock to the ground surface.

Ground motions for the site were calculated using the 2022 California Building Code (CBC) or American Society of Civil Engineers (ASCE) standards in ASCE 7-16, Section 11.4.8, seismic parameters. According to available information and the calculated peak ground acceleration (PGA) values, the Project site will likely be categorized as alluvium, PGA of 0.61 g. This is considered a moderate value for the state. PGA values across California range from about 0.1 g to more than 1.0 g. More than three-fourths of the population of the state resides in counties with seismic hazard calculated to be greater than 0.4 g (DOC and USGS 1996).

5.4.1.2 Local Geology and Stratigraphy

The Project site, including well pads and linear facilities, is located to the southeast of the Salton Sea. The Salton Sea covers an area of approximately 360 square miles, and is California's largest lake. The surface of the Salton Sea is currently at an elevation of –227 feet below sea level. The geology within a two mile radius of the site and along the planned gen-tie lines is shown on Figure 5.4-2. Obsidian Butte lies west of the site and is the westernmost of five small extrusive rhyolite domes arranged along a northeast trend. These 16,000 -year-old domes, collectively known as the Salton Buttes, were extruded onto Quaternary alluvium.

The BRGP site is underlain by Holocene lacustrine deposits associated with ancient Lake Cahuilla. These lacustrine deposits consist of interbedded lenticular and tabular silt, sand, and clay. The late Pleistocene to Holocene lake deposits are probably less than 100 feet thick and derived from periodic flooding of the Colorado River which intermittently formed a historic fresh water lake (Lake Cahuilla). Older deposits consist of Miocene and Pleistocene non-marine and marine sediments deposited in intrusions of the Gulf of California. Basement rock consisting of Mesozoic granite and Paleozoic metamorphic rocks are estimated at depths between 15,000 to 20,000 feet (Landmark 2022).

Subsurface conditions are described in greater detail in the Geotechnical Investigation (Appendix 5.4).

The site is in an area of shallow local groundwater conditions. The surficial soils were observed to be saturated, and groundwater was encountered in all of the subsurface explorations at depths of approximately six feet below ground surface (bgs). In general, groundwater elevations at the site may fluctuate with precipitation and irrigation of the adjacent agricultural fields.

The well pads and linear facilities, including gen-tie lines and pipelines (linear facilities), would be underlain by similar earth materials as the generation plant: silty clays and interbedded medium-dense silty sands, silts, and silty clays.

5.4.1.3 Soils

The two soil types found at the Project site and production well pads are Imperial-Glenbar Silty Clay Loams (wet) and Holtville Silty Clay (wet). The Imperial-Glenbar Silty Clay Loams (wet) soil type is moderately well drained, and water movement in the most restrictive layer is moderately high. This soil type is susceptible to moderate to high water erosion and moderate wind erosion. Holtville Silty Clay (wet) is a moderately well-drained soil. It has moderate to high water erosion and moderate wind erosion potential. Water movement for the most restrictive layer is low for this soil type. This soil type is neither flooded nor ponded (U.S. Department of Agriculture, Natural Resources Conservation Service [USDA-NRCS] 2022).

Soil types found at the injection well pads and along the injection pipeline right-of-ways are Holtville Silty Clay (wet), Imperial-Glenbar Silty Clay Loams (wet), and Indio Loam (wet) (USDA-NRCS 2022). Indio Loam soils are moderately well drained, with moderate permeability. Water movement for the most restrictive layer is moderately high. Additional soil types found at the potential borrow pits and laydown yards include Imperial Silty Clay(wet), Meloland Very Fine Sandy Loam (wet), and Glenbar Clay Loam (wet). An additional soil type found along the gen-tie line is Vint and Indio, very fine sandy loams (wet) (USDA-NRCS 2022).

5.4.1.4 Seismic Setting

The tectonic setting of this area of Southern California is complex and is made up of numerous fault systems, including strike-slip, oblique, thrust, and blind thrust faults throughout the region. Therefore, any specific area is subject to seismic hazards of varying degree, dependent on the proximity to and length of nearby active and potentially active faults and the local geologic and topographic conditions. Seismic hazards primarily include seismic shaking and ground rupture along the fault trace, and strong ground shaking such as liquefaction and lateral spreading. The BRGP site area can be characterized as an active seismic area, with the potential for large-magnitude earthquakes to occur.

5.4.1.5 Potential Geological Hazards

The following subsections discuss the potential geological hazards that might occur in the Project area.

5.4.1.5.1 Ground Rupture

Ground rupture is caused when an earthquake event along a fault results in rupture of the surface. As shown on Figure 5.4-1, the Project site is not transected by any known active or potentially active faults (CGS 2015). The known active and potentially active faults in the vicinity of BRGP are shown on Figure 5.4-1. The site is located within the Brawley Seismic Zone (CGS 2015).

The nearest mapped Earthquake Fault Zone (EFZs) are associated with the Coyote Creek Fault Zone located approximately 22 miles to the southwest of the site, the San Andreas Fault located approximately 16 miles to the north of the site, and the Brawley Fault Zone located approximately 15 miles south of the site (CGS 2015).

The likelihood of a ground rupture to occur from movement along an active fault at the BRGP site is considered low.

5.4.1.5.2 Seismic Shaking

The BRGP site area has experienced strong ground motion during past earthquakes, and it is likely that strong ground motions will occur at the site in the future. The primary geological hazard at the BRGP site is strong ground-shaking during an earthquake. A Design Spectral Acceleration (parameter S_{D1}) of 0.61 g is considered for the design of the Project (Landmark 2022). An updated seismic evaluation will be conducted during the Project's future design-level geotechnical investigation, in accordance with current CBC standards, and will be conducted post-certification pursuant to standard California Energy Commission Conditions of Certification.

5.4.1.5.3 Liquefaction

Liquefaction is a phenomenon in which saturated, cohesionless soils, such as sand and silt, temporarily lose their strength and liquefy when subjected to dynamic forces, such as intense and prolonged ground shaking. To be susceptible to liquefaction, potentially liquefiable soils must be saturated or nearly saturated. In general, liquefaction hazards are most severe in saturated soils within the upper 50 feet of the ground surface. The potential for liquefaction increases with shallower groundwater. The potential hazards associated with liquefaction are ground deformation (soil densification) and lateral spreading.

Soil conditions at the BRGP site predominantly consist of Quaternary alluvial deposits that could include liquefiable materials.

Depth to water during the geotechnical investigation conducted at this property (Landmark 2022) was reported at 3.5 to five feet bgs. Borings advanced to 50 feet bgs identified subsurface material consisting of saturated silts and silty sands that could liquefy. The findings of the 2022 study concluded that some of the soil layers underlying the site are susceptible to liquefaction.

In addition, a previous geotechnical investigation conducted at the site in 2009 also determined that the site is susceptible to liquefaction based on the assumed groundwater surface. The potential for liquefaction to occur at the site is moderate based on the depth and thickness of the liquefiable soil. Factors of safety against liquefaction within the liquefiable zones ranged up to 1.0. Given the depth below the ground surface and the thickness of liquefiable soil, the potential for surface expression of liquefaction is considered high (Landmark 2022).

Seismically induced settlement could occur up to 6.5 inches within the footprint of proposed structures from a design-level earthquake (Landmark 2022).

5.4.1.5.4 Landslides

A landslide is a mass of rock, soil, or debris that has been displaced downslope by sliding, flowing, or falling. There is a low probability for landslides in the project area because of the relatively flat topography (0 to 1% slope) and distance from hills, mountains, or slopes. The Project site is not located within a landslide hazard area, as indicated by a California Landslide Susceptibility Map prepared by the California Geological Survey (DOC 2021). Because the BRGP site is flat, land sliding is unlikely, so the potential for direct impact from mass wasting at the site is considered low to negligible.

5.4.1.5.5 Subsidence

Subsidence, which is the downward displacement of a large portion of land, has affected many areas in California. In areas with shallow groundwater, liquefaction is more likely to occur in the event of significant seismic shaking. The potential for ground subsidence from earthquake motion is largely dependent on the magnitude, duration, and frequency of the earthquake waves. Subsidence is any settling or sinking of the ground surface over a regional area typically as a result of groundwater and/or oil extraction. The BRGP area is not documented to be within an area of known subsidence hazards.

The 2022 geotechnical investigation conducted at the site concluded that the potential for subsidence to occur at the site attributable to withdrawal of oil, gas, or water is considered low (Landmark 2022).

5.4.1.5.6 Expansive Soils

Expansive soils shrink and swell with wetting and drying. The shrinkswell- capacity of expansive soils can result in differential movement beneath foundations. Expansive soils, if present, can be readily mitigated by either soil amendments or by removal and replacement with non-expansive soils, among other methods.

Surficial soils at the Project site consist of predominantly silty clay loams and overlying fine sand.
The BRGP area is not noted to be in a known area of expansive soil. However, the materials encountered during the 2022 geotechnical investigation borings did note the presence of clay-rich soils from 5 feet to 100 feet bgs during field activities. These native soils likely exhibit high swell potential (Landmark 2022) and will be further evaluated during design-level geotechnical investigations.

5.4.1.5.7 Tsunamis and Seiches

Tsunamis are seismically induced ocean waves with very long periods. Tsunamis may be manifested in the form of wave bores or a gradual upwelling of sea level and can be caused by offshore landslides or earthquakes. Seiches are the shaking of water in a large, enclosed body of water such as a lake. Because the BRGP site is located adjacent to the Salton Sea at a current elevation of approximately -227 feet, the potential for a seiche event that would affect the site is considered possible. However, the BRGP site does not lie within a mapped inundation area, according to the CGS (CGS 2009). The shallow depth of the Salton Sea also diminishes any risk.

5.4.1.6 Geologic Resources of Recreational, Commercial, or Scientific Value

At the BRGP site, the geologic units at the surface and in the subsurface are widespread alluvial deposits that occur throughout the Imperial Valley; these units are not unique in terms of commercial value. The potential for recreational or scientific deposits (for example, rare mineral or fossil) is very low, given the geologic environment in the area.

No known commercial petroleum deposits are in the vicinity of the BRGP area. There are a few oil and gas wells located within the vicinity of the BRGP site. According to online maps of the DOC (2022), there are several active geothermal wells within two miles of the BRGP site.

The BRGP is not located in an area of known mineral reserves. In addition, the Division of Mine Reclamation’s list of mines, referred to as the AB 3098 List and regulated under the Surface Mining and Reclamation Act (SMARA), does not include any mines within the vicinity of the Project site (DOC 2019).

5.4.2 Environmental Analysis

The potential effects from construction and operation of BRGP on geologic resources and risks to life and property from geological hazards are presented in the following subsections.

5.4.2.1 Significance Criteria

According to Appendix G of the California Environmental Quality Act statutes, a project may have a significant environmental impact in terms of geological hazards and resources if it would do the following:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving the following:
  - Rupture of a known earthquake fault (Alquist-Priolo [AP] EFZ)
  - Strong seismic ground shaking
  - Seismic-related ground failure, including liquefaction.
- Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, subsidence, or liquefaction.
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local plan, specific plan, or other land use plan.

5.4.2.2 Geological Hazards

Within the Imperial Valley, there is significant potential for seismic ground shaking to affect the BRGP site and linears, in the event of a large-magnitude earthquake occurring on fault segments near the site. The BRGP, however, is not located within a mapped AP EFZ area. The Project is not likely to cause direct human exposure from ground rupture during an earthquake. Seismic hazards will be minimized by conformance with the recommended seismic design criteria of the 2022 or more recent and applicable

CBCs (CBSC 2022). Potential effects of liquefaction and subsidence hazards that are present at the site will be considered during the detailed design process.

The probability of mass wasting or flooding at the BRGP site is low to negligible.

In summary, compliance with the applicable CBC requirements will reduce the potential exposure of people to the risks associated with large seismic events and associated liquefaction to less-than-significant levels. Additionally, structures will be designed to withstand the strong ground motion of a Design Basis Earthquake, as defined by the applicable CBC. Through compliance with CBC standards, impacts associated with geological hazards will be less than significant.

5.4.2.3 Geological Resources

Mineral resources in the vicinity of the Project site are depicted on Figure 5.4-1. Minor aggregate (pumice) or mineral mining operations have been documented within two miles of the site in the volcanic outcrops at Obsidian Butte and Rock Hill. These were small deposits of volcanic breccia that are no longer mined. There are known hydrocarbon resources within two miles of the site.

The Project lies within a KGRA, the Salton Sea KGRA, where the geothermal fluids contain unusually high concentrations of metals such as zinc, lead, copper, silver, iron, manganese, sodium, calcium, potassium, and lithium. Sediments in the deeper parts of the field contain widespread ore minerals such as pyrite, hematite, sphalerite, chalcopyrite, marcasite, and galena. These minerals likely originate from diagenetic, replacement, and vein filling/pore filling mineralization processes.

Carbon dioxide (CO_2) gas was produced north of the site from 1933 to 1954 from shallow sands 200 to 700 feet deep. Historically, the CO_2 recovered from these shallow wells was used to produce dry ice (Elders 1979).

The Project is adjacent to Obsidian Butte, one of the small volcanic glass domes that comprise the Salton Buttes. Obsidian Butte is a popular stop for geologic field trips because of the unique composition (low potassium tholeiitic basalt identical in composition to oceanic crust rocks) and location (at the surface on the continental margin). BRGP does not represent a significant impact to this geologic resource because the Project will not impact its accessibility.

Excavation activities associated with the borrow pits for Project fill material will be subject to regulation under SMARA (Public Resources Code [PRC] Sections 2710-2796). SMARA provides comprehensive surface mining policy with the regulation of surface mining operations to minimize adverse environmental impacts to mined lands. Surface mining activities that will result in the disturbance of more than one acre of fill material or remove more than 1,000 cubic yards of material are subject to SMARA requirements. SMARA defines borrow pits as, "excavations created by the surface mining of rock, unconsolidated geologic deposits or soil to provide material (borrow) for fill elsewhere." (DOC 2022b).

A one-time exemption under SMARA exists for, "… any other surface mining operations that the board determines to be of an infrequent nature and that involve only minor surface disturbances." (PRC Section 2714[f]).

BRGP will 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. Additionally, BRGP will not result in the loss of availability of a locally important mineral resource recovery site delineated on a local plan, specific plan, or other land use plan.

5.4.3 Cumulative Effects

A proposed project may have a cumulative impact when the incremental effect of the project is considerable when viewed in connection with other past, present, and reasonably foreseeable future projects. (PRC Section 21083; California Code of Regulations [CCR], Title 14, Sections 15064[h], 15065[c], 15130, and 15355).

Cumulative impacts of the Project on geological hazards and resources of geothermal development from the extraction of geothermal fluids, in connection with current and other reasonably foreseeable geothermal projects, were considered. The Project operations will include reinjection of geothermal fluids which will be closely monitored at the Project site. Additionally, the Project would be required to comply with the seismic and subsidence monitoring requirements of the *Imperial County General Plan* Geothermal Element. Therefore, the incremental effect of the Project on geologic hazards and on the geothermal resource would be less than significant.

5.4.4 Mitigation Measures

Typical mitigation measures will be incorporated into the Project, including a subsidence monitoring plan that will comply with standards set forth in the Imperial County General Plan, and the assignment of a geotechnical engineer or engineering geologist onsite during construction. With the implementation of these measures, the BRGP will not result in significant direct, indirect, or cumulative geology-related impacts.

5.4.5 Laws, Ordinances, Regulations, and Standards

The LORS that may apply to geologic resources and hazards are summarized in Table 5.4-1. The local LORS discussed in this section are certain ordinances, plans, or policies of Imperial County. There are no federal LORS that apply to geological hazards and resources.

Table 5.4-1. LORS for Geological Hazards and Resources

LORS	Requirements/ Applicability	Administering Agency	Application for Certification Section Explaining Conformance
State			
Surface Mining and Reclamation Act of 1975, PRC, Division 2, Chapter 9, Section 2710 et seq.	The California Surface Mining and Reclamation Act (known as SMARA) requires that all surface mines in the state be reclaimed both to minimize any adverse effects from the mining and to ensure that mined lands are returned to a usable condition and creates no danger to public health and safety. The law requires local jurisdictions to enact ordinances to implement SMARA at the local level and to act as lead agency for issuance of permits, development of reclamation plans, and holder of reclamation financial assurances.	Imperial County Planning/Building Department	Section 5.4.6.2
Title 14, CCR, Division 2, Chapter 8, Subchapter 1, State Mining and Geology Board Reclamation Regulations, Section 3500 et seq.	These regulations further clarify and implement the provisions of SMARA by establishing standards for reclamation plans and financial assurances, as well as administrative procedures for lead agency oversight and decision appeals. SMARA is only applicable to the borrow pits.	Imperial County Planning/Building Department	Section 5.4.2.2
The Seismic Hazards Mapping Act (Title 14, Division 2, Chapter 8, Subchapter 1, Article 10, CCR)	Identifies secondary seismic hazards: liquefaction and seismically induced landslides	California Building Standards Commission, State of California, and City of Stanton	Section 5.4.2.2

LORS	Requirements/ Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Local			
Imperial County General Plan, Renewable Energy/Transmission Element, Goal 1	The County of Imperial supports the safe and orderly development of renewable energy while providing for the protection of environmental resources.	Imperial County Planning/Building Department	Section 5.11.5.3, 5.11.4.1, 5.11.2.3
Imperial County General Plan, Geothermal/Transmission Element, Goal 2	The County will encourage development of electrical gen-tie lines along routes which minimize potential environmental effects.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County General Plan, Geothermal/Transmission Element, Goal 7	The County will actively minimize the potential for land subsidence to occur as a result of renewable energy operations.	Imperial County Planning/Building Department	

5.4.6 State Laws, Ordinances, Regulations, and Standards

5.4.6.1 California Public Resources Code 25523(a): 20 CCR § 1252 (b) and (c)

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) was passed in 1972 to prevent the construction of buildings used for human occupancy on the surface traces of active faults. None of the Project components (plant site, injection well pads and pipelines) cross an AP EFZ. Thus, the Project will not be subject to requirements for construction within an EFZ.

5.4.6.2 Surface Mining and Reclamation Act of 1975, PRC, Division 2, Chapter 9, Section 2710 et seq.

SMARA provides a comprehensive surface mining and reclamation policy for the regulation of surface mining operations to assure that adverse environmental impacts are minimized and mined lands are reclaimed to a usable condition. SMARA also encourages the production, conservation, and protection of the State's mineral resources. PRC Section 2207 provides annual reporting requirements for all mines in the state, under which the State Mining and Geology Board is also granted authority and obligations.

The County enacts ordinances to implement SMARA at the local level and to act as lead agency for the issuance of permits, development of reclamation plans, and is the holder of reclamation financial assurances. SMARA will only be applicable to borrow pits.

5.4.6.3 Title 14, CCR, Division 2, Chapter 8, Subchapter 1, State Mining and Geology Board Reclamation Regulations, Section 3500 et seq.

SMARA Chapter 9, Division 2 of the Public Resources Code, requires the State Mining and Geology Board to adopt state policy for the reclamation of mined lands and the conservation of mineral resources. These policies are prepared in accordance with the Administrative Procedures Act, (Government Code) and are found in California Code of Regulations, Title 14, Division 2, Chapter 8, Subchapter 1.

The administering agency for this authority is the Imperial County Planning/Building Department.

5.4.7 Local Laws, Ordinances, Regulations, and Standards

5.4.7.1 Imperial County General Plan

Geothermal/Transmission Element

Goal 1: The County of Imperial supports the safe and orderly development of renewable energy while providing for the protection of environmental resources

Goal 2: The County will encourage development of electrical gen-tie lines along routes which minimize potential environmental effects.

Goal 7: The County will actively minimize the potential for land subsidence to occur as a result of renewable energy operations

BRGP incorporates engineered grading and drainage plans to minimize grading and assure appropriate drainage of the facility. Additionally, mitigation measures including sediment and erosion control during grading and construction activities, would be implemented to minimize environmental impacts related to erosion and sediment transport. Geothermal production is compatible with agricultural uses, and for which the County has established mitigation measures to reduce potential agricultural impacts to less than a significant level. The Project, as proposed, complies with the goals and objectives of this element.

5.4.8 Agencies and Agency Contacts

Compliance of building construction with CBC standards is covered under engineering and construction permits for the BRGP. There are no other permit requirements that specifically address geologic resources and hazards.

Table 5.4-2. Agency Contacts for Geologic Hazards and Resources

Issue	Agency	Contact
SMARA Reclamation Plan requirements	Imperial County Planning Department	Cruz Guzman, Planner 1, 801 Main Street, El Centro, CA 92243 Phone: 442-265-1736 Fax: 442-265-1735

5.4.9 Permits and Permit Schedule

No permits are required for compliance with geological LORS.

5.4.10 References

California Building Standards Commission (CBSC). 2022. *2022 California Building Code, Title 24, California Code of Regulations*.

California Code of Regulations, Public Resources Code – PRC 2714(f). January 2022.

California Department of Conservation and United States Geologic Survey (DOC and USGS). 1996. *Probabilistic Seismic Hazard Assessment for the State of California.*

California Department of Conservation (DOC). 2019. AB 3098 List. List Published September 13, 2019. https://www.conservation.ca.gov/dmr/smara-mines.

California Department of Conservation (DOC). 2021. *Earthquake Zones of Required investigation.* https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed January 15, 2023.

California Department of Conservation (DOC). 2022a. Oil and Gas Field Maps. https://maps.conservation.ca.gov/doggr/wellfinder. Accessed January 15, 2023.

California Department of Conservation (DOC). 2022b. *Statutes & Regulations, January 2022*.

California Division of Mines and Geology (CDMG). 1967. Geologic Map of California, Salton Sea Sheet.

California Geological Survey (CGS). 2009. *Tsunami Inundation Map for Emergency Planning.* https://www.conservation.ca.gov/cgs/tsunami/maps. Accessed January 15, 2023.

California Geological Survey (CGS). 2015. *Fault Activity Map of California.* https://maps.conservation.ca.gov/cgs/fam/. Accessed January 15, 2023.

California State Mining and Geology Board and California Department of Conservation (DOC). 2000. *Surface Mining and Reclamation Act (SMARA) Regulations. Third Revision.* January.

Landmark Consultants Inc. (Landmark). 2022. *Preliminary Geotechnical Investigation Proposal 81 MW Black Rock Geothermal Power Plant, SWC McKendry and Boyle Roads, Calipatria, California*. October.

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). 2022. Soils Index Map (1:24,000 scale). Accessed September 2022.

5.5 Hazardous Materials Handling

This section discusses the potential effects on human health and the environment from the use and storage of hazardous materials in conjunction with the Black Rock Geothermal Project (BRGP or Project). Section 5.5.1 describes the existing environment that may be affected. Section 5.5.2 identifies potential impacts on the environment and on human health from site development. Section 5.5.3 addresses potential cumulative effects, Section 5.5.4 presents proposed mitigation measures. Section 5.5.5 presents the laws, ordinances, regulations, and standards (LORS) applicable to hazardous materials and the Project. Section 5.5.6 describes the agencies involved and provides agency contacts. Section 5.5.7 describes permits required and the permit schedule. Section 5.5.8 provides the references used to develop this section. Hazardous waste management, including management of potentially contaminated soil and groundwater, is addressed in Section 5.14, Waste Management.

5.5.1 Affected Environment

5.5.1.1 Land Use

The Project site is located on approximately 55 acres of a 160-acre parcel within the unincorporated area of Imperial County, California, and is bounded by McKendry Road to the north, Severe Road to the west, and Boyle Road to the east. The town of Niland is approximately eight miles to the northeast and the town of Calipatria is approximately six miles southeast of the Project site. Land use in the immediate vicinity of the Project site (discussed in detail in Section 5.6, Land Use) consists of actively farmed fields as well as other geothermal plants located throughout the area, including the Vulcan Power Plant and the Hoch (Del Ranch) Power Plant, both located to the southeast of the site. The nearest permanent residence to the Project site is located approximately 2.5 miles to the southeast. There are no schools, child daycare facilities, or assisted living/nursing facilities within a six-mile radius of the Project site.

The Project consists of the geothermal power plant as well as associated infrastructure, including seven new well pads and associated production and injection wells. In addition, the Project includes up to nine laydown and parking areas, two construction crew camps, and up to four borrow pits located throughout the region. Most of the laydown and parking areas for BRGP will be located adjacent to the site immediately south and east. However, all 15 sites may be used and will be shared between three proposed projects: BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project.

5.5.1.2 Project Hazardous Materials Use

The Project will use hazardous materials during construction and operation. The Project will comply with applicable laws and regulations for the storage of these materials to minimize the potential for a release of hazardous materials. In addition, the Project will conduct emergency response planning to address public health concerns regarding hazardous materials storage and use. The following sections describe the Project's use of hazardous materials, followed by tables detailing the characteristics, quantities, and use locations of the hazardous materials.

5.5.1.2.1 Construction Phase

Relatively small quantities of hazardous materials will be onsite during construction and will be limited to gasoline, diesel fuel, solvents, paint, and adhesives. The types of paint required are dictated by the types of equipment and structures that must be coated and by the service conditions and environment.

No regulated substances, as defined in California Health and Safety Code, Section 25531, will be used during construction of the Project.

5.5.1.2.2 Operations Phase

The storage locations for the hazardous materials that will be used during operation are described in Table 5.5-1. Table 5.5-2 includes information about these materials, including trade names, chemical names, Chemical Abstract Service (CAS) numbers, maximum quantities onsite, reportable quantities (RQs), California Accidental Release Program (CalARP) threshold planning quantities (TPQs), and status as Proposition 65 chemicals (chemicals known to be carcinogenic or cause reproductive problems in humans). Health hazards and flammability data are summarized for these materials in Table 5.5-3, which also contains information on incompatible chemicals. Toxicity characteristics and the exposure level criteria for these hazardous substances also are provided in Table 5.5-3.

Most of the hazardous substances that will be used by the Project are required for cooling water treatment, process chemicals, fueling of equipment, facility maintenance, and lubrication of equipment or will be contained within transformers and electrical switches. No regulated substances as defined in California Health and Safety Code, Section 25531 will be used during operation of the Project.

5.5.2 Environmental Analysis

Construction and operation of the Project will involve the use of various hazardous materials. The use of these materials and their potential to cause adverse environmental and human health effects are discussed in this section.

5.5.2.1 Significance Criteria

A project may have a significant effect on the environment in terms of hazardous materials handling if it would do the following (California Environmental Quality Act Guidelines Section 15002[g], Appendix G):

- Create a significant hazard to the public or the environment through the routine transport or use of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 (also known as the Cortese List) and, as a result, create a significant hazard to the public or environment (refer to Section 5.14, Waste Management, for a discussion of hazardous waste sites).
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

5.5.2.2 Transportation of Hazardous Materials

Project operations will require regular transportation of hazardous materials to the Project site. Transportation of hazardous materials will comply with all U.S Department of Transportation (DOT), California Department of Transportation (Caltrans), U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), California Highway Patrol (CHP), and California State Fire Marshal regulations. Compliance with applicable LORS will ensure that impacts from the transportation of hazardous materials will be less than significant. Truck access to the site for delivery of materials is described later in this section. Refer to Section 5.12, Traffic and Transportation, for additional details on the proposed transportation routes.

Trucks transporting hazardous materials will access the BRGP site, via State Route 111 (SR 111) and SR 78/SR 86. From SR 111 the trucks will access the site via Sinclair Road, Gentry Road, and McKendry Road.

Table 5.5-1. Use and Location of Hazardous Materials

Chemical[a]	Use	Maximum Quantity Onsite (gallons, lbs, tons)	Annual Quantity (gallons, lbs, tons)	Storage Location (General Arrangement Location Code)	State	Type of Storage
Chemical Treatment CL41	Oxidizing Biocide	1,000 gallons	3,250 gallons	Cooling Tower (62)	Liquid	Continuously onsite
ChemTreat CL456	Biodetergent	250 gallons	750 gallons	Cooling Tower (62)	Liquid	Continuously onsite
ChemTreat CL5428	Dispersant	250 gallons	750 gallons	Cooling Tower (62)	Liquid	Continuously onsite
ChemTreat CT775	Corrosion Inhibitor	250 gallons	750 gallons	Cooling Tower (62)	Liquid	Continuously onsite
ChemTreat CL2065	NonNonoxidizing Biocide	500 gallons	1,500 gallons	Cooling Tower (62)	Liquid	Continuously onsite
HASA 12.5% Sodium Hypochlorite Solution	Oxidizing Biocide	3,000 gallons	18,000 gallons	Cooling Tower (62)	Liquid	Continuously onsite
ChemTreat C2187T	Oxidizing Biocide – H_2S Abatement	2,000 lbs	75,000 lbs	Cooling Tower (62)	Solid	Continuously onsite
ChemTreat C2184G	Oxidizing Biocide – H_2S Abatement	500 lbs	1,100 lbs	Cooling Tower (62)	Solid	Continuously onsite
NALCO GEO901	Norms Inhibitor	6,000 gallons	73,000 gallons	NORMS (60)	Liquid	Continuously onsite
NALCO N7471 Antifoam	Antifoaming Agent	900 gallons	6,570 gallons	HP Separator Area (59)	Liquid	Continuously onsite
NALCO 1720	Oxygen Scavenger	500 gallons	4,500 gallons	Clarifier (61)	Liquid	Continuously onsite
GEO912	Scale Inhibitor	3,000 gallons	14,600 gallons	HP Separator (25)	Liquid	Continuously onsite
NALCO N9907	Polymer/Flocculant	4,000 lbs	47,450 lbs	Clarifier (61)	Solid	Continuously onsite
Battery Electrolyte	UPS and Emergency Shutdown Battery Array	1,200 gallons	1,200 gallons	Battery Rooms (37)	Liquid	Continuously onsite
Diesel No. 2	Fuel for Onsite Equipment	1,000 gallons	21,000 gallons	Fire Water Pump AST (39)	Liquid	Continuously onsite
Hydrochloric Acid <37%	Filter Press Wash	1,250 gallons	12,000 gallons	Filter Press (7)	Liquid	Continuously onsite
Sulfur Hexafluoride	Circuit Breakers/TET Test	300 lbs	300 lbs	Switchyards/Resources Test Unit (4, 54)	Gas	Continuously onsite
Anti-Freeze and Coolant	Portable Equipment in Shop	1,000 gallons	1,000 gallons	Maintenance Building (6)	Liquid	Continuously onsite
Naphtha	Portable Equipment in Shop	250 gallons	250 gallons	Maintenance Building (6)	Liquid	Continuously onsite

Chemical[a]	Use	Maximum Quantity Onsite (gallons, lbs, tons)	Annual Quantity (gallons, lbs, tons)	Storage Location (General Arrangement Location Code)	State	Type of Storage
Hydraulic fluid	Portable Equipment in Shop/Shop/Equipment	2,000 gallons	2,000 gallons	Maintenance Building/Filter Press (6)	Liquid	Continuously onsite
Laboratory reagents	Geothermal Fluids/Filter Cake Laboratory Filter Cake Laboratory Analysis	5 gallons	5 gallons	Laboratory/chemical storage cabinets (5)	Liquid and Granular Solid	Continuously onsite
Turbine Lubrication Oil	Lubricate Rotating Equipment (e.g., steam turbine bearings, valves)	12,000 gallons	12,000 gallons	Lubricating oil reservoirs adjacent to the steam turbine and drum storage in lubricant storage shed/warehouse (63)	Liquid	Continuously onsite
Mineral Insulating Oil	Transformers	22,000 gallons	15,000 gallons	Transformers and drum storage in lubricant storage shed (38, 44, 6)	Liquid	Continuously onsite
Acetylene	Welding Gas	500 cubic feet	500 cubic feet	Maintenance building (6)	Gas	Continuously onsite
Oxygen	Welding Gas	500 cubic feet	500 cubic feet	Maintenance building (6)	Gas	Continuously onsite
Propane	Torch Gas	500 cubic feet	500 cubic feet	Maintenance building (6)	Gas	Continuously onsite
Alloy Mix Gas	Welding Gas	500 cubic feet	500 cubic feet	Maintenance building (6)	Gas	Continuously onsite
Lab Gas (Helium, Argon, Nitrogen, Air)	Laboratory	500 cubic feet	500 cubic feet	Laboratory (5)	Gas	Continuously onsite
Liquid Argon	Laboratory	300 gallons	300 gallons	Laboratory (5)	Liquid	Continuously onsite
Cleaning Chemicals	Cleaning	Varies (< 25 gallons of fluids or 100 lbs of solid for each chemical)	Varies (< 25 gallons of fluids or 100 lbs of solids for each chemical)	Control Room (5)	Liquid or Solid	Continuously onsite
Paint	Touch-up of Painted Surfaces	Varies (< 25 gallons of fluids or 100 lbs of solid for each chemical)	Varies (< 25 gallons of fluids or 100 lbs of solids for each chemical)	Control Room (5)	Liquid	Continuously onsite

Notes:

[a] Chemical vendor may be subject to change; however, chemical class will remain the same or similar.

AST = aboveground storage tank
H_2S = hydrogen sulfide
HP = high pressure
lbs = pound(s)
UPS = uninterruptible power supply

Table 5.5-2. Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

Trade Name[a]	Chemical Name	CAS Number	Maximum Quantity Onsite (gallons, lbs, cu ft)	Annual Quantity (gallons, lbs, tons)	CERCLA SARA RQ[b]	RQ of Material as Used Onsite[c]	EHS TPQ[d]	Regulated Substance TQ[e]	Prop 65
Chemical Treatment CL41	Sodium bromide (40%)	7647–15–6	1,000 gallons	3,250 gallons	NA	NA	NA	NA	NA
ChemTreat CL456	Components not listed are either nonhazardous or in concentration of less than 1%	None	250 gallons	750 gallons	NA	NA	NA	NA	NA
ChemTreat CL5428	Components not listed are either nonhazardous or in concentration of less than 1%	None	250 gallons	750 gallons	NA	NA	NA	NA	NA
ChemTreat CT775	Phosphoric acid (60%-100%)	7664–38–2	250 gallons	750 gallons	5,000 lbs	5,000 – 8,333 lbs	NA	NA	NA
ChemTreat CL2065	Tributyltetradecyl phosphonium chloride (5%)	81741–28–8	500 gallons	1,500 gallons	NA	NA	NA	NA	NA
HASA 12.5% Sodium Hypochlorite Solution	Sodium Hypochlorite (12.5%), Sodium Hydroxide (0.2%)	7681-52-9, 1310-73-2	3,000 gallons	18,000 gallons	100 lbs (sodium hypochlorite) 1,000 lb (sodium hydroxide)	24,000 lbs (sodium hypochlorite) 1,500,000 lbs (sodium hydroxide)	NA	NA	NA
ChemTreat C2187T	Trichloroisocyanuric acid (92%-93%), Sodium bromide (7%), Boric acid (0%-1%)	87–90–1, 7647–15–6, 10043–35–3	2,000 lbs	75,000 lbs	NA	NA	NA	NA	NA
ChemTreat C2184G	Dichloroisocyanuric acid, sodium salt (88%-90%), Sodium bromide (6%-8%), Water (0.5%-3%), Sodium chloride (0.1%-1.5%)	2893–78–9, 7647–15–6, 7732–18–5, 7647–14–5	500 lbs	1,100 lbs	NA	NA	NA	NA	NA
NALCO GEO901	Amine Triphosphate, Sodium Phosphate, Tribasic, Ethylene Glycol	Proprietary, 7601-54-9, 107-21-1	6,000 gallons	73,000 gallons	5,000 lb (sodium phosphate, tribasic)	31,250 lb (per package)	NA	NA	NA

Trade Name[a]	Chemical Name	CAS Number	Maximum Quantity Onsite (gallons, lbs, cu ft)	Annual Quantity (gallons, lbs, tons)	CERCLA SARA RQ[b]	RQ of Material as Used Onsite[c]	EHS TPQ[d]	Regulated Substance TQ[e]	Prop 65
NALCO N7471 Antifoam	Ethoxylated Tall Oil (10%-30%)	Proprietary	900 gallons	6,570 gallons	NA	NA	NA	NA	NA
NALCO 1720	Sodium Bisulfite (10%-30%) Potassium Bisulfite (1%-5%)	7631-90-5, 7773-03-7	500 gallons	4,500 gallons	5,000 lb (sodium bisulfite)	16,667 – 50,000 lb	NA	NA	NA
GEO 912	NA	NA	3,000 gallons	14,600 gallons	NA	NA	NA	NA	NA
NALCO N9907	Sulfamic Acid (1%-5%), Adipic Acid (1%-5%)	5329-14-6, 124-04-9	4,000 lbs	47,450 lbs	5,000 lb (adipic acid)	100,000 – 500,000 lb	NA	NA	NA
Battery Electrolyte	Sulfuric Acid (30%-40%)	7664-93-9	1,200 gallons	1,200 gallons	1,000 lbs	2,500- 3,333 lb	10001 ,000 lbs	NA	Yes
Diesel No. 2	Petroleum Hydrocarbon	68476-34-6	1,000 gallons	21,000 gallons	NA	NA	500 lbs	NA	NA
Hydrochloric Acid <37%	Hydrochloric acid (30%-60%)	7647-01-0	1,250 gallons	12,000 gallons	5,000 lbs	8,333 – 16,667 lb	5,000 lbs	NA	Yes
Sulfur Hexafluoride	Sulfur Hexafluoride	2551-62-4	300 lbs	300 lbs	NA	NA	NA	NA	NA
Anti-Freeze and Coolant	Ethylene glycol	107-21-1	1,000 gallons	1,000 gallons	NA	5000 lb	NA	NA	NA
Naphtha	petroleum	64742-49-0	250 gallons	250 gallons	NA	NA	NA	NA	NA
Hydraulic Fluid	Oil	None	2,000 gallons	2,000 gallons	42 gallons	42 gallons	NA	NA	NA
Laboratory Reagents	Various	None	5 gallons	5 gallons	NA	NA	NA	NA	NA
Turbine Lubrication Oil	Oil	None	12,000 gallons	12,000 gallons	42 gallons	NA	NA	NA	NA
Mineral Insulating Oil	Oil	8012-95-1	22,000 gallons	15000 gallons	42 gallons	42 gallons	NA	NA	NA
Acetylene	Acetylene	47-86-2	500 cubic feet	500 cubic feet	NA	NA	NA	NA	NA
Oxygen	Oxygen	7782-44-7	500 cubic feet	500 cubic feet	NA	NA	NA	NA	NA
Propane	Propane	74-98-6	500 cubic feet	500 cubic feet	NA	NA	NA	NA	NA
Alloy Mix Gas	Various	Various	500 cubic feet	500 cubic feet	NA	NA	NA	NA	NA

Trade Name[a]	Chemical Name	CAS Number	Maximum Quantity Onsite (gallons, lbs, cu ft)	Annual Quantity (gallons, lbs, tons)	CERCLA SARA RQ[b]	RQ of Material as Used Onsite[c]	EHS TPQ[d]	Regulated Substance TQ[e]	Prop 65
Lab Gas (Helium, Argon, Nitrogen, Air)	None	None	500 cubic feet	500 cubic feet	NA	NA	NA	NA	NA
Liquid Argon	Cryogenic Liquid Argon	7440-37-1	300 gallons	300 gallons	NA	NA	NA	NA	NA
Cleaning Chemicals	Various	Various	Varies (< 25 gallons of fluids or 100 lbs of solids for each chemical)	Varies (< 25 gallons of fluids or 100 lbs of solids for each chemical)	NA	NA	NA	NA	NA
Paint	Paint	Various	Varies (< 25 gallons of fluids or 100 lbs of solids for each chemical)	Varies (< 25 gallons of fluids or 100 lbs of solids for each chemical)	NA	NA	NA	NA	NA

[a] Chemical vendor may be subject to change; however, chemical class will remain the same or similar.

[b] RQ for a pure chemical, per the CERCLA SARA (Ref. 40 CFR Section 302, Table 302.4). Release equal to or greater than RQ must be reported. Under California law, any amount that has a realistic potential to adversely affect the environment or human health or safety must be reported.

[c] RQ for materials as used onsite. Because some of the hazardous materials are mixtures that contain only a percentage of an RQ, the RQ of the mixture can be different than for a pure chemical. For example, if a material only contains 10 percent of a reportable chemical and the RQ is 100 lbs., the RQ for that material would be (100 lb)/(10 percent) = 1,000 lb.

[d] EHS TPQ (Ref. 40 CFR Part 355, Appendix A). If quantities of extremely hazardous materials equal to or greater than the TPQ are handled or stored, they must be registered with the local Administering Agency.

[e] TQ is from 19 CCR 2770.5 (state) or 40 CFR 68.130 (federal).

Notes:

CAS = Chemical Abstracts Service

CCR = California Code of Regulations

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

CFR = Code of Federal Regulations

cu ft = cubic feet

EHS = Extremely Hazardous Substance

NA = Not applicable. No reporting requirement. Chemical has no listed threshold under this requirement.

RQ = reportable quantity

SARA = Superfund Amendments and Reauthorization Act

TQ = threshold quantity

Table 5.5-3. Toxicity, Reactivity, and Flammability of Hazardous Substances Stored Onsite

Hazardous Materials[a]	Physical Description	Health Hazard	Reactive and Incompatibles	Flammability[b]
Chemical Treatment CL41	Liquid, Colorless, Clear	Minor health hazard.	Strong acids, Strong oxidizers	Not flammable
ChemTreat CL456	Liquid, Colorless, Clear	No significant health risks are expected from exposures under normal conditions of use.	Strong oxidizers	Not flammable
ChemTreat CL5428	Liquid, Light Straw, Clear	No significant health risks are expected from exposures under normal conditions of use.	Strong oxidizers, Strong bases	Not flammable
ChemTreat CT775	Liquid, Colorless, Clear	Causes severe skin burns and serious eye damage; harmful if swallowed.	Strong oxidizers, Bases, Fluorine, Reducing agents, Sulfur trioxide, Phosphorus pentoxide	Not flammable
ChemTreat CL2065	Liquid, Colorless, Clear	Causes severe skin burns and serious eye damage; toxic if inhaled.	Strong oxidizers, Strong reducing agents, Strong Alkalis	Not flammable
HASA 12.5% Sodium Hypochlorite Solution	Greenish yellow liquid	Skin corrosion/irritation; serious eye damage/irritation; specific target organ toxicity, single exposure.	Oxidizing agents, acids, nitrogen containing organics, metals, iron, copper, nickel, cobalt, organic materials, and ammonia	Not flammable
ChemTreat C2187T	Tableted Solid, White, Opaque	Causes severe skin burns and serious eye damage; fatal if inhaled; harmful if swallowed; may damage fertility or the unborn child.	Acids, Ammonia, Bases, Hypochlorites (bleach), Organic solvents, Reducing agents, Floor sweeping compounds, Calcium hypochlorite, Organic compounds	Oxidizer; may intensify fire
ChemTreat C2184G	Granular Solid, White, Opaque	Causes severe skin burns and serious eye damage; fatal if inhaled; harmful if swallowed; may cause respiratory irritation; may damage fertility or the unborn child.	Acids, Ammonia, Bases, Hypochlorites (bleach), Organic solvents, Reducing agents, Calcium hypochlorite, Floor sweeping compounds, Organic compounds	Oxidizer; may intensify fire
NALCO GEO901	Liquid, Colorless	Causes serious eye damage.	None known	Not flammable or combustible
NALCO N7471 Antifoam	Liquid, Clear, Amber	Causes skin irritation and serious eye irritation.	Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions, and toxic vapors	Not flammable or combustible
NALCO 1720	Liquid, Clear, Pungent	Harmful if swallowed; causes serious eye damage.	SO_2 may react with vapors from neutralizing amines and may produce a visible cloud of amine salt particles	Not flammable
GEO 912	Liquid, Clear, Light Yellow	None known.	None known	Not flammable or combustible

Hazardous Materials[a]	Physical Description	Health Hazard	Reactive and Incompatibles	Flammability[b]
NALCO N9907	Powder, White, Ammoniacal	Causes eye irritation.	Addition of water results in gelling; contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions, and toxic vapors	Not flammable or combustible
Battery Electrolyte	Liquid, Clear, Pungent	May cause cancer from inhalation of mists; causes severe skin burns and eye damage.	Metals, nitrates, chlorates, carbides and other organic materials	Not flammable
Diesel No. 2	Oily, Light Liquid	May be carcinogenic.	Oxidizers	Flammable
Hydrochloric Acid <37%	Liquid, White/Yellow, Acidic	Causes severe skin burns and eye damage; may cause respiratory irritation.	Water, strong bases, sulfuric acid, amines, bases, carbonates, oxidizers, metals	Not flammable
Sulfur Hexafluoride	Colorless, Odorless	May cause rapid suffocation. May cause dizziness, nausea, drowsiness, vomiting, excess salivation, loss of mobility/consciousness.	Disilane	Not flammable
Anti-Freeze and Coolant	Gold, Red, or Green Liquid	May cause damage to organs through prolonged or repeated exposure.	Not reactive under normal conditions	Flammable
Naphtha	Oil, dark liquid	Harmful if inhaled, causes skin and eye irritation, may be fatal if swallowed or enters airways, and may cause drowsiness and dizziness.	Oxidizers	Flammable
Hydraulic Fluid	Oily, dark liquid	Hazardous if ingested.	Oxidizers	Combustible
Laboratory Reagents	Liquid and solid	Refer to individual chemical labels.	Refer to individual chemical labels	Refer to individual chemical labels
Turbine Lubrication Oil	Oily, dark liquid	Hazardous if ingested.	Oxidizers	Flammable
Mineral Insulating Oil	Oily, clear liquid	Minor health hazard.	Oxidizers	Can be combustible, depending on manufacturer
Acetylene	Colorless gas	Asphyxiant gas.	Oxygen and other oxidizers including all halogens and halogen compounds; forms explosive acetylide compounds with copper, mercury, silver, brasses containing > 66% copper and brazing materials containing silver or copper	Flammable

Hazardous Materials[a]	Physical Description	Health Hazard	Reactive and Incompatibles	Flammability[b]
Oxygen	Colorless, odorless, tasteless gas	Therapeutic overdoses can cause convulsions; liquid oxygen is an irritant to skin.	Hydrocarbons, organic materials	Oxidizing agent; actively supports combustion
Propane	Propane gas (odorant added to provide odor)	Asphyxiant gas; causes frostbite to area of contact.	Strong oxidizing agents and high heat	Flammable
Alloy Mix Gas	Gas	Refer to individual chemical labels.	Refer to individual chemical labels	Refer to individual chemical labels
Lab Gas (Helium, Argon, Nitrogen, Air)	Gas	Displaces oxygen and causes rapid suffocation.	None Known	Not flammable
Liquid Argon	Colorless liquid	May cause burns or injury, displaces oxygen and causes rapid suffocation.	None Known	Data unavailable
Cleaning Chemicals	Liquid	Refer to individual chemical labels.	Refer to individual chemical labels	Refer to individual chemical labels
Paint	Various colored liquid	Refer to individual container labels.	Refer to individual container labels	Refer to individual container labels

[a] Chemical vendor may be subject to change; however, chemical class will remain the same or similar.

[b] Per Caltrans regulations, under 49 CFR 173: “Flammable” fluids have a flash point less than or equal to 141 degrees Fahrenheit; “Combustible” fluids have a flash point greater than 141 degrees Fahrenheit (DOT 2020).

Note:

Data were obtained from Safety Data Sheets. May be provided upon request.

5.5.2.3 Hazardous Materials Use

5.5.2.3.1 Construction Phase

Construction will involve the transport of limited quantities of hazardous materials to the Project site and may pose minor hazards associated with their use. Small fuel spills may occur during onsite refueling. Equipment refueling will be performed away from all aquatic resources to prevent contamination of water in the event of a fuel spill. As described in Section 5.5.4.1, best management practices (BMPs) will be employed to prevent spills and leaks from reaching the environment. If a fuel spill does occur on soil, the contaminated soil will be placed into barrels or trucks for appropriate offsite disposal. The worst-case scenario for a chemical release from fueling operations would be a vehicle accident involving a service or refueling truck.

The quantities of hazardous materials that will be handled during construction are relatively small. The BMPs described in Section 5.5.4.1 will be implemented by contractor personnel; therefore, the potential for environmental effects will be less than significant.

5.5.2.3.2 Project Operation

As stated previously, most of the hazardous materials that will be used by the Project are required for cooling water treatment, process chemicals, facility maintenance, lubrication and fueling of equipment, or will be contained within transformers and electrical switches. Hazardous materials will be contained within designated use areas, and their use will be carefully prescribed in hazardous materials handling plans, facility Health and Safety Plans, and the Hazardous Materials Business Plan (HMBP) required to be filed with the DTSC.

5.5.2.4 Accidental Release Hazards

During both construction and operations, if a chemical release were to occur without proper engineering controls in place, the public could be exposed to harmful vapors. Incompatible chemicals could mix, causing vapors that could potentially have harmful effects. In addition, during operations, an uncontrolled release of liquid chemicals could run off and drain into the brine pond, a Class II surface impoundment. However, the California Fire Code, Articles 79 and 80, includes specific requirements for the safe storage and handling of hazardous materials that would reduce the potential for a release of hazardous materials and mixing of incompatible materials. The Project design will incorporate storage and handling facilities in compliance with the California Fire Code as well as other applicable federal, state, and local LORS. With the implementation of these measures, the potential for the accidental release of hazardous materials will be minimized.

5.5.2.4.1 Offsite Consequences Analysis

No regulated substances, as defined in California's Health and Safety Code, Section 25531, will be used during the construction or operation phase of the Project. Therefore, an offsite consequences analysis is not necessary.

5.5.2.5 Fire and Explosion Hazards

Table 5.5-3 describes the hazard characteristics, such as flammability, for the hazardous materials that will be stored and used onsite. Article 80 of the California Fire Code requires all hazardous material storage areas to be equipped with a fire extinguishing system, and also requires ventilation for all enclosed hazardous material storage areas. Elements of the onsite fire suppression system during construction will consist of portable and fixed firefighting equipment. Portable firefighting equipment will consist of fire extinguishers and small hose lines that conform to the California Division of Occupational Safety and Health (Cal/OSHA) and the National Fire Protection Association.

Machinery lubrication oil is combustible. In accordance with Article 80 of the California Fire Code, the storage area for the lubrication oil will be equipped with a fire extinguishing system, and the lubrication oil will be handled in accordance with an HMBP approved by the DTSC, the Certified Unified Program Agency (CUPA). With proper storage and handling of flammable materials in accordance with the California Fire Code and the site specific- HMBP, the risk of fire and explosion at the Project will be minimal.

The Imperial County Fire Department (ICFD) and Calipatria Fire Department (CFD) are responsible for commanding all hazardous materials incidents at the Project site. The CFD is the closest fire station and primary responder for any fire incidents at the Project site. The closest fire station is located at 125 North Park Avenue, Calipatria, California, approximately seven miles southeast of the Project. The ICFD has one station located at 1078 Dogwood Road, Heber, California, approximately 31 miles south of the Project. If hazardous materials were involved in the incident, Imperial County has a Hazardous Materials (HAZMAT) Task Force that includes firefighters with HAZMAT training from stations in cities throughout the County. The task force members have HAZMAT response training, and they are located around Imperial County to balance the distribution of HAZMAT protection resources (Nadarro 2023).

5.5.3 Cumulative Effects

A cumulative effect refers to a proposed Project’s incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed Project (Public Resources Code Section 21083; Title 14 CCR, Sections 15064[h], 15065[c], 15130, and 15355).

One industrial-zoned property designated as Medium Industrial Area with a Geothermal Overlay (M-2-G) is located approximately 0.75 mile southeast of the plant site (Imperial County 2023a). Several existing geothermal energy production sites are within six miles of the plant site, including Energy Source Mineral ALTiS, Hell's Kitchen Geothermal Exploration Project, Midway Solar Farm IV, Lindsey Solar Farm, Wilkinson Solar Farm, Ormat Wister Solar, Elmore North Geothermal Project, and Morton Bay Geothermal Project as shown in Appendix 5.6A, List of Cumulative Projects. Although these facilities are industrial in nature, the facilities are similarly located within areas zoned for agriculture and open space. The Project will involve the storage, use, disposal, and transport of hazardous materials to varying degrees during construction and operations. The accidental release of hazardous materials can be mitigated to less-than-significant levels through compliance with various federal, state, and local laws, regulations, and policies regarding transport, storage, and use of hazardous materials. Therefore, the Project’s contribution to cumulative hazardous materials impacts is considered less than significant. Additionally, existing and future projects proposed also are subject to, and likely to follow, federal, state, and local laws and ordinances for safe use and storage of hazardous materials; thus, cumulative effects are not significant.

5.5.4 Mitigation Measures

The following sections present measures to mitigate potential public health and environmental effects of handling hazardous materials during construction and operation.

5.5.4.1 Construction Phase

The hazardous materials that would be used during construction present a relatively low public health risk but could contaminate surface water or groundwater if a release occurred. Use of BMPs would reduce the potential for the release of construction-related fuels and other hazardous materials to stormwater and receiving waters as discussed in Section 5.15, Water Resources. BMPs will prevent sediment and stormwater contamination from spills or leaks, control the amount of runoff from the Project, and require proper disposal or recycling of hazardous materials and wastes.

Construction service personnel will follow general industry health, safety, and environmental BMPs for filling and servicing construction equipment and vehicles. The BMPs are designed to reduce the potential for incidents involving hazardous materials, and include the following:

- Refueling and maintenance of vehicles and equipment will occur only in designated areas that are either bermed or covered with concrete, asphalt, or other impervious surfaces to control potential spills. Employees will be present during refueling activities.
- Vehicle and equipment service and maintenance will be conducted only by authorized personnel.
- Refueling will be conducted only with approved pumps, hoses, and nozzles.
- Catch-pans will be placed under equipment to catch potential spills during servicing.
- All disconnected hoses will be placed in containers to collect residual fuel from the hoses.
- Vehicle engines will be shut down during refueling.
- No smoking, open flames, or welding will be allowed in refueling or service areas.
- Refueling will be performed away from all aquatic resources to prevent contamination of water in the event of a leak or spill.
- When refueling is completed, the service truck will leave the Project site.
- Service trucks will be provided with fire extinguishers and spill containment equipment, such as absorbents.
- Should a spill contaminate soil, the soil will be put in containers and disposed of as appropriate. All containers used to store hazardous materials will be inspected at least once per week for signs of leaking or failure. All maintenance and refueling areas will be inspected monthly. Results of inspections will be recorded in a logbook that will be maintained onsite.

In the unlikely event of a spill, the spill may need to be reported to the appropriate regulatory agencies, and cleanup of contaminated soil could be required. Small spills will be contained and cleaned up immediately by trained, onsite personnel. Larger spills will be reported via emergency phone numbers to obtain help from offsite emergency response and cleanup crews. All personnel working on the Project during the construction phase will be trained in handling hazardous materials and the dangers associated with hazardous materials. An onsite health and safety person will be designated to implement health and safety guidelines and to contact emergency response personnel and the local hospital, if necessary.

If there is a large spill from a service or refueling truck, contaminated soil will be placed into barrels or trucks by service personnel for offsite disposal at an appropriate facility in accordance with the law. If a spill involves hazardous materials quantities equal to or greater than the specific RQ (42 gallons for petroleum products), then all federal, state, and local reporting requirements will be followed. In the event of a fire or injury, the local fire department will be called.

5.5.4.2 Operation Phase

During BRGP operations, various hazardous materials will be stored onsite as shown in Table 5.5-1. Table 5.5-2 presents information about these materials, including trade names, chemical names, CAS numbers, maximum quantities onsite, RQs, CalARP TPQs, and status as Proposition 65 chemicals. Health hazards and flammability data are summarized for these materials in Table 5.5-3, which also contains information on incompatible chemicals. The following sections list mitigation measures for minimizing the public health risks associated with hazardous material handling during facility operation.

5.5.4.2.1 Hazardous Materials

All hazardous materials will be handled and stored in accordance with applicable codes and regulations specified in Section 5.5.5. Specific requirements of the California Fire Code that reduce the risk of fire or the potential for a release of hazardous materials that could affect public health or the environment include the following:

- Providing an automatic sprinkler system for any indoor hazardous material storage areas
- Providing an exhaust system for any indoor hazardous material storage areas
- Separating incompatible materials by isolating them from one another with a noncombustible partition
- Providing spill control in all storage, handling, and dispensing areas
- Providing separate secondary containment for each chemical storage system; the secondary containment is required to hold the entire contents of the tank plus the volume of water for the fire suppression system that could be used for fire protection for a period of 20 minutes in the event of a catastrophic spill

In addition, a Business Emergency/Contingency Plan (in this case, an HMBP) is required by CCR Title 19 and the Health and Safety Code (Section 25504). In accordance with these regulations, the HMBP will include an inventory and location map of hazardous materials onsite and an emergency response plan for hazardous materials incidents. Specific topics addressed in the plan will include the following:

- Facility identification
- Emergency contacts
- Chemical inventory information (for every hazardous material)
- Site map
- Emergency notification data
- Procedures to control actual or threatened releases
- Emergency response procedures
- Training procedures
- Certification

The HMBP will be filed with the DTSC, the designated CUPA for the County, and will be updated annually in accordance with applicable regulations.

In accordance with emergency response procedures specified in the HMBP, designated personnel will be trained as members of a plant hazardous material response team, and team members will receive the first responder and hazardous material technical training to be developed in the HMBP, including training in appropriate methods to mitigate and control accidental spills. In the event of a chemical emergency, plant personnel will defer to the ICFD, DTSC, and first responders. The CFD, located in Calipatria, would be the first responder onsite. The Imperial County HAZMAT team is located throughout Imperial County and also may be called on to respond. Staff from the Imperial County Public Health Department (ICPHD), Environmental Health Division or DTSC (the designated CUPA for Imperial County) also may be dispatched to the Project site, if warranted.

5.5.4.2.2 Petroleum Products

Federal and California regulations require a Spill Prevention, Control, and Countermeasure (SPCC) plan if petroleum products above certain quantities are stored. Both federal and state laws apply only to petroleum products that might be discharged to navigable waters. If stored quantities are equal to or greater than 1,320 gallons total (including aboveground storage tanks [ASTs], oil-filled equipment, and drums), an SPCC plan must be prepared. Because the facility will store more than 1,320 gallons of petroleum products, an SPCC plan will be prepared.

5.5.4.2.3 Transportation/Delivery of Hazardous Materials and Regulated Substances

Hazardous materials will be delivered periodically to the facility. As discussed in Section 5.12, Traffic and Transportation, transportation of hazardous materials will comply with all Caltrans, DOT, EPA, DTSC, CHP, and California State Fire Marshal regulations. Under the California Vehicle Code (CVC), CHP has the authority to adopt regulations for transporting hazardous materials in California.

5.5.4.2.4 Security Plan

In addition to standard industrial business security measures, the Project will be preparing a security plan that will include the following elements:

- Descriptions of site fencing and security gate;
- Evacuation procedures;
- A protocol for contacting law enforcement in the event of conduct endangering the facility, its employees, its contractors, or the public;
- A fire alarm monitoring system;
- Measures to conduct site personnel background checks, including employee and routine onsite contractors, consistent with state and federal law regarding security and privacy;
- A site access protocol for vendors; and
- A protocol for hazardous materials vendors to prepare and implement security plans as per 49 CFR 172.800 and to ensure that all hazardous materials drivers comply with personnel background security checks as per 49 CFR Part 172, Subpart I.

The plan also will include a demonstration that the perimeter security measures will be adequate. The demonstration may include one or more of the following:

- Security alarm for critical structures;
- Perimeter breach detectors and onsite motion detectors; and
- Video or still camera monitoring system to enable offsite monitoring.

5.5.4.3 Monitoring

In compliance with applicable federal, state, and local LORS, Project personnel will regularly inspect the facility will ensure that any deficiencies are promptly repaired. In addition, the Project would be subject to regular inspections by the ICPHD, Environmental Health Division, which would determine compliance with appropriate regulatory requirements for hazardous materials handling.

5.5.5 Laws, Ordinances, Regulations, and Standards

The storage and use of hazardous materials at the facility are governed by federal, state, and local LORS to protect the environment from contamination and to protect facility workers and the surrounding community from exposure to hazardous materials. The applicable LORS are summarized in Table 5.5-4 and described in the following sections.

Table 5.5-4. Laws, Ordinances, Regulations, and Standards for Hazardous Materials Handling

LORS	Requirements/ Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
Section 302, EPCRA (Public Law 99–499, 42 USC 11022) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR 370)	Requires one-time notification if EHSs are stored in excess of TPQs.	DTSC	An HMBP will be prepared and provided within the CERS submittal (Section 5.5.4.2).
Section 304, EPCRA (Public Law 99–499, 42 USC 11002) Emergency Planning and Notification (40 CFR 355)	Requires notification when there is a release of hazardous material in excess of its RQ.	DTSC	An HMBP will be prepared to describe notification and reporting procedures (Section 5.5.4.2).
Section 311, EPCRA (Public Law 99–499, 42 USC 11021) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR 370)	Requires that SDSs for all hazardous materials or a list of all hazardous materials be submitted to the State Emergency Response Commission, LEPC, and ICPHD, Environmental Health Division.	ICPHD, Environmental Health Division	The HMBP to be prepared will include a list of hazardous materials for submission to agencies (Section 5.5.4.2).
Section 313, EPCRA (Public Law 99–499, 42 USC 11023) Toxic Chemical Release Reporting: Community Right-To-Know (40 CFR 372)	Requires annual reporting of releases of hazardous materials.	EPA	The HMBP to be prepared will describe reporting procedures (Section 5.5.4.2).
Section 311, CWA (Public Law 92–500, 33 USC 1251 et seq.) Oil Pollution Prevention (40 CFR 112)	Requires preparation of an SPCC plan if the total petroleum storage (including ASTs, oil-filled equipment, and drums) is greater than 1,320 gallons. The facility will have petroleum in excess of the aggregate volume of 1,320 gallons.	RWQCB, CUPA, ICPHD, Environmental Health Division	An SPCC will be prepared (Section 5.5.4.2).
State			
Health and Safety Code, Section 25500, et seq. (HMBP)	Requires preparation of an HMBP if hazardous materials are handled or stored in excess of threshold quantities.	Cal/OSHA	An HMBP will be prepared and provided within the CERS submittal (Section 5.5.4.2).
Health and Safety Code, Section 25270 through 25270.13 (Aboveground Petroleum Storage Act)	Requires preparation of an SPCC plan if the total petroleum storage (including ASTs, oil-filled equipment, and drums) is greater than 1,320 gallons. The facility will have petroleum in excess of the aggregate volume of 1,320 gallons.	RWQCB, CUPA, ICPHD, Environmental Health Division	An SPCC plan will be prepared (Section 5.5.4.2).

LORS	Requirements/ Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Health and Safety Code, Section 25249.5 through 25249.13 (Safe Drinking Water and Toxics Enforcement Act) (Proposition 65)	Requires warning to persons exposed to a list of carcinogenic and reproductive toxins and protection of drinking water from same toxins.	OEHHA	The site will be appropriately labeled for chemicals on the Proposition 65 list (Section 5.5.5.2).
Local			
No local ordinances for hazardous materials. Imperial County follows state laws and regulations.			

Notes:

Cal/OSHA = California Division of Occupational Safety and Health

CERS = California Environmental Reporting System

CWA = 1972 Amendments to the Federal Water Pollution Control Act, commonly known as the Clean Water Act

EPCRA = Emergency Planning and Community Right-to-Know Act of 1986

GO = General Order

LEPC = local emergency planning committee

OEHHA = Office of Environmental Health Hazard Assessment

RWQCB = Regional Water Quality Control Board

SDS = Safety Data Sheet

USC = United States Code

5.5.5.1 Federal LORS

Hazardous materials are governed under CERCLA, the Clean Air Act (CAA), and the CWA.

5.5.5.1.1 29 CFR Sections 1910 et seq. and 1926 et seq.

These sections contain requirements for equipment used to store and handle hazardous materials for the purpose of protecting worker health and safety. This regulation also addresses requirements for equipment necessary to protect workers in emergencies. It is designed primarily to protect worker health, but also contains requirements that affect general facility safety. The California regulations contained in Title 8 (California equivalent of 29 CFR) are generally more stringent than those contained in Title 29. The administering agencies are the U.S. Occupational Safety and Health Administration (OSHA) and Cal/OSHA.

5.5.5.1.2 49 CFR Parts 172, 173, and 179

These regulations provide standards for labels, placards, and markings on hazardous materials shipments by truck (Part 172), for packaging hazardous materials (Part 173), and for transporting hazardous materials in tank cars (Part 179). The administering agencies are the CHP and the DOT.

5.5.5.1.3 CERCLA

The Superfund Amendments and Reauthorization Act (SARA) amends CERCLA and governs hazardous substances. The applicable part of SARA for the proposed Project is Title III, otherwise known as the EPCRA, which requires states to establish a process for developing local chemical emergency preparedness programs and to receive and disseminate information on hazardous substances present at facilities in local communities. The law provides primarily for planning, reporting, and notification concerning hazardous substances. Key sections of the law are as follows:

- Section 302—Requires one-time notification when EHSs are present in excess of their TPQs. EHSs and their TPQs are found in Appendices A and B to 40 CFR Part 355.
- Section 304—Requires immediate notification to the LEPC and the State Emergency Response Commission when a hazardous material is released in excess of its RQ. If a CERCLA-listed hazardous substance RQ is released, notification also must be given to the National Response Center in Washington, DC. (RQs are listed in 40 CFR Part 302, Table 302.4.) These notifications are in addition to notifications given to the local emergency response team or fire personnel.
- Section 311—Requires that either SDSs for all hazardous materials or a list of all hazardous materials be submitted to the State Emergency Response Commission, LEPC, and local fire department.
- Section 313—Requires annual reporting of hazardous materials released into the environment either routinely or as a result of an accident.

The administering agencies are EPA Region 9, the National Response Center, and the DTSC (the designated CUPA).

5.5.5.1.4 Clean Air Act

Regulations (40 CFR 68) under the CAA are designed to prevent accidental releases of hazardous materials. The regulations require facilities storing a TQ or greater of listed regulated substances to develop a risk management plan (RMP), including hazard assessments and response programs to prevent accidental releases of listed chemicals. Section 112(r)(5) of the CAA discusses the regulated substances. These substances are listed in 40 CFR 68.130.

5.5.5.1.5 Clean Water Act

The SPCC rule under the CWA is designed to prevent or contain the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Regulations (40 CFR 112) under the CWA require facilities to prepare a written SPCC plan if they store oil and its release would pose a threat to navigable waters. The SPCC rule is applicable if a facility has a single oil AST with a capacity greater than 1,320 gallons, or underground storage capacity greater than 42,000 gallons. The SPCC rule is administered by the local CUPA, which is the DTSC, or ICPHD, Environmental Health Division.

Other related federal laws that address hazardous materials but do not specifically address their handling include the Resource Conservation and Recovery Act (which is discussed in Section 5.14, Waste Management) and the Occupational Safety and Health Act (which is discussed in Section 5.16, Worker Health and Safety).

5.5.5.2 State LORS

California laws and regulations relevant to hazardous materials handling at the Project include Health and Safety Code Section 25500 (hazardous materials), Health and Safety Code 25531 (regulated substances), and the Aboveground Petroleum Storage Act (petroleum in aboveground tanks).

5.5.5.2.1 Title 8, CCR, Section 339; Section 3200 et seq.; Section 5139 et seq.; and Section 5160 et seq.

Title 8 CCR Section 339 lists hazardous chemicals relating to the Hazardous Substance Information and Training Act; Title 8 CCR Section 3200 et seq. and 5139 et seq. address control of hazardous substances; and Title 8 CCR Section 5160 et seq. addresses hot, flammable, poisonous, corrosive, and irritant substances.

5.5.5.2.2 Health and Safety Code Section 25500

California Health and Safety Code, Section 25500, et seq., and the related regulations in 19 CCR 2620, et seq., require local governments to regulate local business storage of hazardous materials in excess of certain quantities. The law also requires that entities storing hazardous materials be prepared to respond to releases. Those using and storing hazardous materials are required to submit an HMBP to their local CUPA and to report releases to their CUPA and the State Office of Emergency Services. The TQs for hazardous materials are 55 gallons for fluids, 500 pounds for solids, and 200 cubic feet for compressed gases measured at standard temperature and pressure.

5.5.5.2.3 Health and Safety Code Section 25531 (CalARP)

California Health and Safety Code, Section 25531, et seq., and CalARP regulate the registration and handling of regulated substances. Regulated substances are any chemicals designated as an EHS by EPA as part of its implementation of SARA Title III. Health and Safety Code Section 25531 overlaps or duplicates some of the requirements of SARA and the CAA. Facilities handling or storing regulated substances at or above TPQs must register with their local CUPA.

5.5.5.2.4 Aboveground Petroleum Storage Act

The California Health and Safety Code, Sections 25270 to 25270.13, ensure compliance with the CWA. The law applies to facilities that operate a petroleum AST with capacity greater than 1,320 gallons, or oil-filled equipment where there is a reasonable possibility that the tank(s) or equipment may discharge oil in "harmful quantities" into navigable waters or adjoining shore lands. If a facility falls under these criteria, it must prepare an SPCC plan.

5.5.5.2.5 Proposition 65

Proposition 65, which requires the state to identify chemicals that cause cancer and reproductive toxicity, contains requirements for informing the public of the presence of these chemicals, and prohibits discharge of the chemicals into sources of drinking water. Lists of the chemicals of concern are published and updated periodically by California's OEHHA. The Project will have geothermal filter cakes, battery electrolytes, and hydrochloric acid onsite, which are listed on the cancer-causing and reproductive-toxicity lists of Proposition 65.

5.5.5.2.6 CVC Section 32100.5

CVC Section 32100.5 regulates the transportation of hazardous materials that pose an inhalation hazard. No substances posing an inhalation hazard will be transported to the facility.

5.5.5.3 Local LORS

Imperial County does not have any local ordinances for hazardous materials but follows State laws and regulations. The DTSC is the designated CUPA and is responsible for administering HMBP, and SPCC plans filed by businesses located in the County (Salinas 2023). There will be no underground storage at the site. In addition, the agency is responsible for ensuring that businesses and industry store and use hazardous materials safely and in conformance with various regulatory codes.

5.5.5.4 Codes

The design, engineering, construction, and operation of hazardous materials storage and dispensing systems will be in accordance with all applicable codes and standards, including the following:

- CVC, 13 CCR 1160, et seq.—Provides CHP with authority to adopt regulations for the transportation of hazardous materials in California. CHP can issue permits and specify the route for hazardous material delivery.

- The 2022 California Fire Code, Title 24, Part 9, Chapter 50—These are the hazardous materials sections of the Fire Code. Local fire agencies or departments enforce this code and can require that an HMBP and a Hazardous Materials Inventory Statement be prepared. The California Fire Code is based on the federal fire guidelines, which include the Uniform Fire Code.
- State Building Standard Code, Health and Safety Code Sections 18901 to 18949—Incorporates the Uniform Building Code, Uniform Fire Code, and Uniform Plumbing Code.
- The American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section VIII.

5.5.6 Agencies and Agency Contacts

Several agencies regulate hazardous materials, and they will be involved in regulating the hazardous materials stored and used at the Project. At the federal level, EPA will be involved; at the state level, California Environmental Protection Agency will be involved. However, local agencies primarily enforce hazardous materials laws. For the Project, the primary local agencies with jurisdiction will be the ICPHD, Environmental Health Division and ICFD. Contact information is shown in Table 5.5-5.

Table 5.5-5. Agency Contacts for Hazardous Materials Handling

Issue	Agency	Contact
CUPA for Hazardous Materials Business Plan	DTSC	Laura Florez DTSC Imperial CUPA 627 Wake Avenue El Centro, California 92243 (760) 352-0381
Fire Department Permits	Imperial County Fire Department	Imperial County Fire Prevention Department 2514 La Brucherie Imperial, Ca. 92251 (442) 265-6000
Hazardous Materials Response	Imperial County Fire Department 1078 Dogwood Road, Heber, CA 92249	Rotating contacts (24/7), Battalion Chief Christian Guzman (A Shift Supervisor), Battalion Chief Hector Garcia (B Shift Supervisor), and Battalion Chief Oscar Robles (C Shift Supervisor). (442) 265-3010
	Calipatria Fire Department 125 N Park Avenue Calipatria, CA 92233	Jesse Llanas Fire Captain (760) 348-4144 J_Llanas@calipatria.com
	ICPHD, Environmental Health Division	Mario Salinas MarioSalinas@co.imperial.ca.us Imperial County Public Health Department, Environmental Health Division 935 Broadway St. El Centro, CA 92243 (442) 265-1888

5.5.7 Permits and Permit Schedule

The ICPHD, Environmental Health Division and DTSC do not require permits; however, the HMBP is required to be provided within the California Environmental Reporting System (CERS) submittal prior to storing hazardous materials onsite (Florez 2023 and Salinas 2023). Table 5.5-6 identifies the permits for hazardous materials handling.

Table 5.5-6. Permits for Hazardous Materials Handling

Submittal	Agency Contact	Schedule
HMBP	Laura Florez DTSC Imperial CUPA 627 Wake Avenue El Centro, California 92243 (760) 352-0381	Approximately 30 days before any regulated substance comes onsite, and submitted to DTSC and ICPHD via CERS

5.5.8 References

Florez, Laura (Florez), Department of Toxic Substances and Control. February 17, 2023. Personal communication with Lindsey Xayachack, Jacobs; discussed permitting requirements for hazardous materials and waste.

Salinas, Mario (Salinas), Imperial County Public Health Department, Environmental Division. February 17, 2023. Personal communication with Lindsey Xayachack, Jacobs; discussed inspection and permitting requirements for hazardous materials and waste.

Nadarro, Nydia (Nadarro), Engineer, City of Calipatria Fire Department. January 30, 2023. Personal communication with Emma McGinty, Jacobs; discussed fire department current information and staffing and provided the most updated contact information. Confirmed that the Imperial County Fire Department's contact information has changed.

U.S. Department of Transportation (DOT). 2020. *Emergency Response Guidebook*.

5.6 Land Use

This section discusses the environmental and regulatory setting and includes the analysis of potential land use impacts associated with the Black Rock Geothermal Project (BRGP or Project). For the purpose of this section, the affected environment study area (study area) is defined as those areas within one mile of the Project and 0.25 mile of related ancillary facilities (Title 20, California Code of Regulations [CCR], Appendix B). Section 5.6.1 describes the environment that could be affected by the Project. Section 5.6.2 presents an environmental analysis on potential Project impacts. Section 5.6.3 discusses potential cumulative effects. Section 5.6.4 presents recommended measures to mitigate significant impacts. Section 5.6.5 presents the laws, ordinances, regulations, and standards (LORS) applicable to land use. Section 5.6.6 provides the agencies and agency contacts for land use issues. Section 5.6.7 provides a discussion of permits and Section 5.6.8 lists the references used in preparing this section.

5.6.1 Affected Environment

5.6.1.1 Location

The Project study area is located entirely within the northern portion of unincorporated Imperial County near the southeastern shore of the Salton Sea, approximately 0.5 mile east of Obsidian Butte and 0.25 mile southeast of the Salton Sea shoreline. The primary geothermal energy production site, referred to as the Project site in this analysis, is a 55-acre portion of a larger 160-acre parcel that has been assigned Assessor's Parcel Number (APN) 020-110-08. The Project site is generally located on the southwestern corner of Boyle Road and McKendry Road.

State Route (SR) 111, located approximately six miles east of the Project site, is the main north-south roadway corridor in the area. However, Gentry Road, located approximately 0.5 mile east of the Project site, is a paved north-south roadway that would be used for site access. McKendry Road (unpaved) would be used to access the property from Gentry Road. The Project site is surrounded by McKendry Road to the north, the Vail 4-A canal and Boyle Road to the east, geothermal production equipment to the southeast, Grubel Road to the south, and the Vail 5 canal and Severe Road to the west.

Project-related ancillary facilities include production and injection well sites, aboveground production and injection pipelines, freshwater connections, generation interconnection transmission (gen-tie) line, temporary laydown yards, temporary construction camps, and temporary borrow pits. These supportive facilities are located within five miles of the Project site. Refer to Figure 1-4 for the Project component locations.

5.6.1.2 Existing Land Uses

5.6.1.2.1 Project Site

Existing land uses at the Project site are agricultural and include active row crops. An approximate two-acre square area on the northeastern corner of the property is vacant; however, several cement pads and wooden poles are present. The remainder of the parcel outside of the Project site, where facilities such as well pads will be located, is also currently in agricultural use. This portion of the parcel includes an approximate four-acre rectangular area on the southeastern perimeter, which is largely vacant but contains aboveground pipelines and well equipment associated with the neighboring geotechnical facility east of Boyle Road. Similarly, two approximately one-acre square areas on the southwest and northwest corners of the property are vacant.

5.6.1.2.2 Well Sites

Five production wells, installed on three new well pads, will be required for full plant operation. The production well pads will be located on the same parcel as the Project site. The production well heads will connect with the Project site via aboveground production pipelines that lead to the Resource Production

Facility (RPF), as shown on Figure 1-4. Production wells are expected to be drilled to an average total depth of approximately 7,500 feet below the surface. Existing land uses at the production well pad sites are agricultural.

Seven injection wells, installed on four well pads, will be required for full plant operation. The injection well pads are generally located along Boyle Road and Gentry Road, south and southeast of the Project site. The RPF will connect with the injection wells via aboveground injection pipelines. Injection wells are expected to be drilled to a total depth of approximately 7,500 feet below the surface. Existing land uses at the injection well pad sites are agricultural.

5.6.1.2.3 Pipelines

Project-related ancillary facilities include a network of aboveground production and injection pipelines, which will be constructed of appropriate corrosion-resistant alloys or functional equivalent. The pipelines will be supported on drilled pier cast-in-place foundations. Both production and injection pipelines will be installed aboveground to allow regular inspection. During construction, the pipelines will require a 150-foot right-of-way (ROW). During operations, the pipelines will require a 50-foot ROW, plus an additional 10 percent to accommodate several expansion joints required along the length of the pipelines. One or more pipelines would be constructed within each ROW.

The aboveground production pipelines will be located on the same parcel as the Project site and will connect each production well head to the RPF located on the Project site. Generally, the production pipeline will travel from the well pad located in the southwest area of the parcel in a northerly direction along the west side of the Project site, turning east along the northern side of the Project site, before turning south into the RPF. The total length of the production pipeline is approximately one linear mile. Existing land uses at the production pipeline sites are agricultural.

The aboveground injection pipelines will connect the RPF to remote injection wells. Generally, the injection pipeline will travel from the RPF, eastward along the southern side of the Project site, south to the southern perimeter of the parcel, and eastward to Boyle Road. The aboveground injection pipeline will travel south along the west side of Boyle Road over KUDU property while connecting to injection well heads along the route. The injection pipeline will go underground to cross Boyle Road, reappear above ground, and travel east along the south side of West Lindsey Road before terminating at the injection well site located on the southwestern corner of West Lindsey Road and Gentry Road. The total length of the injection pipeline is approximately six linear miles. Existing land uses at the injection pipeline sites are agricultural.

5.6.1.2.4 Gen-Tie Line Route

A gen-tie line would extend northward from the Project to McKendry Road. The gen-tie line would travel eastward along McKendry Road to Garst Road and then extend northward. The gen-tie line will interconnect with the new 230-kilovolt (kV) switching station located off Garst Road over Smith and Baretta property, immediately south of the Elmore North facility. In total, the new gen-tie line will be approximately 2.3 linear miles long, consisting of 23 tubular steel poles (TSP), each TSP reaching a height of approximately 130 feet.

Conductor lines spanning the gen-tie alignment would be subject to General Order-95 (GO-95). GO-95 requires above ground 230-kV conductor lines, located in rural districts or other areas capable of being traversed by vehicles or agricultural equipment, to have a minimum ground clearance of 30 feet (CPUC 2020). The Project would be constructed with a minimum conductor clearance with the ground of 30 feet.

The gen-tie line would be located adjacent to existing roadways, the Project site, and the new switchyard. Existing land uses along the gen-tie route are roadways and agricultural.

5.6.1.2.5 Water Supply

The source of external water for the facility will be from an existing Imperial Irrigation District (IID) water canal. The primary water supply connection is via the Vail 4A Lateral, Gate 459 or 460. The pipeline route will extend from the southeast corner of the Project site, along Boyle Road, ending at Vail 4A Lateral. The secondary route will extend from the Project to Vail 4 Lateral, Gate 417 or 418 via an approximately 0.5-mile connection through a buried 10-inch pipeline. Due to the underground nature of the freshwater supply pipeline, no land uses are associated.

5.6.1.2.6 Temporary Construction Laydown Yards, Parking Areas, Borrow Pits, and/or Construction Camps

As shown on Figure 1-4, nine areas are proposed for combination of temporary construction laydown yards and parking areas. Four areas are proposed for temporary borrow pits in the event additional fill material is required. Two areas are proposed for construction camps to support Project construction. Temporary security fencing will be installed around each of the temporary construction laydown yards, parking areas, borrow pits, and construction camp boundaries. Additionally, security personnel will be onsite.

5.6.1.3 Important Farmland

The California Department of Conservation’s (DOC) Farmland Mapping and Monitoring Program (FMMP) developed categorical definitions of important farmlands for land inventory purposes. Important farmlands provide the best opportunity for agricultural production. According to the FMMP, the Project site is designated primarily as Farmland of Statewide Importance. Prime Farmland is present within the northwestern and southeastern portions of the Project site parcel. The northeast corner of the parcel is designated as Farmland of Local Importance and the southwestern corner of the parcel is designated as Other Land (DOC 2022).

FMMP designations at the various Project areas, including supportive facilities, are listed by permanent impact acreage in Table 5.11.2 and are illustrated on Figure 5.11-2. Of the total 63.10 acres of permanent impacts associated with the BRGP site, approximately 96% are located on Important Farmland, consisting of approximately 7.33 acres of Prime farmland, 50.94 acres of farmland of Statewide Importance, and 2.25 acres of farmland of Local Importance. Impacts associated with the well pads and distribution pipelines are not considered in evaluating Important farmland impacts because the land will continue to be used for farming purposes during Project operation.

As defined by the DOC, Prime Farmland contains the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Farmland of Statewide Importance is similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. For both Farmland of Statewide Importance and Prime Farmland, the land must have been used for irrigated agricultural production at some time during the four years prior to the FMMP mapping date. Farmland of Local Importance is defined as land that is of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee. Other Land is defined as land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry, or aquaculture facilities; strip mines and borrow pits; and water bodies smaller than 40 acres (DOC 2023).

5.6.1.4 Williamson Act

Imperial County currently does not participate in Williamson Act contracts and there are currently no active contracts within Imperial County. On February 23, 2010, the Imperial County Board of Supervisors approved Minute Order #10a, which forced all existing Williamson Act contracts into nonrenewal and denied any new contracts. The last Williamson Act contracts expired in 2020 (Newland pers. comm. 2023).

5.6.1.5 Surrounding Land Uses

This section provides a description of land uses surrounding the Project site. Current surrounding land uses include agricultural, open space, recreational, geothermal energy production, and equipment staging. Refer to Figure 5.6-1 for land use designations surrounding the Project sites. Refer to Figure 5.6-2 for zoning designations surrounding the Project sites.

5.6.1.5.1 Land Uses Adjacent to the Project Site

Table 5.6-1 lists current land uses on property adjacent to the Project site.

Table 5.6-1. Land Uses Adjacent to the Project Site

Location From Project Site	Current Use	Zoning
North of the Project site	Open Space; recreational; agricultural	Open Space/Recreational with Renewable Energy/Geothermal Overlay (S-1-RE); Open Space/Recreational with Geothermal Overlay (S-1-G)
East of the Project site	Agricultural; Geothermal energy production; equipment staging	Heavy Agricultural Area with a Geothermal Overlay (A-3-G)
South of the Project site	Agricultural; Geothermal energy production; equipment staging	Heavy Agricultural Area with a Geothermal Overlay (A-3-G)
West of the Project site	Open Space; recreational	Heavy Agricultural Area with Renewable Energy/Geothermal Overlay (A-3-RE); Open Space/Recreational with Renewable Energy/Geothermal Overlay (S-1-RE)

Sources: Imperial County 2023a; Google Earth 2023

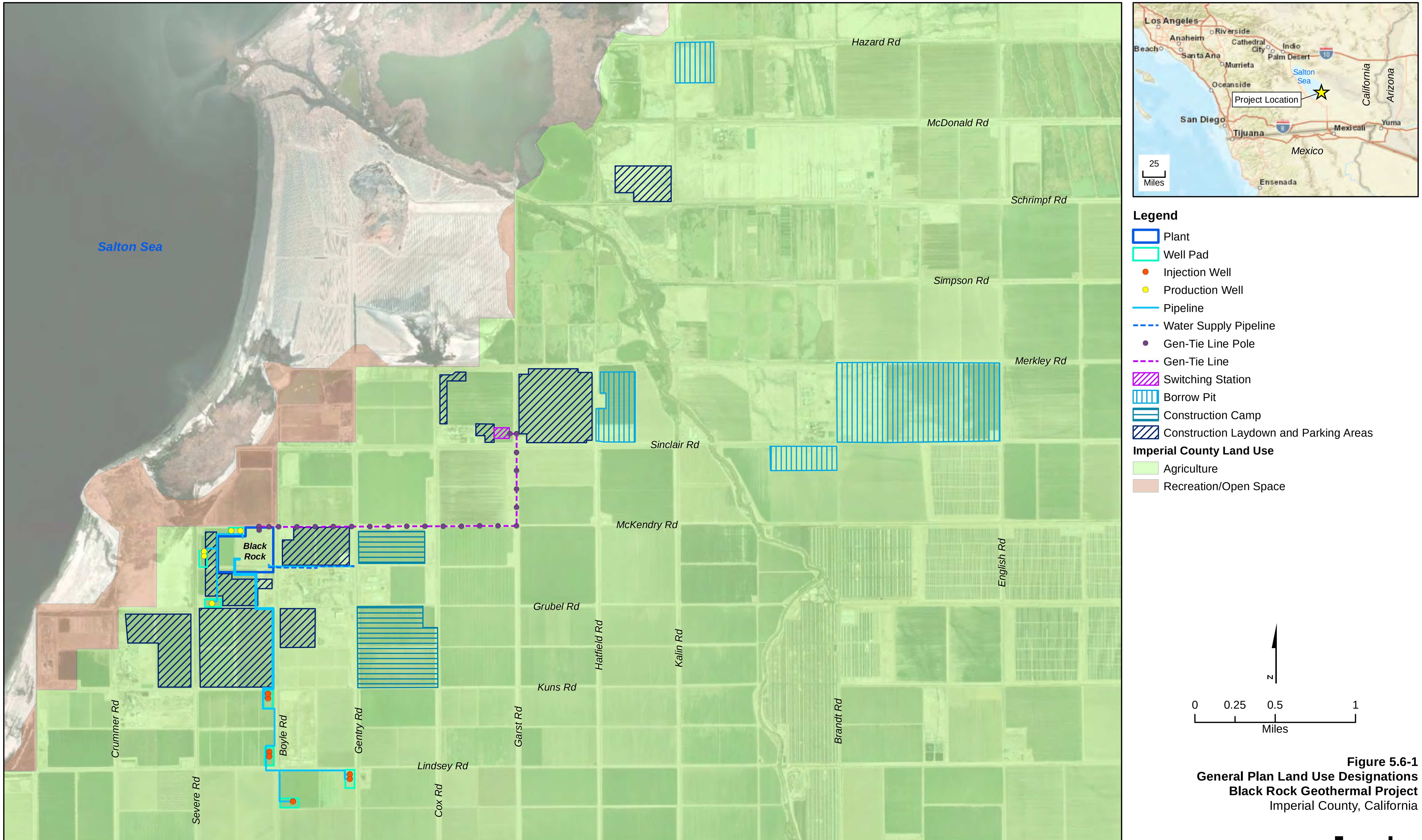


Figure 5.6-1
General Plan Land Use Designations
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Land_Use\Black_Rock_Land_Use_230201.mxd

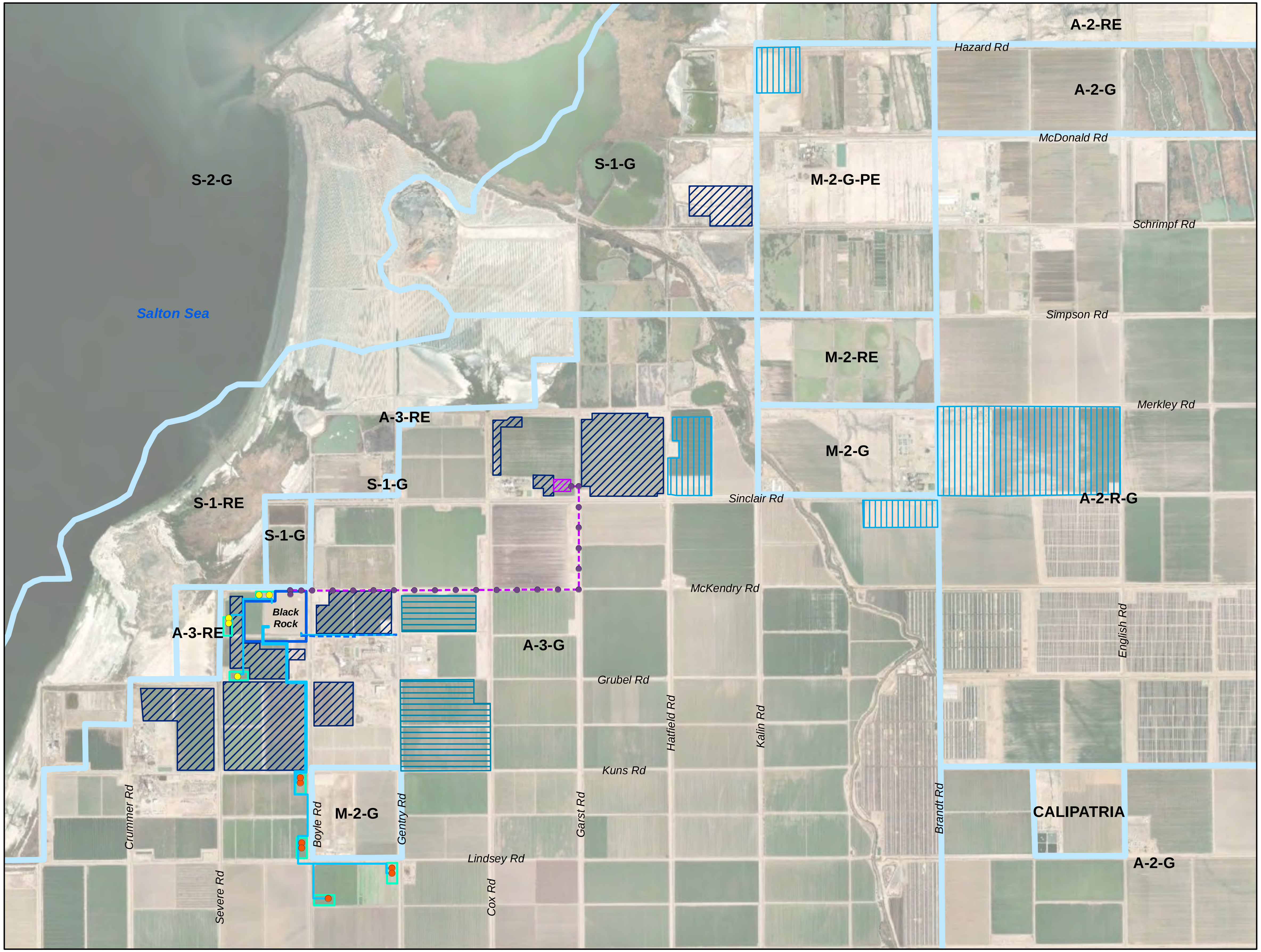


Figure 5.6-2
Zoning Designations
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Land_Use\Black_Rock_Zoning_230201.mxd

5.6.1.5.2 Sensitive Land Uses

Sensitive receptors include residences, schools, care facilities, places of worship, and recreational facilities. Table 5.6-2 lists sensitive receptors within the Project study area.

Table 5.6-2. Sensitive Land Uses Within the Project Study Area

Approximate Distance from the Project Site (miles)	Current Use	Zoning
0.65 (northwest)	Sonny Bono Salton Sea National Wildlife Refuge – Visitor Center and employee lodging	Open Space/Recreational with Geothermal Overlay (S-1-G)
0.5 (north)	Sonny Bono Salton Sea National Wildlife Refuge – Rock Hill Trail	Open Space/Recreational with Renewable Energy/Geothermal Overlay (S-1-RE)
0.2 (north)	Sonny Bono Salton Sea National Wildlife Refuge – Hunting Blind U1	Open Space/Recreational with Geothermal Overlay (S-1-G); Open Space/Recreational with Renewable Energy/Geothermal Overlay; (S-1-RE)
0.2 (north)	Sonny Bono Salton Sea National Wildlife Refuge – Hunting Blind U2	Open Space/Recreational with Geothermal Overlay (S-1-G)
0.08 (north)	Sonny Bono Salton Sea National Wildlife Refuge – Hunting Blind U1/U2 Parking	Open Space/Recreational with Renewable Energy/Geothermal Overlay (S-1-RE)
0.21 (northeast)	Sonny Bono Salton Sea National Wildlife Refuge – Hunting Blind U3	Heavy Agricultural Area with Geothermal Overlay (A-3-G)
0.35 (northeast)	Sonny Bono Salton Sea National Wildlife Refuge – Hunting Blind U4	Heavy Agricultural Area with Geothermal Overlay (A-3-G)
0.03 (northeast)	Sonny Bono Salton Sea National Wildlife Refuge – Hunting Blind U3/U4 Parking	Heavy Agricultural Area with Geothermal Overlay (A-3-G)

Sources: Imperial County 2023a; Google Earth 2023

5.6.1.5.3 Industrial Land Uses

The Project site is located within a predominately agricultural area. One industrial-zoned property designated as Medium Industrial Area with a Geothermal Overlay (M-2-G) is located approximately 0.75 mile southeast of the Project site (Imperial County 2023a).

Several existing geothermal energy production sites are within 1.5 miles of the Project site, including the Elmore Geothermal Facility and three CalEnergy geothermal generating facilities. Although these facilities are industrial in nature, the facilities are similarly located within areas zoned for agricultural and open space.

5.6.1.5.4 Residential Land Uses

The Sonny Bono Salton Sea National Wildlife Refuge (NWR) includes employee housing and is located 0.65 mile northwest of the Project. The Red Hill Marina County Park includes camping facilities located approximately 2.3 miles northeast of the Project. The nearest permanent private residence to the Project site is located approximately 2.5 miles to the southeast. No residential zoned properties are within the Project study area (Imperial County 2023a).

5.6.1.5.5 Agricultural Land Uses

Agricultural operations dominate the surrounding land uses. As of January 2023, active agricultural operations occurred throughout the general area, including on property to the north, east, and south of the Project site. The majority of this surrounding zoning designation is Heavy Agriculture Area with a Geothermal Overlay (A-3-G) (Imperial County 2023a).

The FMMP designation on surrounding agricultural properties varies among Farmland of Local Importance, Farmland of Statewide Importance, and Prime Farmland. As described in Section 5.6.1.4, no properties associated with a Williamson Act contract are located in the Project study area. FMMP designations at the various Project facilities, including ancillary components, are listed by permanent impact acreage in Table 5.11.2 and are illustrated on Figure 5.11-2.

5.6.1.5.6 Recreation

Recreational opportunities are located along the Salton Sea shoreline and open water. Nearby lands with recreational zoning designations include the land to the west and north of the Project site designated as Open Space/Recreation with a Renewable Energy/Geothermal Overlay (S-1-RE) and Open Space/Recreation with a Geothermal Overlay (S-1-G).

Sonny Bono Salton Sea National Wildlife Refuge

The Sonny Bono Salton Sea NWR offers public recreation opportunities. Portions of the wildlife refuge are located north of the Project site. Waterfowl hunting occurs from October through February. Ponds have been created and farm fields planted to provide feeding and resting areas for waterfowl. Hunting blinds are set up throughout the refuge, with pit blinds buried in the farm fields and near ponds for goose and duck hunting. The blinds are assigned via a lottery administered by the California Department of Fish and Game. During years when the ponds contain much aquatic vegetation, duck hunting can be very good for mallard, teal, redhead, gadwall and other species. Field hunting for snow and Ross's geese is consistently productive. The refuge provides an important public hunting opportunity in California's Imperial Valley and is a very popular spot for Southern California hunters. Blinds U-1 through U-4, along with designated parking areas, are located immediately north and northeast of the Project site.

There are approximately 35,500 acres of refuge lake area open to fishing, with water ranging from shallow to approximately 20 feet deep. Fishing season is year-round. Available species include orangemouth corvina, sargo, gulf croaker, and tilapia. Boat fishing only is permitted.

Approximately 2,100 miles of trails and boardwalks meander throughout the wildlife refuge. Trails range from paved and universally accessible to challenging. Particular trails include displays on visual arts, local history and culture, or environmental education. Rock Hill trail is located approximately 0.5 mile north of the Project site.

Education programs are featured at the wildlife refuge and many teachers, outdoor education leaders, adult leaders, and students are actively involved in exploring the diverse habitats of the wildlife refuge. Students participate in a variety of hands-on activities that are designed to teach ecological concepts that focus on the NWR’s resource management issues such as habitat preservation, endangered species, and migratory birds (USFWS n.d.).

5.6.1.5.7 Open Space

Under Section 65560 of the State Government Code, open space is defined as any parcel or area of land or water that is essentially unimproved and devoted to an open space use, and that is designated on a local, regional, or state open space plan as any of the following: open space for the preservation of natural resources, open space used for the managed production of resources, open space for outdoor recreation, or open space for public health and safety.

Open space use within the Project study area is synonymous with recreation, agriculture, or vacant land. Land with an open space zoning designation, specifically Open Space/Recreational with a Renewable Energy/Geothermal Overlay (S-1-RE) and Open Space/Recreational with a Geothermal Overlay (S-1-G), is located to the north, northeast, and east of the Project site (Imperial County 2023a).

5.6.1.5.8 Scenic Areas

As discussed in Section 5.13 (Visual), the greater Salton Sea region, along with surrounding desert environments, have significant visual resources and scenic value. Particularly, the Salton Sea shoreline near the Project site, including shoreline associated with the Sonny Bono Salton Sea National Wildlife Preserve, has significant visual resources that are accessible to, and benefit, the general public.

The Imperial County General Plan includes scenic resources within the Conservation and Open Space Element. However, the Project site is not within an Imperial County designated scenic resource protection area (Imperial County 2016). No California Department of Transportation (Caltrans)-designated scenic highways are located in the Project vicinity. Highways SR 78 and SR 111 are Caltrans-designated Eligible Scenic Highways and are located approximately 10 miles southwest and six miles east of the Project site, respectively. A portion of SR 78 is a Caltrans officially designated Scenic Highway and is located approximately 31 miles west of the Project site (Caltrans 2023).

5.6.1.5.9 Natural Resource Protection

The Desert Renewable Energy Conservation Plan (DRECP) was developed as a Habitat Conservation Plan/Natural Community Conservation Plan and a Bureau of Land Management (BLM) Land Use Plan Amendment covering both public and private lands across seven counties, including Salton Sea area in Imperial County (Conservation Biology Institute 2023). The Project is within the boundaries of the DRECP, but it is not located on BLM lands or Areas of Critical Environmental Concern (Conservation Biology Institute 2023). Therefore, the Project is consistent with the DRECP.

5.6.1.5.10 Schools, Child Care Centers, and Nursing Homes

As discussed in Section 5.6.1.5.6, the Sonny Bono Salton Sea NWR provides educational programs to the public. However, no schools, child daycare facilities, or assisted living/nursing homes are located within one mile of the Project site. The Project area is within the Calipatria United School District and the nearest school is Calipatria High School, located approximately 6.3 miles southeast of the Project site. The nearest childcare center (United Families, Inc.) and libraries (Meyer Memorial Library and Imperial County Library) are located in Calipatria, approximately 6.7 miles southeast of the Project site. No nursing home facilities are within 10 miles of the Project site.

5.6.1.5.11 Religious Facilities

No formal religious facilities are located within one mile of the Project site. Several religious facilities are located in Calipatria. The nearest religious facility, Potter's House Church of Calipatria, is located approximately 6.7 miles southeast of the Project site.

5.6.1.5.12 Cultural and Historic

Section 5.3, Cultural Resources, provides a discussion of cultural and historic resources in the Project study area, including implementation of standard mitigation measures to address incidental discovery of resources during construction of the Project.

5.6.1.5.13 Unique Land Uses

No unique land uses, other than geothermal-related uses, have been identified within the Project study area.

5.6.2 Environmental Analysis

5.6.2.1 Significance Criteria

Significance criteria for impacts on land use were determined through a review of applicable state and local regulations. Because of the California Energy Commission's (CEC's) Site Certification Process pursuant to the Warren-Alquist Act, which is a certified agency program pursuant to the California Environmental Quality act (CEQA), the following criteria developed from the CEQA Guidelines and the CEQA Checklist were used to evaluate the potential environmental impacts of the Project:

1. Will the Project physically divide an established community?
2. Will the Project cause a significant environmental impact due to a conflict with any applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

5.6.2.2 Potential Effects on Land Use during Project Construction and Operation

Will the Project physically divide an established community?

The Project site is not within an established community. Surrounding land uses are rural and include agricultural and geothermal energy operations. The Project would not physically divide or inhibit land uses in the Project study area (**no impact**).

Will the Project cause a significant environmental impact due to a conflict with any applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The Project is located within unincorporated Imperial County and is subject to Imperial County land use plans and policies. Consistency of the Project with applicable local land use plans, policies, and regulations is detailed in Table 5.6-3.

Table 5.6-3. Project Conformity with Applicable Local Land Use Plans and Policies

Goal/Objective	Project Consistency
Imperial County General Plan (adopted 1993)	
Land Use Element	
Commercial Agriculture	
Goal 1: Preserve commercial agriculture as a prime economic force. ▪ Objective 1.1: Encourage the continued agricultural use of prime/productive agricultural lands. ▪ Objective 1.2: Discourage the location of incompatible development adjacent to or within productive agricultural lands. ▪ Objective 1.3: Identify compatible agriculture-related uses or renewable energy projects appropriate for location in agricultural areas. ▪ Objective 1.4: Encourage and enhance the continued participation in the County Williamson Act Program. ▪ Objective 1.5: Encourage agricultural food processing or value-added business to locate in Imperial County to further enhance the continued viability of the Agricultural Economy. ▪ Objective 1.6: Encourage the continued viability and growth of the agricultural industry to minimize dependence on foreign food supplies to the region and the country.	Although the Project does not preserve commercial agriculture on prime/productive agricultural lands, Objective 1.3 identifies renewable energy projects as an alternative to agricultural uses if the location is appropriate. Because the Project is located on land designated by Imperial County as an appropriate zoning with the Geothermal Overlay, the location is considered an appropriate site for renewable energy. Therefore, the renewable energy Project is an appropriate alternative to commercial agriculture and is compatible with development adjacent to/within productive agricultural lands. No properties subject to a Williamson Act contract are affected by the Project. The Project would support the community, including agricultural businesses and industries located in Imperial County, by producing renewable energy for commercial consumption. The Project is not directly consistent with Goal 1 due to the development of prime/productive agricultural lands to nonagricultural uses. However, renewable energy production, specifically geothermal, has been identified by Imperial County as an appropriate alternative. Therefore, impacts associated with the inconsistency of Goal 1 are less than significant.
Economic Growth	
Goal 2: Diversify employment and economic opportunities in the county while preserving agricultural activity. ▪ Objective 2.1: Achieve a balanced and diversified local economy with a variety of economic and employment opportunities. ▪ Objective 2.2: Provide adequate space and land use classifications to meet current and projected economic needs for commercial development. ▪ Objective 2.3: Continue to evaluate economic development strategies, including new industrial, commercial, and tourist-oriented land uses. Tourist-oriented uses must be compatible with BLM management goals in areas near BLM lands.	Project development (construction and operations) will create diverse employment opportunities for Imperial County residents. Further, local businesses will be supported by construction and operational employees. The Project is not located on or near BLM land. The Project will create diverse employment and economic opportunities for Imperial County residents and businesses. Therefore, the Project is consistent with Goal 2 and no impact would occur.

Goal/Objective	Project Consistency
Regional Vision	
Goal 3: Achieve a balanced economic and residential growth while preserving the unique natural, scenic, and agricultural resources of Imperial County. ▪ **Objective 3.2:** Preserve agriculture and natural resources while promoting diverse economic growth through sound land use planning. ▪ **Objective 3.4:** Protect/improve the aesthetics of Imperial County and its communities. ▪ **Objective 3.6:** Recognize and coordinate planning activities as applicable with BLM and the California Desert Conservation Plan. ▪ **Objective 3.15:** Support the safe and orderly development of renewable energy in conformance with the goals and objectives of the Renewable Energy and Transmission Element.	The Project is not directly consistent with Goal 3 due to the lack of agricultural resource preservation. However, Objective 3.15 calls for the support of safe and orderly development of renewable energy in conformance of the goals and objectives of the Renewable Energy and Transmission Element of the General Plan. Therefore, with conformance to the goals and objectives of the Renewable Energy and Transmission Element of the General Plan, impacts related to inconsistency with Goal 3 would be **less than significant**.
Industrial Development	
Goal 6: Promote orderly industrial development with suitable and adequately distributed industrial land. ▪ **Objective 6.1:** Provide adequate space and land use classifications to meet current and projected economic needs for industrial development.	The Project will provide for industrial development that will use existing space and land use classifications designated for renewable energy production. Operation of the Project would support the objective to meet current and projected economic needs for industrial development. Therefore, the Project is consistent with Goal 6 and **no impact** would occur.
Protection of Environmental Resources	
Goal 9: Identify and preserve significant natural, cultural, and community character resources and the county's air and water quality. ▪ **Objective 9.1:** Preserve as open space those lands containing watersheds, aquifer recharge areas, floodplains, important natural resources, sensitive vegetation, wildlife habitats, historic and prehistoric sites, or lands that are subject to seismic hazards and establish compatible minimum lot sizes.	The Project is situated on property zoned for geothermal and supportive facility uses. No Project components are located on land designated as open space. No historic or prehistoric sites would be impacted by the Project. The Project is consistent with Goal 9 and **no impact** would occur. Refer to Section 5.2 for information on sensitive habitats and Section 5.3 for information on cultural resources in the Project area.
Conservation and Open Space Element	
Conservation of Environmental Resources for Future Generations	
Goal 1: Environmental resources shall be conserved for future generations by minimizing environmental impacts in all land use decisions and educating the public on their value. ▪ **Objective 1.1:** Encourage uses and activities that are compatible with the fragile desert environment and foster conservation.	The Project will be subject to best management practices and potential mitigation measures that would avoid or minimize environmental impacts to the extent feasible. The Project is located on lands designated for geothermal development and not on lands identified for conservation. Therefore, the Project is consistent with Goal 1 and **no impact** would occur.

Goal/Objective	Project Consistency
Renewable Energy and Transmission Element	
Goal 1: Support the safe and orderly development of renewable energy while providing for the protection of environmental resources. ▪ **Objective 1.1:** The County of Imperial supports the overall goals of the DRECP to provide a balance between the development of renewable energy resources while preserving sensitive environmental resources within its jurisdiction **Goal 2:** Encourage development of electrical gen-tie lines along routes that minimize potential environmental effects. ▪ **Objective 2.1:** To the extent practicable, maximize use of IID's transmission capacity in existing easements or ROWs. Encourage the location of all major gen-tie lines within designated corridors, easements, and ROWs. ▪ **Objective 2.2**: Where practicable and cost effective, design gen-tie lines to minimize impacts on agricultural, natural, and cultural resources, urban areas, military operation areas, and recreational activities. **Goal 8:** Develop overlay zones that will facilitate the development of renewable energy resources while preserving and protecting agricultural, natural, and cultural resources. Development of overlay zones shall include coordination with federal, state, county, Tribal governments, educational entities, the public and local industries. ▪ **Objective 8.1:** Allow for county review with appropriate development and performance standards for development of local resources within the overlay zones.	**Goal 1:** The Project would contribute the safe and orderly development of renewable energy and avoid or minimize potential impacts on environmental resources. The Project will be subject to the DRECP and must comply with the overall goals of facilitating renewable energy development and conserving desert resources. Therefore, impacts would be **less than significant**. **Goal 2:** New electrical transmission structures would be required to support the Project. However, the electrical gen-tie lines would be located along the same ROWs and easements as existing IID gen-tie lines, if applicable. The Project has designed gen-tie lines to minimize impacts on agricultural, natural, and cultural resources and on recreational areas when practicable and cost effective. Therefore, impacts would be **less than significant**. **Goal 3:** The Project is within the Geothermal Overlay zone and ancillary components would require Imperial County review via the Conditional Use Permit process. Therefore, **no impacts** would occur.
Agricultural Element	
Goal 1: All Important Farmland, including the categories of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance, as defined by federal and state agencies, should be preserved for agricultural uses. ▪ **Objective 1.1:** Maintain existing agricultural land uses outside of urbanizing areas and allow only those land uses in agricultural areas that are compatible with agricultural activities. ▪ **Objective 1.3:** Conserve Important Farmland for continued farm-related (non-urban) use and development while ensuring its proper management and use. ▪ **Objective 1.4**: Discourage the location of development adjacent to productive agricultural lands. ▪ **Objective 1.6**: Recognize and preserve unincorporated areas of the county, outside of city sphere of influence areas, for irrigation agriculture, livestock production, aquaculture, and other special uses.	**Goal 1**: The Project is not directly consistent with Goal 1 due to the conversion of important farmland to nonagricultural uses. However, per the Imperial County Municipal Code, geothermal production is a compatible use in the A-3-G zone. There is a purpose and need for the conversion of agricultural land to nonagricultural uses, as described in the Section 2: Project Description. The Project site is within a relatively rare resource area for geothermal activity that is predominately used for agricultural operations. Due to the established purpose and need, limited accessible geothermal resources, and zoning, which allows for geothermal energy production, impacts would be **less than significant**.

Goal/Objective	Project Consistency
▪ **Objective 1.8:** Allow conversion of agricultural land to nonagricultural uses including renewable energy only where a clear and immediate need can be demonstrated, based on economic benefits, population projections and lack of other available land (including land within incorporated cities) for such nonagricultural uses. Such conversion shall also be allowed only where such uses have been identified for nonagricultural use in a city or county general plan, and are supported by a study to show a lack of alternative sites.	

Refer to Section 5.6.5.3.2 and Figure 5.6-2 for zoning information on Project components. The Project site and the majority of the supportive facilities are located on land zoned as A-3 with a Geothermal Overlay. Per Imperial County Municipal Code Section § 90509.02, major geothermal projects that meet the requirements of Division 17 are conditionally permitted in the A-3 zoning. Further, the Geothermal Overlay identifies the parcel as suitable for geothermal activities. Accessory uses and structures, if incidental to and accessory to the primary permitted uses, are permitted by right in the A-3 zone. Gen-tie lines are permitted by right within the A-3 zone. Temporary construction yards and construction camps are conditionally permitted in the A-3 zone. Mining and mineral extraction is conditionally permitted in the A-3 zone.

Temporary Construction Laydown Yard, Parking Area, and/or Borrow Pit #1 is located on a parcel with a zoning designation of Medium Industrial Area with Geothermal and Pre-Existing Allowed/Restricted Overlays (M-2-G-PE). Per Imperial County Municipal Code Section § 90516.01, contractor equipment yards and contractor storage yards are uses permitted by right within the M-2 zone.

Temporary Construction Laydown Yard and Parking Area #2 is located on a parcel with a zoning designation of Open Space/Recreational with a Geothermal Overlay (S-1-G). Per Imperial County Municipal Code Section § 90518.02, temporary contractor storage yards are conditionally permitted uses within the S-1 zone.

Borrow Pits #2 and #4 are located on parcels with a zoning designation of General Agricultural/Rural Zone with Geothermal Overlay (A-2-R-G). Per Imperial County Municipal Code Section § 90507.02, mineral extraction and resource extraction are conditionally permitted uses within the A-2 zone.

The Project site orientation includes front, side, and rear setbacks greater than the minimum required setbacks set forth in Imperial County Municipal Code Section § 91702, as described in Section 5.6.5.3.3. The maximum building height at the Project site is approximately 95 feet in height, below the 120-foot maximum building height established by Imperial County Municipal Code Section § 90509.07.

The Project components are located on parcels with zoning designations allowing for geothermal and associated supportive facilities. Project site structures comply with the development standards established by Imperial County Municipal Code Section § 90509.07. The Project is consistent with the applicable goals and objectives established by the Imperial County General Plan. Implementation of the Project would result in less than significant impacts to applicable land use plans, policies, or regulations.

5.6.3 Cumulative Effects

A cumulative impact refers to a proposed Project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed Project (Public Resources Code [PRC] Section 21083; CCR, Title 14, Section 15064[h], 15065[c], 15130, and 15355).

The CEQA Guidelines further note that:

> The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative effects can result from individually minor, but collectively significant, projects taking place over a period of time.

Cumulative land use impacts could occur if the development of the Project and other related past, present, and reasonably foreseeable probable future projects will be inconsistent with applicable plans and policies or have other cumulative land use-related impacts such as the conversion of farmland.

The Project will involve the construction and operation of a new electric generation facility primarily located on a parcel zoned for agricultural or geothermal energy production uses. The FMMP identified the Project site as containing Important Farmland, including Prime Farmland and Farmland of Statewide

Importance. However, the Project site is designated for agricultural or geothermal energy production uses by the Imperial County Zoning Code. Although the Project and associated supportive facilities will result in the conversion of designated agricultural lands to other land uses, the land is also designated for geothermal energy production. The Project is consistent with land use plans and policies and is compatible with adjacent uses. Therefore, the Project will not significantly contribute to cumulative impacts associated with land use compatibility.

Moreover, there are no past, present, or reasonably foreseeable future projects proposed within the Project area that would result in adjacent incompatible land uses (refer to Appendix 5.6A for a list of cumulative projects). Imperial County established the Geothermal Overlay zone along with Division 17 of Title 9 to facilitate the beneficial use of the geothermal resource for the general welfare of the public and manage geothermal resources. Projects identified on the list of cumulative projects, as well as future projects, will be subject to LORS intended to minimize or avoid significant cumulative impacts. Significant long-term cumulative impacts are not anticipated with the implementation of the Project and the listed cumulative projects because each project is required to comply with CEQA guideline requirements for evaluating potential cumulative impacts, and/or to obtain approval from the Lead Agency prior to permitting and construction by demonstrating conformance to existing land use policies. For these reasons, the Project will not cause a significant cumulative land use impact.

5.6.4 Mitigation Measures

Because the Project is not expected to cause significant adverse impacts related to land use, as discussed in Section 5.6.2, mitigation is not necessary.

5.6.5 Laws, Ordinances, Regulations, and Standards

This section lists and discusses the land use LORS that apply to the Project. Consistent with Application for Certification (AFC) requirements, all plans and policies applicable to the one-mile area surrounding the Project site and 0.25-mile area surrounding the offsite ancillary facilities are summarized below. As discussed above, the Project site, including all Project components (Project site, pipelines, staging area, switching station, and gen-tie lines), are located in unincorporated Imperial County.

5.6.5.1 Federal Laws, Ordinances, Regulations, and Standards

5.6.5.1.1 Federal Aviation Administration Title 14 *Code of Federal Regulations* Part 77.9

The Federal Aviation Administration (FAA) requires that all structures exceeding Title 14 *Code of Federal Regulations* [CFR] Part 77.9 notice criteria be submitted to the FAA so that an aeronautical study can be conducted. The FAA's objective in conducting aeronautical studies is to ensure that proposed structures do not have an effect on the safety of air navigation and the efficient use of navigable airspace by aircraft. The end result of an aeronautical study is the issuance of a determination of "hazard" or "no hazard" that can be used by the proponent to obtain necessary local construction permits.

The Project is located approximately six miles northwest of the Calipatria Municipal Airport, outside of the Airport Land Use Compatibility Plan (Imperial County 1996). Further, because the atmospheric vent stacks would be approximately 95 feet above grade, there is sufficient clearance to avoid a hazard to air navigation. Therefore, FAA review under Title 14 CFR Part 77.9 is not anticipated.

5.6.5.2 State Laws, Ordinances, Regulations, and Standards

5.6.5.2.1 Warren-Alquist Act

The AFC process is a certified regulatory process pursuant to the Warren-Alquist Act and, therefore, fulfills the requirements of CEQA. CEQA is codified in the California PRC, Section 21000-21178.1. Guidelines for implementation of CEQA are codified in the CCR, Sections 15000-15387.

5.6.5.2.2 California Land Conservation Act (Williamson Act)

The California Land Conservation Act of 1965, commonly known as the Williamson Act, was enacted to encourage preservation of agricultural lands and encourage open space preservation and efficient urban growth. The Williamson Act provides incentives to landowners through reduced property taxes to create an agricultural preserve and agree to keep their land in agricultural production (or another compatible use) for at least 10 years. Maps, statistics, and reports on Williamson Act lands are available online. As discussed in Section 5.6.1.4, no active Williamson Act contracts exist within Imperial County. Therefore, the Project will not impact any property associated with a Williamson Act contract.

5.6.5.3 Local Laws, Ordinances, Regulations, and Standards

5.6.5.3.1 General Plan Land Use Designations

Land use provisions included in every California city and county general plan (California State Planning Law, Government Code Section 65302 et seq.) reflect the goals and policies that guide the physical development of land in their jurisdiction. This section describes the land use designations for properties located within the Project study area. Refer to Figure 5.6-1 for a map of general plan land use designations in the study area.

Project Site

The General Plan Land Use Element designates the Project site as Agriculture. The Agriculture land use includes all agricultural crop production and animal keeping, including aquaculture, dairies, feed lots, and animal sales yards as a primary use. Implementing zoning may regulate numbers of animals per acre, minimum lot size for animal keeping, or setbacks from property lines for animal enclosures. Incidental uses such as produce stands may be permitted with limitations by implementing zoning. Onsite packing and processing of agricultural crops and livestock and farm construction camps may be permitted with limitations by implementing zoning. Surrounding parcels to the east, south, and west are similarly designated Agriculture by the General Plan Land Use Element.

A parcel to the north of the Project site is designated Recreation/Open Space. The Recreation/Open Space designation recognizes the unique recreational character of Imperial County and includes desert, mountain, and waterfront areas with the potential for development as public or private parks and recreation facilities in appropriate areas. Primarily, however, areas designated Recreation/Open Space are characterized by a low intensity of human use and include mountain areas, sand dunes, desert lands, and other open lands (Imperial County 2015).

Pipeline Route

Both production and injection pipeline routes intersect parcels designated by the General Plan Land Use Element as Agriculture. Refer to Section 5.6.5.3.1.1 for Agriculture land use descriptions.

Well Sites

Both production and injection well pads are located on parcels designated by the General Plan Land Use Element as Agriculture. Refer to Section 5.6.5.3.1.1 for Agriculture land use descriptions.

Generation-Tie Line Route

The generation-tie line route is located on parcels designated by the General Plan Land Use Element as Agriculture. Refer to Section 5.6.5.3.1.1 for Agriculture land use descriptions.

Temporary Construction Laydown Yards, Parking Areas, Borrow Pits, and/or Construction Camps

The temporary construction laydown yards, parking areas, borrow pits, and/or construction camp sites are located on parcels designated by the General Plan Land Use Element as Agriculture. Refer to Section 5.6.5.3.1.1 for Agriculture land use descriptions.

5.6.5.3.2 Zoning Designations

Imperial County implements zoning as a method to classify parcels of land for specific land uses and development. The goals of assigning zoning areas to real property include allowing for clusters of parcels to have a reasonably uniform land use (e.g., residential) and to limit impacts on a parcel from differing types nearby land uses and physical structures. Zoning information at the Project site is shown on Figure 5.6-2 and discussed in the following subsections.

Project Site

The zoning designation at the Project site is Heavy Agriculture with a Geothermal Overlay (A-3-G). The purpose of the Heavy Agriculture (A-3) Zone is to designate areas that are suitable for agricultural land uses; to prevent the encroachment of incompatible uses onto and within agricultural lands; and to prohibit the premature conversion of such lands to nonagricultural uses. The A-3 designation is used to promote the heaviest of agricultural uses in the most suitable land areas of Imperial County. Uses in the A-3 zoning designation are limited primarily to agricultural-related uses and agricultural activities that are compatible with agricultural uses. Per Imperial County Municipal Code Section § 90509.02, major geothermal projects that meet the requirements of Division 17 are conditionally permitted in the A-3 zoning. Further, the Geothermal Overlay identifies the parcel as suitable for geothermal activities. Adjacent parcels to the east and south are similarly zoned A-3-G. The parcel to the west of the Project site is zoned Heavy Agriculture with a Renewable Energy/Geothermal Overlay (A-3-RE). The two parcels to the north are zoned Open Space/Recreational with a Renewable Energy/Geothermal Overlay (S-1-RE), and Open Space/Recreational with a Geothermal Overlay (S-1-G) (Imperial County 2023a).

Pipeline Route

Both production and injection pipeline routes intersect parcels with A-3-G zoning designations. Per Imperial County Municipal Code Section § 90509.02, accessory uses and structures, if incidental to and accessory to the primary permitted uses, are permitted by right in the A-3 zone.

Well Sites

Both production and injection wells are located on parcels with A-3-G zoning designations. Per Imperial County Municipal Code Section § 90509.02, accessory uses and structures, if incidental to and accessory to the primary permitted uses, are permitted by right in the A-3 zone.

Generation-Tie Line Route

The generation-tie line intersects parcels with A-3-G zoning designations. Per Imperial County Municipal Code Section § 90509.02, gen-tie lines are permitted by right within the A-3 zone.

Temporary Construction Laydown Yards, Parking Areas, Borrow Pits, and/or Construction Camps

Temporary Construction Laydown Yard, Parking Area, and/or Borrow Pit #1 is located on a parcel with a zoning designation of Medium Industrial Area with Geothermal and Pre-Existing Allowed/Restricted Overlays (M-2-G-PE). Per Imperial County Municipal Code Section § 90516.01, contractor equipment yards and contractor storage yards are uses permitted by right within the M-2 zone. Per Imperial County Municipal Code Section § 90516.02, surface mining is conditionally permitted within the M-2 zone.

Temporary Construction Laydown Yard and Parking Area #2 is located on a parcel with a zoning designation of Open Space/Recreational with a Geothermal Overlay (S-1-G). Per Imperial County

Municipal Code Section § 90518.02, temporary contractor storage yards are conditionally permitted uses within the S-1 zone.

Borrow Pits #2 and #4 are located on parcels with a zoning designation of General Agricultural/Rural Zone with Geothermal Overlay (A-2-R-G). Per Imperial County Municipal Code Section § 90507.02, mineral extraction and resource extraction are conditionally permitted uses within the A-2 zone.

The remaining temporary construction laydown yards, parking areas, borrow pits and/or construction camps are located on parcels within the A-3-G zone. Per Imperial County Municipal Code Section § 90509.02, temporary construction yards, construction camps, and mining and mineral extraction are conditionally permitted uses in the A-3 zone.

5.6.5.3.3 Development Standards

Per Imperial County Municipal Code Sections § 90509.07 and § 91702, the development standards in Table 5.6-4 apply to renewable energy production uses within the A-3 zoning and Geothermal Overlay areas.

Table 5.6-4. Non-Residential Development Standards Within the A-3 Zone and Geothermal Overlay Areas

Front Yard Setback	Side Yard Setback	Rear Yard Setback	Max Building Height
Minimum 100 feet from property line	Minimum 100 feet from property line	Minimum 100 feet from property line	120 feet in height

Source: Imperial County 2023b

5.6.5.3.4 Imperial County Municipal Code, Title 9, Division 17, Geothermal Projects

The purpose of regulations provided in Division 17 of Title 9 is to facilitate the beneficial use of the geothermal resource for the general welfare of the public, to protect the resource from wasteful or detrimental uses, and to protect people, property, and the environment from detriments that might result from the improper use of the resource. Title 9, Division 17, describes general standards for geothermal applicants when applying for Conditional Use Permits both inside and outside of the Geothermal Overlay Zone. The overall goal of these regulations is to integrate, to the extent feasible, Imperial County's regulations with those of other governmental agencies that regulate geothermal resource exploration and development. As shown on Figure 5.6-2, the Project site is within the Geothermal Overlay zone. The Geothermal Overlay is applied to areas where existing and future development has been environmentally reviewed for geothermal renewable energy facilities.

5.6.5.3.5 Other Applicable Planning Documents

Aside from the general plan and zoning ordinances implemented by each local jurisdiction, there are no other applicable planning documents that provide for land use or development guidance/restrictions that could affect the Project.

5.6.5.3.6 Population and Growth Trends

Population and growth trends identified for the Project area are based on the U.S. Census. Imperial County's 2021 population estimate was 179,851. In 2010, it was estimated to be 174,528. Imperial County's population growth between 2010 and 2021 was 0.1 percent or 5,323 new residents (U.S. Census Bureau n.d.).

Imperial County had a median household income in 2021 of $49,078 (in 2021 dollars), a median owner-occupied home value of $219,800, and 58 percent homeowner-occupied rate (U.S. Census Bureau n.d.). Imperial County has an unemployment rate of 16.2 percent, which is higher than the state unemployment rate of 4.1 percent (California Employment Development Department 2023). The percentage of persons in poverty within Imperial County is 18.1% (U.S. Census Bureau n.d.).

5.6.6 Agencies and Agency Contacts

Agencies and contacts are provided in Table 5.6-5.

Table 5.6-5. Agency Contacts for Land Use

Issue	Agency	Contact
Imperial County permitting; Imperial County zoning and land use data; Imperial County engineering data	Imperial County Planning Division	Jim Minnick Planning & Development Services Director Email: jimminnick@co.imperial.ca.us
	Imperial County Building Division	Sergio Rubio Building Division Manager Email: sergiorubio@co.imperial.ca.us
	Imperial County Public Works/Engineering	John Gay Director of Public Works Email: johngay@co.imperial.ca.us
Paleontological Resources Documentation and Specimen Repository	Anza Borrego Desert State Park Stout Research Center	Dr. Lyndon K. Murray District Paleontologist 200 Palm Canyon Drive Borrego Springs, CA 92004 Phone: (760) 767-4974 Email: lyndon.murray@parks.ca.gov

5.6.7 Permits and Permit Schedule

Because of the exclusive jurisdiction of the CEC, no other land use permits are required for the Project site. Conditional use permits and encroachment permits, issued by Imperial County, are anticipated to be required for ancillary facilities.

5.6.8 References

California Department of Conservation (DOC). 2022. California Important Farmland Finder. https://maps.conservation.ca.gov/DLRP/CIFF/.

California Department of Conservation (DOC). 2023. Important Farmland Categories. https://www.conservation.ca.gov/dlrp/fmmp/Pages/Important-Farmland-Categories.aspx.

California Department of Transportation (Caltrans). 2023. California State Scenic Highways. https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways.

California Employment Development Department. 2023. Imperial County, California - Labor Market Information Resources and Data. https://labormarketinfo.edd.ca.gov/geography/imperial-county.html.

California Public Utilities Commission (CPUC). 2020. *Rules for Overhead Electric Line Construction – General Order No. 95*. https://www.cpuc.ca.gov/proceedings-and-rulemaking/cpuc-general-orders.

Conservation Biology Institute. 2023. Land Cover/Natural Vegetation Communities, Desert Renewable Energy Conservation Plan (DRECP). https://drecp.databasin.org/datasets/0a419342ec904b3c8fc710003f52ebe0/.

Google. 2023. Google Earth imagery of Imperial County. Retrieved January 31, 2023.

Imperial County. 1996. *Airport Land Use Compatibility Plan: Imperial County Airports.* https://www.icpds.com/hearings/airport-land-use-commission.

Imperial County. 2015. *Imperial County General Plan: Land Use Element.* https://www.icpds.com/planning/land-use-documents/general-plan/land-use-element.

Imperial County. 2016. *Imperial County General Plan: Conservation and Open Space Element.* https://www.icpds.com/planning/land-use-documents/general-plan/conservation-and-open-space-element.

Imperial County. 2023a. Zoning Information. https://www.icpds.com/planning/maps.

Imperial County. 2023b. Imperial County Ordinances, Title 9, Division 5. https://www.icpds.com/planning/land-use-documents/ordinances.

Newland, Derek, Sender, Imperial County Planning and Development Services Department. 2023. Personal communication (email) with Joe Aguirre, Receiver, Jacobs Engineering. January 23.

U.S. Census Bureau. n.d. QuickFacts: Imperial County, California. Census.gov. Accessed on January 31, 2023. https://www.census.gov/quickfacts/imperialcountycalifornia.

U.S. Fish and Wildlife Service (USFWS). n.d. Sonny Bono Salton Sea National Wildlife Refuge - Facility Activities. Accessed on January 31, 2023. https://www.fws.gov/refuge/sonny-bono-salton-sea/visit-us/activities.

5.7 Noise

This section presents an assessment of potential noise effects related to the Black Rock Geothermal Project (Project). Section 5.7.1 discusses the fundamentals of acoustics. Section 5.7.2 describes the affected environment, including baseline noise level survey methodology and results. Section 5.7.3 presents an environmental analysis of the construction and operation of the power plant and associated facilities. Section 5.7.4 discusses cumulative effects. Section 5.7.5 discusses mitigation measures. Section 5.7.6 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.7.7 presents agency contacts, and Section 5.7.8 presents permit requirements and schedules. Section 5.7.9 contains the references used to prepare this section.

5.7.1 Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure creating a sound wave. Acoustical terms used in this section are summarized in Table 5.7-1.

Table 5.7-1. Definitions of Acoustical Terms

Term	Definition
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient level is typically defined by the L_{eq} level.
Background noise level	The underlying ever-present sound level that remains in the absence of intermittent sounds. Distant sources, such as traffic, typically make up the background. The background level is generally defined by the L_{90} percentile noise level.
Sound pressure level decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-Weighted sound pressure level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear, and generally correlates well with subjective reactions to environmental sounds. All sound levels in this report are A-weighted.
Equivalent sound pressure level (L_{eq})	The average A-weighted sound pressure level, on an equal energy basis, during the measurement period.
Percentile sound pressure level (L_n)	The sound pressure level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (e.g., L_{90} represents the sound pressure level that is exceeded during 90 percent of the measurement period).
Community Noise Exposure Level (CNEL)	The average A-weighted noise level during a 24-hour day, based on the Leq plus 5 decibels from 7:00 p.m. to 10:00 p.m. and Leq plus 10 decibels from 10:00 p.m. to 7:00 a.m.

The most common metric is the overall A-weighted sound level measurement that has been adopted by regulatory bodies worldwide. The A-weighting network measures sound in a similar fashion to the way in which a person perceives or hears sound.

A-weighted sound levels are typically measured or presented as equivalent sound pressure level (L_{eq}), which is defined as the average noise level, on an equal energy basis for a stated period of time, and is commonly used to measure steady-state sound or noise that is usually dominant. Statistical methods are used to capture the dynamics of a changing acoustical environment. Statistical measurements are typically denoted by L_{xx}, where xx represents the percentile of time the sound level is exceeded. The L_{90} is a measurement that represents the noise level that is exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

Some metrics used in determining the impact of environmental noise consider the differences in response that people have two daytime and nighttime noise levels. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes more noticeable. Furthermore, most people sleep at night and are sensitive to intrusive noises. To account for human sensitivity to nighttime noise levels, the CNEL was developed. CNEL is a noise index that accounts for the greater potential annoyance of noise during the evening and nighttime hours.

CNEL values are calculated by averaging hourly L_{eq} sound levels for a 24-hour period, and apply a weighting factor to nighttime L_{eq} values. The weighting factor, which reflects the increased sensitivity to noise during nighttime hours, is added to each hourly L_{eq} sound level before the 24-hour CNEL is calculated. For the purposes of assessing noise, the 24-hour day is divided into three time periods with the following weightings:

- Daytime: 7 a.m. to 7 p.m. (12 hours) Weighting factor of 0 dB
- Evening: 7 p.m. to 10 p.m. (three hours) Weighting factor of 5 dB
- Nighttime: 10 p.m. to 7 a.m. (nine hours) Weighting factor of 10 dB

The three time periods are then averaged to compute the overall CNEL value. For a continuous noise source, the CNEL value is easily computed by adding 6.7 dB to the overall 24-hour noise level (L_{eq}). For example, if the expected continuous noise level from the power plant were 60.0 dBA, then the resulting CNEL from the plant would be 66.7 dBA.

The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants may experience noise effects in the last category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily attributable to the wide variation in individual thresholds of annoyance and habituation to noise.

Table 5.7-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Table 5.7-2. Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Shotgun (at shooter's ear)	140	Carrier flight deck	Painfully loud
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Threshold of pain
Loud rock music	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)	90	Boiler room	
Pneumatic drill (50 feet)	80	Noisy restaurant	
Busy traffic; hair dryer	70		Moderately loud
Normal conversation (5 feet)	60	Data processing center	
Light traffic (100 feet); rainfall	50	Private business office	
Bird calls (distant)	40	Average living room, library	Quiet

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Soft whisper (five feet); rustling leaves	30	Quiet bedroom	
	20	Recording studio	
Normal breathing	10		Threshold of hearing

Source: Beranek 1998

5.7.2 Affected Environment

5.7.2.1 Local Land Use and Noise Sources

Current land uses surrounding the Project site include agricultural, open space, recreational, geothermal energy production, and equipment staging. The Project site is located within a predominately agricultural area. One industrial-zoned property designated as Medium Industrial Area with a Geothermal Overlay (M-2-G) is located approximately 0.75 mile southeast of the Plant site (Imperial County 2023a). Several existing geothermal energy production sites are within 1.5 miles of the Project site, including the Elmore Geothermal Facility and three CalEnergy geothermal generating facilities. Although these facilities are industrial in nature, the facilities are similarly located within areas zoned for agricultural and open space. Refer to Figure 5.6-1 for land use designations surrounding the Project site. Refer to Figure 5.6-2 for zoning designations surrounding the Project site.

An isolated residence is located approximately 2.5 miles southeast of the Project site. Refer to Figure 5.7-1. The Red Hill Marina County Park includes camping facilities and is located approximately 2.3 miles northeast of the Project site. The Sonny Bono Refuge Headquarters includes lodging for employees and is located 0.65 miles northwest of the Project site. As summarized above and in more detail in Section 5.6, no residentially zoned areas are located in the vicinity of the Project and the surrounding area is designated for geothermal, industrial, and agricultural uses. The County has also established a “right to farm” ordinance to ensure disclosure of the amenity concerns associated with living in such areas.

5.7.2.2 Ambient Noise Survey

The Project completed baseline sound level surveys in late January/early February 2023. Continuous monitoring was conducted at four locations, depicted as M1, M2, M3 and M5 in Figure 5.7-1. Additional short-term monitoring was conducted at location M4, the Sonny Bonny Wildlife Refuge Headquarters and M6, the Red Hill Marina County Park. Appendix 5.7A presents tables of the measured sound levels for each of the monitoring locations. Tables 5.7-3 and 5.7-4 summarize the noise survey locations and the overall measurement results at each location.

Table 5.7-3. Summary of Noise Survey Locations

Map ID	Location Description	Primary Noise Sources
M1	Hunting/Duck Club on Pound Road	Geothermal activities, aircraft overflights
M2	Residence, Agricultural Equipment Staging, Maintenance, Repair Facility	Auto shop, farm animals, birds
M3	BHER Administration Equipment Staging and Repair Facility	Geothermal activities, aircraft overflight
M4	Sonny Bono Refuge Headquarters	Aircraft overflights, road traffic, people talking, birds
M5	BHER Service Center	Aircraft overflights, geothermal activities, birds
M6	Red Hill Marina Camp Site	Flowing water in irrigation pond

Table 5.7-4. Summary of Measured Sound Levels

Map ID	CNEL (dBA)
M1	57
M2	51
M3	55
M4[a]	43
M5	53
M6[b]	50

Notes:
[a] Short-term monitoring location thus CNEL column is log average of Leq measurements
[b] A single short-term measurement was collected at M6. CNEL column is measured Leq.

5.7.3 Environmental Analysis

Noise will be produced during the construction and operation of the Project. Potential noise impacts from construction and operation activities are assessed in this subsection.

5.7.3.1 Significance Criteria

Following the California Environmental Quality Act (CEQA) guidelines (Title 14, California Code of Regulations [CCR], Appendix G, Section XI), the Project would cause a significant impact if it would result in the following:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Generation of excessive groundborne vibration or groundborne noise levels.

Generally, the design basis for noise control is the minimum, or most stringent, noise level required by any of the applicable LORS. Therefore, noise from the Project is evaluated against Imperial County requirements. The County has established quantitative planning guidelines for various land uses in the Noise Element of its General Plan and has specifically addressed the noise from geothermal power projects in Title 9, Division 17, Renewable Energy Resources of the County Code.

5.7.3.2 Construction Impacts

5.7.3.2.1 Project Construction Noise

Construction of the Project is expected to be generally similar in terms of activities and equipment to that of other power plants. The construction schedule is based on a two-shift, 10 hours per day, 6 days a week work week. Facility startup schedules are based on a two-shift, 24 hours per day, 7 days per week work week. The noise level will vary during the construction period depending on the construction phase. Construction of power plants can generally be divided into the following five phases that use different types of construction equipment: demolition, site preparation, and excavation; concrete pouring; steel erection; mechanical; and cleanup (Miller et al. 1978).

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control and the Empire State Electric Energy Research Company studied noise from individual pieces of construction equipment, as well as from construction sites of power plants and other types of facilities (EPA 1971; Barnes et al. 1976). Because specific information on types, quantities, and operating schedules of construction equipment is not available at this point in Project development, information from these documents for similarly sized industrial projects will be used.

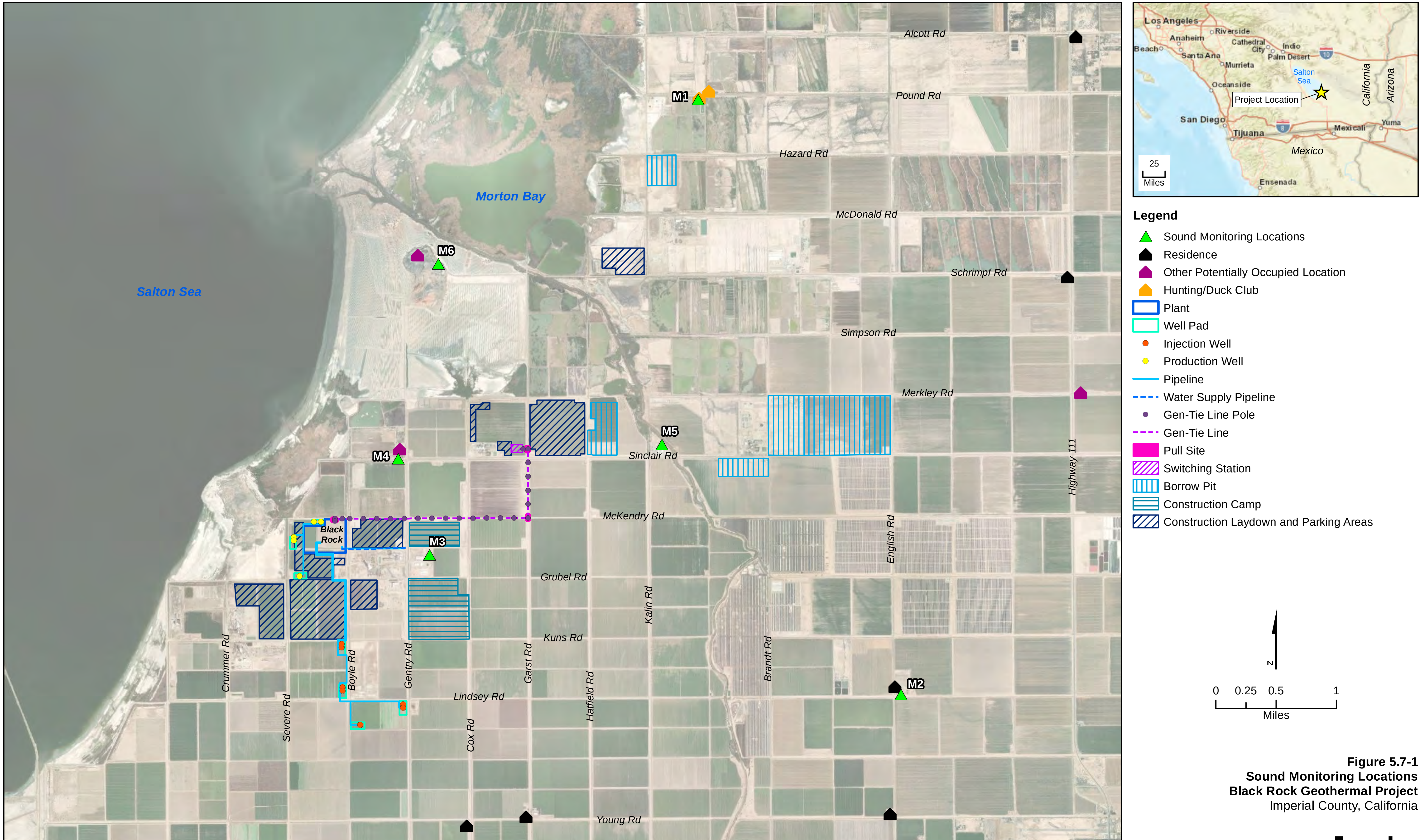


Figure 5.7-1
Sound Monitoring Locations
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Noise\BR_Figure_1_230302.mxd

The loudest equipment types generally operating at a site during each phase of construction are presented in Table 5.7-5. The composite average or equivalent site noise level, representing noise from all equipment, is also presented for each phase.

Table 5.7-5. Construction Equipment and Composite Site Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level (dBA) at 50 feet	Composite Site Noise Level (dBA) at 50 feet
Demolition, Site Clearing, and Excavation	Dump Truck Backhoe	91 85	89
Concrete Pouring	Truck Concrete Mixer	91 85	78
Steel Erection	Derrick Crane Jack Hammer	88 88	87
Mechanical	Derrick Crane Pneumatic Tools	88 86	87
Cleanup	Rock Drill Truck	98 91	89

Source: EPA 1971; Barnes et al. 1976.

Average or equivalent construction noise levels projected at various distances from the site are presented in Table 5.7-6. These results are conservative because the only attenuating mechanism considered was divergence of the sound waves in open air. Over large distances sound levels are further reduced by both air and ground absorption. Table 5.7-7 presents noise levels from common construction equipment at various distances.

Table 5.7-6. Average Construction Noise Levels at Various Distances

	Sound Pressure Level (dBA)		
Construction Phase	375 feet	1,500 feet	3,000 feet
Demolition, Site Clearing, and Excavation	71	59	53
Concrete Pouring	60	48	42
Steel Erection	69	57	51
Mechanical	69	57	51
Cleanup	71	59	53

Table 5.7-7. Noise Levels from Common Construction Equipment at Various Distances

Construction Equipment	Typical Sound Pressure Level at 50 feet (dBA)	Typical Sound Pressure Level at 375 feet (dBA)	Typical Sound Pressure Level at 1,500 feet (dBA)
Pile Drivers (20,000 to 32,000 ft-lbs/blow)	104	86	74
Dozer (250 to 700 hp)	88	70	58
Front End Loader (6 to 15 cu yd)	88	70	58
Trucks (200 to 400 hp)	86	68	56
Grader (13- to 16-foot blade)	85	67	55
Shovels (2 to 5 cu yd)	84	66	54
Portable Generators (50 to 200 kW)	84	66	54
Derrick Crane (11 to 20 tons)	83	65	53
Mobile Crane (11 to 20 tons)	83	65	53

Construction Equipment	Typical Sound Pressure Level at 50 feet (dBA)	Typical Sound Pressure Level at 375 feet (dBA)	Typical Sound Pressure Level at 1,500 feet (dBA)
Concrete Pumps (30 to 150 cu yd)	81	63	51
Tractor (0.75 to 2 cu yd)	80	62	50
Unquieted Paving Breaker	80	62	50
Quieted Paving Breaker	73	55	43

Notes:

cu yd = cubic yard

ft-lbs/blow = foot pounds per blow

hp = horsepower

kW = kilowatt

Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) represents the most recent and comprehensive tabulation of sound from common pieces of construction equipment. Representative sound levels from the FTA (2018) manual are presented in Table 5.7-8. This FTA data is generally consistent with the data above.

Table 5.7-8. FTA Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level 50 feet from Source, dBA	Equipment	Typical Noise Level 50 feet from Source, dBA
Air Compressor	80	Loader	80
Backhoe	80	Paver	85
Compactor	82	Pneumatic Tool	85
Concrete Mixer	85	Pump	77
Concrete Pump	82	Roller	85
Concrete Vibrator	76	Saw	76
Crane, Derrick	88	Scarifier	83
Crane, Mobile	83	Scraper	85
Dozer	85	Shovel	82
Generator	82	Jack Hammer	88
Grader	85	Truck	84
Impact Wrench	85		

Source: Table 7-1, FTA 2018.

Review of construction equipment noise emission levels presented in Tables 5.7-10 and 5.7-11 indicates that the loudest equipment generally emits noise of approximately 80 to 90 dBA at 50 feet.

Sound levels at any specific receptor are dominated by the closest and loudest equipment. The types, numbers, and duration of equipment anticipated to be used during construction near any specific location will vary over time. An estimated construction sound level near a specific activity area may be based on the assumptions of multiple pieces of loud equipment operating in close proximity of each other, such as the following:

- One piece of equipment generating a reference noise level of 85 dBA located 50 feet at the edge of the construction activity.
- Two pieces of equipment generating reference noise levels of 85 dBA located 50 feet farther away from the edge of construction.

- Two more pieces of equipment generating reference noise levels of 85 dBA located 100 feet farther away from the edge of construction.

As described by FTA, the average noise level from each piece of equipment is determined by the following formula for geometric spreading:

*Typical Noise Level at 50 feet + 10*log (Adj$_{usage}$) – 20*log (distance to receptor/50) – 10*G*log (distance to receptor/50)*

Using a usage factor (Adj$_{usage}$) of 1 (i.e., all equipment is operating simultaneously at its rated sound level of 85 dBA) and ground effect factor (G) of 0, representing hard ground (i.e., pavement, a ground condition that does not result in additional attenuation) yields a conservative calculation. A usage factor of 0.5 and ground factor of 0.5 (more acoustical absorptive ground surface such as dirt) is expected to yield a more typical result. Average construction noise levels at various distances, based on these scenarios, are presented in Table 5.7-9.

Table 5.7-9. Average Construction Equipment Noise Levels versus Distance (dBA)

Distance from Construction Activity (feet)	Usage Factor=1 and G=0	Usage Factor=0.5 and G=0.5
50	87	84
100	83	78
200	78	72
400	73	65
800	67	58
1,600	62	51
3,200	56	44

Steam blows during the construction phase are an activity designed to clean scale and other debris from and steam lines before steam is admitted to the steam turbine where such debris would damage the blades. When high-pressure blows are used, several short blows several minutes in duration are generally performed each day and the entire process takes several weeks.

Noise generated during the testing and commissioning phase of the Project is not expected to be substantially different from that produced during normal full-load operation. Starts and abrupt stops are more frequent during this period, but they are usually short-lived.

5.7.3.2.2 Construction Vibration

Construction vibrations can be divided into three classes based on the wave form and its source (Table 5.7-10). Pile driving is typically the construction activity with the greatest potential to generate ground vibrations. These vibrations attenuate rapidly with distance to less than typical criteria for sensitive structures within 200 feet. The closest residence is over one mile away; therefore, mitigation is not required.

Table 5.7-10. Construction Residence Vibrations

Wave Form	Example Source
Impact	Impact pile driver or blasting
Steady-state	Vibratory pile driver
Pseudo steady-state	Double acting pile hammer

5.7.3.2.3 Worker Exposure to Noise

Worker exposure levels during construction of the Project will vary depending on the phase of the Project and the proximity of the workers to the noise generating activities. The Project will develop a Hearing Protection Plan, which complies with California Division of Occupational Safety and Health Administration (Cal/OSHA) requirements. This Hearing Protection Plan will be incorporated into the Project's construction Health and Safety Plan. The plan will require appropriate hearing protection for workers and visitors throughout the duration of the construction period.

5.7.3.3 Operational Impacts

5.7.3.3.1 Worker Exposure

Nearly all components will be specified not to exceed near-field maximum noise levels of 90 dBA at three feet or 85 dBA at three feet where available as a vendor standard. No permanent or semi-permanent workstations are located near any piece of noisy Project equipment. Nevertheless, signs requiring the use of hearing protection devices will be posted in all areas where noise levels commonly exceed 85 dBA. The Project will comply with applicable Cal/OSHA requirements. Outdoor levels throughout the Project will typically range 90 dBA near certain equipment to roughly 65 dBA in areas more distant from any major noise source. When steam is being vented, such as during scheduled geothermal maintenance activities, sound levels may exceed 100 dBA near equipment such as the rock muffler; however, workers would not be expected to be in such areas during these events.

5.7.3.3.2 Transmission Line and Switchyard Noise Levels

One of the electrical effects of high-voltage gen-tie lines is corona. Corona is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware attributable to very high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and production of ozone. Corona is generally a concern with gen-tie lines of 345-kilovolts and greater and with lines that are at higher elevations. Corona noise is also generally associated with foul weather conditions. Because the Project will be connected at the 230-kilovolt level, it is expected that no corona-related design issues will be encountered.

5.7.3.3.3 Project Operational Noise Modeling

A preliminary noise model of the proposed Project has been developed using the CadnaA noise model by DataKustik GmbH of Munich, Germany. The sound propagation factors used in the model have been adopted from International Organization for Standardization (ISO) 9613-2 *Acoustics—Sound Attenuation During Propagation Outdoors* (Part 2: General Method of Calculation). Atmospheric absorption was estimated for conditions of 10 degrees Celsius and 70 percent relative humidity (conditions that favor propagation) and computed in accordance with ISO 9613-1 *Acoustics—Sound Attenuation During Propagation Outdoors* (Part 1: Calculation of the Absorption of Sound by the Atmosphere). The ISO 9613-2 parameters used in this assessment are a receptor height of 1.5 meters and hard ground (G = 0.0, where G may vary between zero for hard pavement or water and one for acoustically absorptive ground such as plowed earth) for the Project site and soft ground (G=1) for the surrounding area given its predominately agricultural uses. Modeling is based on measurements of other similar operating facilities as well as expected Project equipment sound levels. Specifically, far field measurements of nominal 40 megawatt (MW) operations were acoustically scaled up to 77 MW (net) and the Project’s cooling tower sound levels of 70 dBA at 200 feet were incorporated. This essentially double counts the cooling tower as it is included in the underlying far field measurements. As indicated in Section. 5.7.6.3.2 the County has established a sound limit of 70 dBA CNEL at the closest residence. Given the large distances to the closest residence, the steady-state of the Project will readily comply.

Sound levels during maintenance activities may vary. The highest sound levels are associated with temporary steam venting through a rock muffler during upset or startup/shutdown conditions. These were observed to vary between approximately 68 dBA at 300 feet to 71 dBA at 4,000 feet. As these events are infrequent, temporary, and finite, they are not expected to pose a significant impact.

5.7.3.3.4 Tonal Noise

At the distant isolated residential uses, no significant tones are anticipated.

5.7.3.3.5 Ground and Airborne Vibration

The equipment that would be used in the Project is well balanced and is designed to produce very low vibration levels throughout the life of the Project. An imbalance could contribute to ground vibration levels in the vicinity of the equipment. However, vibration monitoring systems installed in the equipment are designed to ensure that the equipment remains balanced. Should a significant an imbalance occur, the event would be detected and the equipment would automatically shut down.

5.7.4 Cumulative Effects

A cumulative impact refers to a proposed Project’s incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed Project (Public Resources Code § 21083; Title 14, CCR, §§15064[h], 15065[c], 15130, and 15355).

The Project will involve the construction and operation of a new electric generation facility primarily located on a parcel zoned for agricultural or geothermal energy production uses. The closest permanent residence is over three miles from the Project. Similar geothermal uses exist within the broader area. The Project is consistent with both noise and land use policies. The overall sound level is strongly dependent on the closest noise source. While the precise level of any potential increase depends on how far projects are from a sensitive receptor, when considering the potential cumulative influence of two sources at a receptor, the maximum cumulative increase is three dBA.

Moreover, there are no past, present, or reasonably foreseeable future projects proposed within the Project area that would result in adjacent incompatible land use or sound levels (refer to Appendix 5.6A for a list of cumulative projects). Imperial County established the Geothermal Overlay zone along with Division 17 of Title 9 to facilitate the beneficial use of the geothermal resource for the general welfare of the public and manage geothermal resources. Projects identified on the list of cumulative projects do not represent new noise sensitive uses and are not substantial sources noise at the residences in the vicinity of the Project. This Project, as well as future projects, will be subject to LORS intended to minimize or avoid significant cumulative impacts.

Significant long-term cumulative impacts are not anticipated with the implementation of the Project and the listed cumulative projects because each project is required to comply with CEQA guideline requirements for evaluating potential cumulative impacts, and/or to obtain approval from the Lead Agency prior to permitting and construction by demonstrating conformance to existing land use policies. For these reasons, the Project will not cause a significant cumulative noise impact.

5.7.5 Mitigation Measures

In addition to the attenuation measures incorporated into the design and discussed above, the Project proposes to implement the following measures to minimize any potential noise impacts.

5.7.5.1 Noise Hot Line

The Applicant will establish a telephone number for use by the public to report any significant undesirable noise conditions associated with the construction and operation of the Project. If the telephone is not staffed 24 hours per day, the Project owner will include an automatic answering feature with date and time stamp recording to answer calls when the phone is unattended. This telephone number will be posted at the Project site during construction in a manner visible to passersby. This telephone number will be maintained until the Project has been operational for at least one year.

5.7.5.2 Noise Complaint Resolution

Throughout Project construction and operation, the Project owner will document, investigate, evaluate, and attempt to resolve all legitimate Project-related noise complaints.

The Applicant or authorized agent will do the following:

- Use the Noise Complaint Resolution Form typically suggested by California Energy Commission or a functionally equivalent procedure to document and respond to each noise complaint.
- Attempt to contact the person(s) making the noise complaint within 24 hours.
- Conduct an investigation to attempt to determine the source of noise related to the complaint.
- If the noise complaint is legitimate, take all feasible measures to reduce the noise at its source.

5.7.6 Laws, Ordinances, Regulations, and Standards

Table 5.7-11 presents the LORS that apply to noise.

Table 5.7-11. Laws, Ordinances, Regulations, and Standards for Noise

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
EPA	Guidelines for state and local governments.	EPA	5.7.6.1.1
Occupational Safety and Health Act of 1970	Exposure of workers over 8-hour shift limited to 90 dBA.	Occupational Safety and Health Administration	5.7.6.1.2
State			
Cal/OSHA, Title 8 CCR Article 105 Sections 095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.	Cal/OSHA	5.7.6.2.1
California Vehicle Code Sections 23130 and 23130.5	Regulates vehicle noise limits on California highways.	Caltrans, California Highway Patrol, and the County Sheriff's Office	5.7.6.2.2
Local			
California Government Code Section 65302	Requires local government to prepare plans that contain noise provisions.	California Office of Planning and Research	5.7.6.3
County of Imperial General Plan	The General Plan provides quantitative compatibility goals and policy.	County of Imperial	5.7.6.3
County of Imperial Municipal Code	The Municipal Code includes quantitative limits on allowable noise from geothermal projects	County of Imperial	5.7.6.3

5.7.6.1 Federal LORS

5.7.6.1.1 EPA

Guidelines are available from the EPA (1974) to assist state and local government entities in development of state and local LORS for noise. Because there are local LORS that apply to this Project, these guidelines are not applicable.

5.7.6.1.2 Occupational Safety and Health Administration

Onsite noise levels are regulated through the OSHA. The noise exposure level of workers is regulated at 90 dBA over an 8-hour work shift, to protect hearing (29 Code of Federal Regulations 1910.95). Onsite noise levels will generally be in the 70 to 85dBA range. Areas above 85 dBA will be posted as high noise level areas, and hearing protection will be required. The power plant will implement a hearing conservation program for applicable employees and will maintain exposure levels below 90 dBA.

5.7.6.2 State LORS

5.7.6.2.1 Cal/OSHA

The California Department of Industrial Relations, Division of Occupational Safety and Health enforces Cal/OSHA regulations, which are the same as the federal OSHA regulations described previously.
The regulations are contained in Title 8, CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, Sections 5095 et seq.

5.7.6.2.2 California Vehicle Code

Noise limits for highway vehicles are regulated under the California Vehicle Code, Sections 23130 and 23130.5. The limits are enforceable on highways by the California Highway Patrol and the County sheriffs' offices.

5.7.6.3 Local LORS

5.7.6.3.1 General Plan

The California State Planning Law (California Government Code Section 65302) requires that all cities, counties, and entities (such as multi-city port authorities) prepare and adopt a General Plan to guide community development. The Noise Element of the County of Imperials General Plan (2015) "provides a program for incorporating noise issues into the land use planning process." The Noise Element identifies that existing industrial uses in the County include geothermal power plants southeast of the Salton Sea and that additional geothermal power plants are anticipated. While the Noise Element states that "standards associated with the construction and operation of geothermal power stations are included in Appendix B to the Renewable Energy and Transmission Element of the General Plan," such limits are found in Title 9, Division 17, Renewable Energy Resources of the County Code.

It is further noted in the Noise Element that Imperial County has established a "Right to Farm Ordinance" which "advises persons that discomfort and inconvenience from machinery and aircraft noise resulting from conforming and accepted agricultural operations are a normal and necessary aspect of living in the agricultural areas of the County."

5.7.6.3.2 Municipal Code

Title 9, Division 17, Renewable Energy Resources, of the Imperial County Code establishes operational and construction noise limits for renewable and geothermal power projects such as the Project. Section 91702.00(I) establishes a general limit for all renewable energy facilities of 70 dBA CNEL limit at the "nearest human receptor site outside the parcel boundary, or one-half mile from the sound, whichever is greater." Section 91703.01 identifies "Additional Specific Standards for Geothermal Projects." Section 91703.01(B) limits drilling noise to 65 dBA CNEL at the "nearest human receptor site outside the parcel boundary, or one-half mile from the sound, whichever is greater" and notes the sound level may be exceeded by ten percent "if the noise is intermittent and during daylight hours only" and requires that impulse noises such as steam venting be controlled with a muffler. As the nearest residents are several miles from drilling activities, noise during these efforts is anticipated to be below the 65 dBA CNEL requirement.

For a continuous steady sound source that operates through the day and night, the CNEL limits of 70 dBA equates to 63 dBA. Given the large distances to the closest residence, steady-state operation of the Project will comply with the County Code.

5.7.7 Agencies and Agency Contacts

No agencies were contacted directly to specifically discuss Project noise.

5.7.8 Permits and Permit Schedule

No permits are required; therefore, there is no permit schedule.

5.7.9 References

Barnes, J.D., L.N. Miller, and E.W. Wood. 1976. *Prediction of Noise from Power Plant Construction*. Bolt Beranek and Newman, Inc. Cambridge, MA. Prepared for the Empire State Electric Energy Research Corporation, Schenectady, NY.

Beranek, L.L. 1998. *Noise and Vibration Control.* Institute of Noise Control Engineering. McGraw Hill.

DataKustik, GmbH, Munich, Germany (DataKustik). 2022. CadnaA. Accessed November 2022. http://www.datakustik.de/frameset.php?lang=en.

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

International Organization for Standardization (ISO) 1993. ISO 9613-1, *Acoustics—Sound Attenuation During Propagation Outdoors*. Part 1: Calculation of the Absorption of Sound by the Atmosphere. Geneva, Switzerland.

International Organization for Standardization (ISO). 1996. ISO 9613-2, *Acoustics—Sound Attenuation During Propagation Outdoors*. Part 2: General Method of Calculation. Geneva, Switzerland.

Miller, L.N., E.W. Wood, R.M. Hoover, A.R. Thompson, S.L. Thompson, and S.L. Paterson. 1978. *Electric Power Plant Environmental Noise Guide*, Vol. 1. Bolt Beranek & Newman, Inc. Cambridge, MA. Prepared for the Edison Electric Institute, NY.

Miller, Laymon N., et al. 1984. *Electric Power Plant Environmental Noise Guide*, 2nd Edition. Edison Electric Institute, NY.

U.S. Environmental Protection Agency (EPA). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA-550/9-74-004. March.

U.S. Environmental Protection Agency (EPA). 1971. *Noise from Construction Equipment and Operations, US Building Equipment, and Home Appliances*. Prepared by Bolt Beranek and Newman for EPA Office of Noise Abatement and Control. Washington, DC.

5.8 Paleontological Resources

This section presents the potential effects on paleontological resources (fossils) from the construction and operation of Black Rock Geothermal LLC's Black Rock Geothermal Project (BRGP or Project) within the Salton Sea Known Geothermal Resource Area located near Calipatria in Imperial County, California. Section 5.8.1 discusses the affected environment, including the resource inventory and its results. Section 5.8.2 presents the environmental analysis and impact assessment. Section 5.8.3 considers cumulative effects on paleontological resources, and Section 5.8.4 presents BRGP proposed mitigation measures. Section 5.8.5 discusses applicable laws, ordinances, regulations, and standards (LORS). Section 5.8.6 lists involved agencies, Section 5.8.7 lists permits, and Section 5.8.8 provides the references consulted. Confidential fossil locality records will be submitted separately with an application for confidential designation as Appendix 5.8A.

This section of the Application for Certification meets all siting regulations of the California Energy Commission (CEC) (CEC 2000; CEC 2007) and conforms to the recommendations of the Society of Vertebrate Paleontology (SVP) (SVP 2010) that address assessing and mitigating potential impacts on paleontological resources from the Project.

5.8.1 Affected Environment

This section describes the affected environment for paleontological resources. It begins by describing the physiographic and geological context of the Project area, and then continues by describing the nature and types of fossil resources that have been recorded in the area. It concludes by providing an assessment of the scientific importance of the fossils that may be encountered during the construction of the BRGP.

Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. Fossils are important scientific and educational resources because of their use in documenting the present and evolutionary history of particular groups of now-extinct organisms; reconstructing the environments in which those organisms lived; and in determining the relative ages of the strata in which they occur and of the geologic events that resulted in the deposition of the sediments that buried them. Fossils are considered a nonrenewable scientific resource and afforded protection under several federal, state, and local laws, ordinances, and regulations because the organisms they represent no longer exist.

5.8.1.1 Physiographic and Geologic Setting

The BRGP and associated Project elements are located within the southern portion of the Salton Trough geomorphic province, a northwesterly trending tectonic basin located between the Peninsular Ranges on the west and the Chocolate Mountains on the east (Dorsey 2006). The area is characterized by numerous northwest-trending strike-slip faults, including, from east to west, the San Andreas, San Jacinto, and Elsinore faults. The Salton Trough was formed by rifting along the East Pacific Rise and is largely a product of the ongoing tectonic activity within the San Andreas Fault system (Alles 2004). The San Andreas Fault system terminates at the Brawley seismic zone, a spreading center in the southeastern corner of the Salton Sea (Alles 2004). This spreading center accounts for all the active seismicity in the region and is responsible for the large number of young volcanic and geothermal features in the area (the Salton Sea geothermal field).

Roughly 2,000 square miles of the Salton Trough lie below sea level and can be considered a landward extension of the depression filled by the Gulf of California. However, during the past five million years, the ancestral and modern-day Colorado River has cut down through the Colorado Plateau, carrying the eroded sediment load southward, resulting in deposition of a sediment dam (the Colorado River delta) from east to west across the Salton Trough. The Colorado River delta separates the Salton Trough from the Gulf of California (Kirby et al. 2007).

The southwestern Salton Trough is characterized by four major rock groups. The first group includes the basement and subbasement complexes. The basement complex is composed of Late Cenozoic crystalline igneous and metamorphic rocks (Fuis and Kohler 1984). The subbasement complex or lower crust beneath the axis of the Salton Trough is composed of a mafic intrusive complex similar to oceanic middle crust (Fuis and Kohler 1984).

The second major rock group includes the Middle to Late Miocene-age Split Mountain and Mecca Formations, and the Mio-Pliocene Imperial Group. The Split Mountain and Mecca Formations consist of sedimentary rocks mostly of terrestrial origin and comprised chiefly of coarse-grained locally derived detritus from the surrounding mountains (Sylvester and Smith 1976). These formations lie nonconformably on the crystalline basement rocks, where they are observed in the western margin of the basin (Sylvester and Smith 1976). The Mio-Pliocene Imperial Formation consists of mudstones and shales that record a major marine incursion into the basin during the late Miocene to early Pliocene.

The third major rock group includes Pliocene to Holocene sedimentary deposits that have accumulated during the formation of numerous ephemeral lakes, which have formed at various times over the last three million years during the history of the prograding Colorado River delta when the Colorado River was diverted to the northwest (Kirby et al. 2007). The oldest ephemeral lakes (formed approximately 2.5 to 1.1 million years ago) accumulated extensive deposits of claystone, mudstone, and siltstone that are referred to as the Borrego Formation (Lutz et al. 2006). A younger succession of ephemeral freshwater lakes (formed approximately 1.1 to 0.5 million years ago) accumulated thick deposits of fine-grained sediments, which are referred to as the Brawley Formation (Steely et al. 2009). Overlying the Brawley Formation and exposed extensively across the central portion of the Salton Trough are more-recent ephemeral freshwater lake deposits (formed approximately 0.5 million years to 450 years ago), which are referred to as Lake Cahuilla beds. Because they were derived from a common source and deposited in similar environments, the Borrego Formation, Brawley Formation, and Lake Cahuilla beds are not easily distinguished from one another. The principal differences between the older (Borrego and Brawley formations) and younger lacustrine sediments (Lake Cahuilla beds) are stratigraphic position, degree of consolidation, topographic expression, attitude (tilted versus flat lying), and fossil content.

Lake Cahuilla was one of the largest ephemeral lakes, covering more than 2,000 square miles to a depth of more than 300 feet. The lake was approximately 100 miles long by 35 miles across at its widest point and extended from the delta in Mexico north to the vicinity of Indio. It was six times the size of the present Salton Sea, which has a surface area of about 350 square miles and an average depth of about 20 feet. (Singer n.d.). The shoreline of ancient Lake Cahuilla is still visible at the base of the surrounding mountains and averages about 40 feet above sea level. As the shorelines retreated, enormous numbers of Pleistocene gastropods and pelecypods (mollusks) became stranded, leaving their shells in windrows that stretch for miles along the northwest and eastern margins of the Salton Sea (Bowersox 1972).

The fourth major rock group includes modern volcanic deposits collectively known as the Salton Buttes lava domes. The Salton Buttes lava domes consist of four small volcanoes that include, from southwest to northeast, Obsidian Butte, Rock Hill, Red Hill, and Mullet Island (Robinson et al. 1976). These volcanoes last erupted approximately 16,000 years ago. Erosional features (sea cliffs and shorelines) around the margins of several of the domes indicate former periods of inundation associated with prehistoric Lake Cahuilla.

The basement and subbasement complexes, Middle to Late Miocene-age Split Mountain and Mecca Formations, and the Mio-Pliocene Imperial Group are present in the deep subsurface and are not anticipated to be encountered during BRGP construction based on the expected depths where construction activities will occur. Thus, they will not be discussed further.

5.8.1.2 Resource Inventory Methods

To develop a baseline paleontological resources inventory of the BRGP study area, which includes the proposed Project footprint and a one-mile buffer (Figure 5.8-1), published and available unpublished geological and paleontological literature was reviewed. Sources included geological maps, satellite

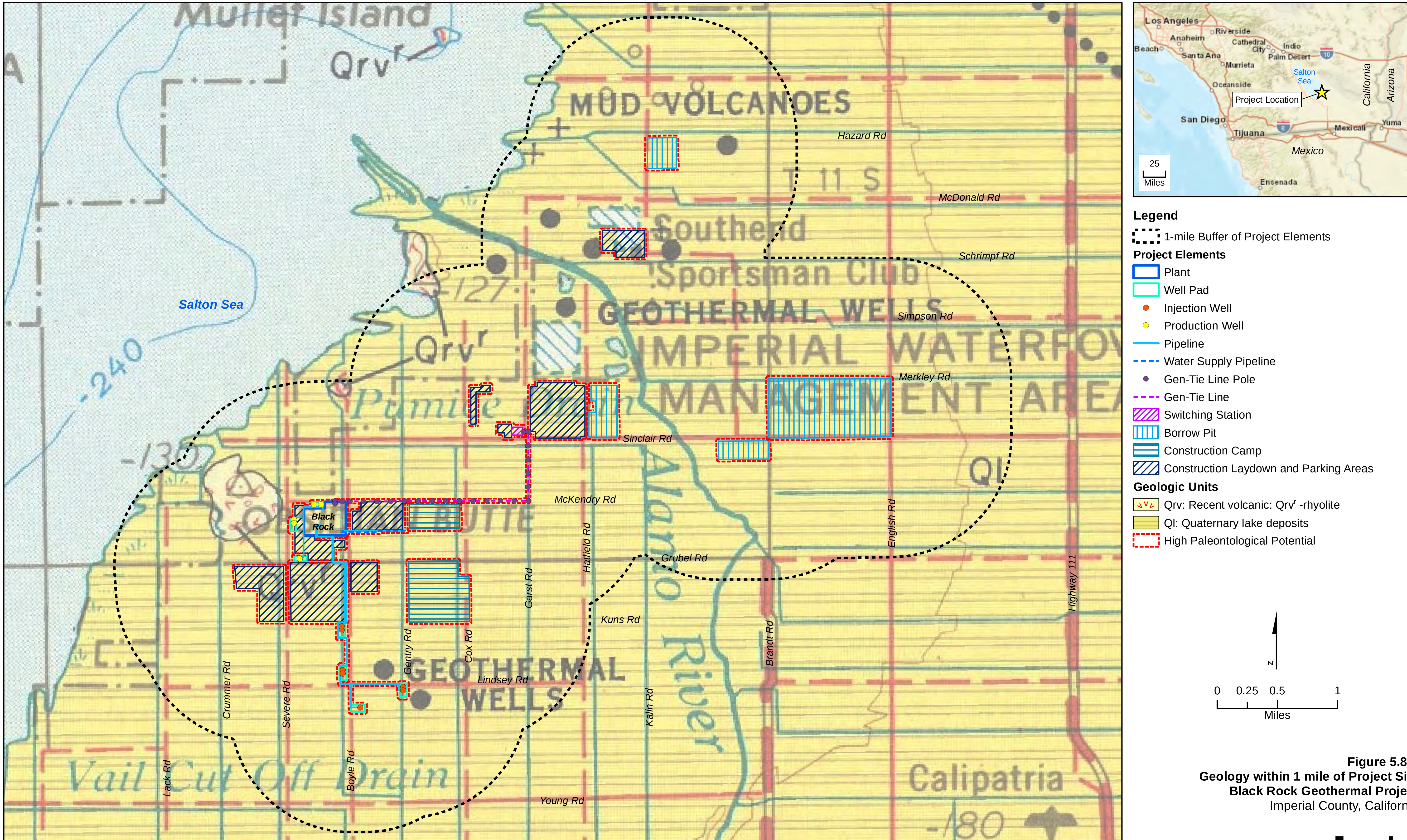


Figure 5.8-1
Geology within 1 mile of Project Site
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Geology\Black_Rock\One_Mile_Geo_230206.mxd photography, technical and scientific reports, and electronic databases. The potential paleontological productivity of stratigraphic units that may be affected by Project implementation then was developed through a paleontological resources records search. For this Project, a paleontological resources records review was conducted using the online database maintained by the University of California Museum of Paleontology at Berkeley (UCMP). A records search also was conducted through the by Dr. Lyndon Murray, district paleontologist for the Colorado Desert District Stout Research Center (SRC) at Anza-Borrego Desert State Park (ABDSP).

A pedestrian field survey of the study area was conducted from April 24 through 26, 2022. The field survey was conducted to ground truth the results of the literature review and geologic mapping, and to directly evaluate the paleontological potential of the geologic units within the Study area.

5.8.1.2.1 Resource Inventory Results

The BRGP study area is typified by agricultural development and existing geothermal energy infrastructure. While the surface has been disturbed primarily by agricultural development, exposures of undisturbed Lake Cahuilla bed sediments were observed in several canal bank sidewalls within the study area (refer to Section 5.8.1.2.4). Recent volcanic deposits (rhyolite domes) also outcrop along the southern shore of the Salton Sea within the western portion of the study area.

5.8.1.2.2 Geological Units in the Project Area

The local geology of a project area determines its paleontological potential. A large-scale geologic map (such as 1:24,000) is not available for the Study area. Smaller-scale maps, including those published by Jennings (1967; 1:250,000 scale) and Morton (1977; 1:125,000 scale), were consulted for this analysis. Based on these maps, the entire Study area is immediately underlain by Quaternary lake deposits locally referred to as Lake Cahuilla beds. As shown on Figure 5.8-1, the two-letter geologic mapping designation for this unit is “Ql.” Within the western portion of the study area, volcanic deposits (rhyolite domes) also outcrop along the southern shore of the Salton Sea within the western portion of the study area. As shown on Figure 5.8-1, the three-letter geologic mapping designation for this unit is “Qrv^{r}.” While not mapped at the surface, the Brawley and Borrego formations underlie the Lake Cahuilla beds and may be encountered at unknown depths during ground disturbance. Thus, these two formations are included in the following assessment:

- **Volcanic deposits –** Holocene-age volcanic deposits of rhyolite and pumice with subordinate obsidian that form prominent volcanic domes. The high viscosity of silica-rich lava prevents the lava from flowing very far, which results in the formation of a dome (Robinson et al. 1976).
- **Lake Cahuilla beds –** Lake Cahuilla beds are Holocene to Pleistocene in age and consist largely of interbedded lacustrine, playa, and fluvial deposits. The lacustrine sediments are composed of Colorado River-derived medium- to very fine-grained sandstone, siltstone, and mudstone. The fluvial deposits are composed mainly of coarse-grained sandstone with minor amounts of gravel from the local mountains. Total thickness of the unit is unknown (Jefferson 2007). The Lake Cahuilla beds generally overlie the Pleistocene Brawley Formation with an angular unconformity. However, there are some locations on the east and south sides of the central Salton Trough where the Brawley Formation and overlying Lake Cahuilla beds are in conformity or paraconformity, making the contact between the two units harder to distinguish (Ross et al. 2020).
- **Brawley Formation –** The Pleistocene Brawley Formation is primarily a lacustrine deposit, but the presence of marine-estuarine fauna within the unit indicates that it was deposited near sea level and flooded with marine waters during sea level highstands (Ross et al. 2020). The Brawley Formation consists of light gray-green to light yellow-brown claystone and interbeds of buff-colored sandstone. The Brawley Formation overlies the Pliocene Borrego Formation. The Brawley Formation is lithologically distinguished from the underlying Borrego Formation by the coarse-grained intervals of sandstone and gravel.

- **Borrego Formation –** The Pliocene Borrego Formation is a regionally extensive deposit of lacustrine claystone, mudstone, and marlstone with minor amounts of sandstone and siltstone (Lutz 2005).

5.8.1.2.3 Results of the Records Search and Literature Review

A search of the UCMP online database was performed on May 4, 2022. The UCMP database was queried for fossil site records within the potentially impacted formations. While geologic names such as "lake deposits" and informal names assigned to geologic units by geologists such as "Lake Cahuilla beds" do not lend themselves to database searches, the results can be used as a general guide to the paleontological potential (that is, the likelihood of yielding scientifically significant fossils) of the sediments in the vicinity of the Project, with allowance for the nature of the data. In particular, the complex history of the geologic names complicated this search because historic locality records often retain their original stratigraphic designations despite later revisions to the nomenclature. Fortunately, the UCMP is aware of these issues, and many of the records indicate the history of the formation name.

Queries of the UCMP database did not yield any fossil records from the Borrego Formation, Brawley Formation, or "Quaternary lake deposits" or "Lake Cahuilla beds." The UCMP database did yield two invertebrate and two vertebrate fossil records from Pleistocene deposits in Imperial County, which may be correlative with the Lake Cahuilla beds or Brawley Formation. The applicable fossil records from the UCMP database are provided in Confidential Appendix A. UCMP invertebrate locality A4336 is identified with the locality name "Lake Coahuila," but no further information was provided. Similarly, invertebrate locality A3766 is identified with the locality name "Salton Sink," but no further information was provided. The two vertebrate localities are identified with the locality names "Seeley West" and "Coachella," which are located more than 20 miles from the BRGP area.

Several paleontological records searches of the Imperial Valley within the Salton Trough have been processed through the SRC at ABDSP in the past two decades. Within the Study area, freshwater fossils are abundant in the Borrego and Brawley formations and Lake Cahuilla beds. Several significant invertebrate, plant, and vertebrate fossil localities from within the Borrego Formation, Brawley Formation, and Lake Cahuilla beds are on file at the SRC at ABDSP and are provided in Appendix 5.8A under a request for confidentiality. The SRC at ABDSP yielded 45 invertebrate localities from within the Borrego Formation, one invertebrate and 34 vertebrate fossil localities from within the Brawley Formation, and 27 invertebrate and one vertebrate fossil localities from the Lake Cahuilla beds.

The Borrego Formation invertebrates indicate deposition in a large perennial lake and/or playa lake (Tarbet and Holman 1944; Dibblee 1954; Dronyk 1977; Wagoner 1977; Lutz et al. 2006). In addition to invertebrates, the Borrego Formation also has produced an assemblage of charophytes (algae), rare foraminifera, and fragments of petrified wood (Dibblee 1954, Kirby et al. 2007).

The Brawley Formation has yielded invertebrate ichnofossils; marine and terrestrial foraminifera and ostracodes; fossil leaves; marine, estuarine, and terrestrial mollusks; marine and terrestrial fishes; and small terrestrial vertebrate assemblages, including *Mammuthus*, *Bison*, *Camelops*, and *Equus* (Jefferson 2007; Kirby et al. 2007).

Fossils from the Lake Cahuilla beds were first reported by Blake (1854, 1857), who noted the occurrence of shells of various kinds of freshwater mollusks (clams and snails). Since then, numerous writers have discussed the occurrence of these molluscan fossils (Orcutt 1890; Stearns 1901; Whistler et al. 1995; Bowersox 2003). In addition, the occurrence of fossil fish remains has been reported by Hubbs and Miller (1948), Hubbs et al. (1960), Myncklei (1979), and Whistler et al. (1995).

The freshwater molluscan assemblages reported by Whistler et al. (1995) documented at least four cycles of Lake Cahuilla inundation and desiccation. Whistler et al. (1995) also reported on vertebrate fossils recovered from Lake Cahuilla beds, including terrestrial reptiles (horned lizard, spiny lizard, brush lizard, shovel-nosed snake, night snake, gopher snake, ground snake, sidewinder, and rattlesnake) and mammals (cottontail rabbit, pocket mouse, kangaroo rat, ground squirrel, and wood rat). Freshwater fishes also were recovered and include desert pupfish, bonytail chub, and razorback sucker. Abundantly fossiliferous Lake

Cahuilla bed strata also are exposed in the walls of an abandoned barrow pit southeast and east of the Salton Sea SRA maintenance yard and residency, south of Parkside Drive (Jefferson 2007).

In addition, paleontological mitigation work in Imperial County has resulted in the recovery of diverse fossil assemblages from temporary subsurface exposures of Lake Cahuilla bed sediments. During trenching and slant drilling for the Southern California Gas Line 6914 Loop Imperial Valley Project between Brawley and Calipatria, well-preserved remains of freshwater mollusks (clams and mussels), ostracods, and fish were recovered from depths as shallow as five feet bgs from Lake Cahuilla bed sediments described as alternating layers of clayey siltstones and fine-grained sandstones. Mass grading operations for the State Route 78/111 Brawley Bypass Project near Brawley exposed more than 35 feet of prehistoric Lake Cahuilla bed sediments from which well-preserved remains of freshwater algae, mollusks, ostracods, and fish were recovered as shallow as three feet bgs (PaleoServices 2011).

Fossil remains from Lake Cahuilla bed sediments are considered significant and unique because of the paleoclimatic and paleoecological information they can provide (Jefferson 2006). In addition, Lake Cahuilla bed sediments may preserve evidence of human activity, both along the high lake margin and as the lake receded to the playa floor. The buried fluvial-deltaic and para-limnic deposits of older lacustrine phases could contain evidence of human interface with extinct late Pleistocene megafauna at the base of the Holocene strata.

5.8.1.2.4 Results of the Field Survey

During the field survey of the BRGP study area (Figure 5.8-1), no significant fossil resources or localities were discovered. Limited exposures of Lake Cahuilla bed sediments were observed at the following locations:

- Canal on the north side of Schrimpf Road east of the intersection with English Road
- Canal on the east side of Boyle Road at its intersection with Kuns Road
- Canal on the east side of Garst Road just north of its intersection with Grubel/East Peterson Road
- Canal on the east side of Gentry Road between Kuns Road and Grubel Road

The most accessible exposure was the canal bank along the north side of Schrimpf Road, so a stratigraphic section was measured from that exposure. The exposed stratigraphy in the canal on the north side of Schrimpf Road consists of approximately 12 feet of brown mudstone interbedded with thin tan to gray siltstone. The siltstone intervals are spaced approximately 12 to 18 inches apart and are approximately 0.25 inch to 3.00 inches thick. Several siltstone interbeds exhibited cross bedding. The top 18 to 24 inches of the exposed section consisted of previously disturbed sediments (likely from agricultural operation).

Based on the measured stratigraphic section and observation of similar lithology in other canal banks within the study area, the thickness of the soil cover that has been disturbed by agricultural operation ranges from 18 to 36 inches. The stratigraphy of the other canal banks were similar to that described from the exposure on Schrimpf Road, except that the thickness of the top layer of disturbed sediments was typically greater (up to 36 inches). A photo log is provided in Appendix 5.8B.

5.8.1.2.5 Paleontological Potential

The paleontological potential of a geologic unit exposed in a project area is inferred from the abundance of fossil specimens and previously recorded fossil sites in exposures of the unit, or of similar units in similar geological settings. The underlying assumption of this assessment method is that a geologic unit is mostly likely to yield fossil remains in a quantity and of a quality similar to those previously recorded from the unit elsewhere in the region.

Significant paleontological resources are fossils and fossiliferous deposits consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and biochronologic information. Paleontological resources are considered to be older than recorded human history and older than middle Holocene (older than approximately 5,000 radiocarbon years) (SVP 2010).

Thus, the paleontological potential of a geologic unit reflects (1) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant vertebrate, invertebrate, plant, or trace fossils, and (2) the importance of recovered evidence for proper stratigraphic interpretation, age determination of a geologic unit, paleoenvironmental and paleoclimatic reconstructions, or to understanding evolutionary processes.

Determining the paleontological potential of a geologic unit helps to determine which units may require mitigation to reduce potential impacts to paleontological resources during the development of the Project. In its guidelines for assessment and mitigation of adverse impacts to paleontological resources, the SVP (2010) established the following four categories of paleontological potential of geologic units: high, low, none, and undetermined. These categories are described in more detail in Table 5.8-1.

Table 5.8-1. Definitions of Paleontological Potential

Rating	Definition
High	Geologic units from which vertebrate or scientifically important invertebrate, plant, or trace fossils have been recovered are considered to have a High Potential for containing additional scientifically important paleontological resources. Geologic units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and geologic units which may contain new vertebrate deposits, traces, or trackways, also are classified as having High Potential.
Low	Geologic units with Low Potential are known to produce significant fossils only on rare occasions, and only preserve fossils in rare circumstances such that the presence of fossils is the exception not the rule, for example, basalt flows or recent colluvium.
Undetermined	Geologic units for which little information is available concerning their geologic context (depositional environment, age) and potential to contain paleontological resources are considered to have undetermined potential. The paucity of data is usually from a lack of study in that unit or because of high variability in the unit's lithology. Typically, further study is necessary to determine whether these units have High, Low, or No Potential to contain scientifically significant paleontological resources. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.
None	Geologic units with No Potential are those that formed at high temperatures and pressures, deep within the Earth, such as plutonic igneous rocks and high-grade metamorphic rocks. Since the environment in which these rocks formed is not conducive to the preservation of biological remains, they do not contain fossils. Manmade fill also is considered to possess no paleontological potential.

5.8.2 Environmental Analysis

The BRGP study area is immediately underlain by Lake Cahuilla bed sediments. In all parts of the Salton Sea Known Geothermal Resource Area, Lake Cahuilla bed sediments are underlain at depth by the Pleistocene Brawley Formation and Pliocene Borrego Formation. Within the western study area, modern volcanic domes outcrop along the southern shore of the Salton Sea. The environmental effects on paleontological resources from construction and operation of the BRGP are presented in the following subsections.

5.8.2.1 Paleontological Resource Significance Criteria

California Environmental Quality Act (CEQA) Appendix G provides that a significant effect may occur if a project has the potential to "directly or indirectly destroy a unique paleontological resource or site or unique geologic feature" (CEQA Appendix G, Section V.f.). This is most typically thought of as occurring from heavy equipment damage to fossils, but also may occur when fossils are looted, improperly removed from the surrounding sediment, or otherwise lost to the scientific world. Fossils are a nonrenewable resource (SVP 2010).

Generally, the probability of adverse impacts during excavations within a geologic unit is proportionate to the paleontological potential of the unit. While it is theoretically possible to adversely affect paleontological resources in geologic units with Low Potential, it would be remote because the units are not known to contain fossils. The highest probability of significant adverse effects to paleontological resources results from disturbance of geologic units with High Potential, which have produced scientifically significant fossils, and recorded fossil localities are sufficiently frequent to anticipate encountering more (SVP 2010).

In its standard guidelines for assessment and mitigation of adverse impacts to paleontological resources, the SVP (2010) notes that an individual fossil specimen is considered scientifically important and significant if it meets any of the following criteria:

- Identifiable
- Complete
- Well preserved
- Age-diagnostic
- Useful in paleoenvironmental reconstruction
- A member of a rare species
- A species that is part of a diverse assemblage
- A skeletal element different from, or a specimen more complete than, those now available for that species

For example, identifiable land mammal or terrestrial plant fossils are considered scientifically important because of their potential use in determining the age and paleoenvironment of the sediments in which they occur. Moreover, vertebrate and plant remains are comparatively rare in the fossil record. Fossil plants are particularly important in this regard and, as sessile (anchored in place) organisms, are actually more sensitive indicators of their paleoenvironment and are therefore more important than mobile mammals for paleoenvironmental reconstructions.

For marine and shoreline sediments, invertebrate mega-fossils (mollusks and cephalopods) are scientifically important for the same reasons that land mammal and land plant fossils are valuable in terrestrial deposits. Marine microfossils such as foraminifera or radiolaria are much more common, and consequently they are usually not considered for resource protection because of their relative abundance. The value or importance of different fossil groups varies depending on the age and depositional environment of the stratigraphic unit that contains the fossils, their abundance in the record, and their degree of preservation.

Using these criteria and the categories of paleontological potential previously provided, the significance of potentially adverse impacts of earth moving associated with implementation of this Project on paleontological resources was assessed. Any unmitigated impact on a fossil site, or on a fossil-bearing rock unit with high paleontological potential, would be considered significant.

5.8.2.2 Paleontological Resource Impact Assessment

The significance of impacts of BRGP-related activities on the paleontological resources of each stratigraphic unit found within the study area of the BRGP (including those that may be encountered at depth) is presented in this section. Construction activities involving ground disturbance that include grading, trenching, drilling, and excavation operations will impact Lake Cahuilla bed sediments. Deeper excavation activities and drilling operations have the potential to not only penetrate Lake Cahuilla bed sediments, but also older and more deeply buried geologic deposits (Brawley Formation, Borrego Formation).

Table 5.8-2 presents the paleontological potential of the geologic units that may be impacted during ground-disturbing activities for the BRGP. Lake Cahuilla beds, Brawley Formation, and Borrego Formation possess a high paleontological potential to contain significant fossil remains. Holocene volcanic deposits are too young to contain paleontological resources and are formed at high temperatures, which would destroy any remains that may have been present; thus, they have no paleontological potential.

Because no ground disturbance is anticipated during the operation or the maintenance phase of the Project, no impacts on paleontological resources are expected from the operations and maintenance of the BRGP.

Table 5.8-2. Paleontological Potential of Geologic Units

Geologic Unit	Geologic Map Abbreviation	Types of Fossils	Paleontological Potential
Holocene Volcanic deposits	Qvr	None	None
Holocene to Pleistocene Lake Cahuilla beds	Ql	Invertebrates, Vertebrates, Plants, Microfossils	High
Pleistocene Brawley Formation	Not mapped at the surface within the study area, but present at unknown depth beneath unit Ql	Invertebrates, Vertebrates, Plants, Microfossils	High
Pliocene Borrego Formation	Not mapped at the surface within the study area, but present at unknown depth beneath unit Ql	Invertebrates, Microfossils, and Plants	High

5.8.3 Cumulative Effects

Development in the Imperial Valley and Salton Sea area has resulted in cumulative impacts on paleontological resources. The extensive nature of these cumulative impacts is from this extensive development combined with the widespread presence of fossiliferous sedimentary units in the region. However, measures typically implemented pursuant to state statutes (refer to Section 5.8.5) serve to mitigate these impacts through the recovery of the scientific and educational potential of the affected paleontological resources. Although not all projects are subject to CEQA review, and only a proportion of those incorporate paleontological protection measures, application of paleontological monitoring and mitigation measures is common and, therefore, mitigates the cumulative and direct impacts of continued development.

The potential of the BRGP to contribute to cumulative impacts on paleontological resources is low with mitigation implemented. Therefore, the contribution of the BRGP to cumulative negative impacts on paleontological resources would be negligible.

5.8.4 Mitigation Measures

The mitigation measures proposed in the following sections are in compliance with CEC environmental guidelines (CEC 2000; CEC 2007) and conform to SVP standard guidelines for mitigating adverse construction-related impacts on paleontological resources (SVP 2010). Mitigation measures would include an onsite Paleontological Resources Specialist, Monitoring, development of a Paleontological Resources Monitoring and Mitigation Plan, and development of a Worker Environmental Awareness Program. Implementation of these mitigation measures would assure that potential impacts on paleontological resources from Project-related ground disturbance would be maintained at an insignificant level.

5.8.5 Laws, Ordinances, Regulations, and Standards

Paleontological resources are the mineralized (fossilized) remains of prehistoric plants and animals and the mineralized impressions (trace fossils) left as indirect evidence of the form and activity of such organisms. These resources are located within geologic units and considered to be nonrenewable. Thus, they are afforded protection under several federal, state, and local LORS. Table 5.8-3 presents the LORS applicable to paleontological resources.

Table 5.8-3. LORS Applicable to Paleontological Resources

LORS	Applicability	Application for Certification Reference	Project Conformity
Omnibus Public Land Management Act of 2009 (H.R. 146), Title 6, Subtitle D Antiquities Act of 1906 National Environmental Policy Act of 1969	Applies to fossil resources on federally owned or controlled land, or to projects receiving federal funding, or if a federal entitlement or other permit is required. Not applicable to this Project because it is entirely on private property.	Section 5.8.5.1	Yes
CEQA, Appendix G	Applicable – Requires assessment of the potential to affect paleontological resources during earth-moving activities.	Sections 5.8.2, 5.8.3, and 5.8.5	Yes
Public Resources Code, Sections 5097.5/5097.9	Applies to paleontological resources on land owned by, or in the jurisdiction of, the state of California, or any city, county, district, authority, or public corporation, or any agency thereof. Not applicable to this Project because it is entirely on private property.	Section 5.8.5	Yes
Imperial County General Plan	Requires assessment of current and proposed land uses for impacts upon historic and prehistoric resources or sites of scientific value.	Section 5.8.5	Yes

5.8.5.1 Federal LORS

Federal protection for significant paleontological resources would apply to the BRGP only if any construction or other related Project impacts occur on federally owned or managed lands, or if a federal entitlement or other permit were required.

Federal regulations protecting paleontological resources, including Title 6, Subtitle D of the Omnibus Public Land Management Act (OPLMA; H.R. 146 and the Antiquities Act of 1906 (Public Law [PL] 59-209; 16 United States Code [USC] 431 et seq.; 34 Stat. 225), are generally applicable only to projects that include work on federal lands. Because this Project is entirely on private lands, these regulations are not applicable.

The National Environmental Policy Act of 1969 (USC, Section 4321 et seq.; 40 Code of Federal Regulations Section 1502.25), as amended, requires analysis of potential environmental impacts to important historic, cultural, and natural aspects of our national heritage. Because the BRGP may receive federal funding, the federal agency issuing the funds may need to conduct a NEPA analysis. (refer to Table 5.8-2).

5.8.5.2 State LORS

The CEC environmental review process under the Warren-Alquist Act is considered functionally equivalent to that of CEQA (Public Resources Code [PRC] Sections 21000 et seq.). CEQA requires that public agencies and private interests identify the environmental consequences of their proposed projects on any object or site of significance to the scientific annals of California (Division I, California PRC: 5020.1 [b]). The CEQA Guidelines (PRC Sections 15000 et seq.) define procedures that public agencies are required to implement to comply with CEQA. Appendix G in Section 15023 provides an Environmental Checklist of questions that a lead agency should normally address if relevant to a project's environmental impacts. One of the questions to be answered in the Environmental Checklist (Section 15023, Appendix G, Section VII, Part f) is "Would the project directly or indirectly destroy a unique paleontological resource or site…?"

The CEQA lead agency having jurisdiction over a project is responsible for ensuring that paleontological resources are protected in compliance with CEQA and other applicable statutes. The lead agency with the responsibility to ensure that fossils are protected during construction of the BRGP is the CEC. PRC Section 21081.6, entitled Mitigation Monitoring Compliance and Reporting, requires that the CEQA lead agency demonstrate project compliance with mitigation measures developed during the environmental impact review process.

Other state requirements for paleontological resource management are in California PRC Sections 5097.5 and5097.9 entitled Archaeological, Paleontological, and Historical Sites. This statute protects historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological sites, or any other archaeological, paleontological, or historical feature that is situated on land owned by, or in the jurisdiction of, the state of California, or any city, county, district, authority, or public corporation, or any agency thereof. PRC Section 5097.5/5097.9 does not apply to the BRGP because it lies entirely on private property.

5.8.5.3 Local LORS

The Imperial County General Plan serves as the primary policy statement by the County Board of Supervisors for implementing development policies and land uses. The General Plan does not have any requirements specific to paleontological resources. However, paleontological resources often are considered a subcategory of prehistoric or cultural resources and are certainly considered significant natural or scientific resources. Thus, the following elements of the Imperial County General Plan may apply to paleontological resources.

The Conservation and Open Space Element of the General Plan contains requirements for cultural resources that involve the identification and documentation of significant historic and prehistoric resources and the preservation of representative and worthy examples. The Conservation and Open Space Element also recognizes the value of historic and prehistoric resources or sites of scientific value and the need to assess current and proposed land uses for impacts upon these resources.

Goals and Objectives, as stated in the Land Use Element of the General Plan, provide direction for private development and guidelines for land use decision making. These Goals and Objectives repeatedly mention preserving natural resources and the natural environment and avoiding adverse environmental impacts. Objective 8.8 specifically states that the siting of future facilities for the transmission of electricity should be compatible with the environment. Goal 9 deals with the protection of environmental resources and states that the County will identify and preserve significant natural, cultural, and community character resources. Objective 9.1 requires the preservation of important natural resources, including prehistoric sites.
The BRGP would achieve these objectives with the implementation of the mitigation measures specified in Section 5.8.4.

5.8.5.4 Professional Standards

The SVP, an international organization of professional paleontologists, has established guidelines and standard procedures that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation (SVP 2010). This assessment was prepared in accordance with these guidelines.

5.8.6 Agencies and Agency Contacts

There are no agencies having blanket jurisdiction over paleontological resources. The CEC has jurisdiction over paleontological resources for this Project. If encountered, scientifically significant fossil specimens and associated site records will be submitted to the closest regional repository in operation, which is the Colorado Desert District SRC at ABDSP (Table 5.8-4).

Table 5.8-4. Agency Contacts for Paleontological Resources

Issue	Agency	Contact
Paleontological Resources Documentation and Specimen Repository	Anza-Borrego Desert State Park Stout Research Center	Dr. Lyndon K. Murray District Paleontologist 200 Palm Canyon Drive Borrego Springs, CA 92004 Phone: (760) 767-4974 E-mail: lyndon.murray@parks.ca.gov

5.8.7 Permits and Permit Schedule

No state or county agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earth moving on this Project site.

5.8.8 References

Alles, D. L., editor. 2004. Geology of the Salton Trough. http://fire.biol.wwu.edu/trent/alles/GeologySaltonTrough/pdf. Accessed March 22, 2004.

Blake, W.P. 1854. "Ancient Lake in the Colorado Desert." *American Journal of Science* 17:435-438.

Blake, W.P. 1857. Geological report. U.S. Pacific Railroad Exploration. U.S. 33rd Congress, 2nd session, Senate Executive Document 78 and House Executive Document 91, vol. 5, 390 pp.

Bowersox, R.J. 1972. *Molluscan paleontology and paleoecology of Holocene Lake Cahuilla*. Undergraduate Research Reports, Geology Department, San Diego State University, California 21:1-22.

Bowersox, R.J. 2003. "Salinity tolerance of the freshwater mussel *Anodonta dejecta* Lewis in Holocene Lake Cahuilla, southeastern California; a caution in the use of fossil freshwater mussels as a freshwater indicator in stable isotope studies." Abstracts with Programs, *Geological Society of America* 35:212.

California Energy Commission (CEC). 2000. "Paleontological Resources." *Regulations Pertaining to the Rules of Practice and Procedure & Power Plant Site Certification*.

California Energy Commission (CEC). 2007. "Paleontologic Resources." *Complete Text of the Energy Commission's Proposed Amendments to the Power Plant Siting Regulations*.

Dibblee, T.W., Jr. 1954. "Geology of the Imperial Valley region, California." In Geology of Southern California, edited by R.H. Jahns. *California Division of Mines and Geology Bulletin* 170(2, 2):21-81.

Dorsey, R. 2006. "Stratigraphy, tectonics, and basin evolution in the Anza-Borrego Desert region." In, Jefferson, G.T. and L. Lindsay (eds.), *Fossil Treasures of the Anza-Borrego Desert*. Sunbelt Publications, San Diego, California, p. 89-104.

Dronyk, M.P. 1977. *Stratigraphy, structure and seismic refraction survey of a portion of the San Felipe Hills, Imperial Valley, California*. Master of Science Thesis, Department of Geological Sciences, University of California, Riverside, 141 pp.

Fuis, G., and W.M. Kohler. 1984. *Crustal Structure and Tectonics of the Imperial Valley Region, California*. United States Geological Survey. p. 25-49.

Hubbs, C.L., and R.R. Miller. 1948. "The Great Basin. Part II, The zoological evidence." University of Utah, *Bulletin* 38:18-144.

Hubbs, C.L., G.S. Bien, and H.E. Suess. 1960. "La Jolla natural radiocarbon measurements." *American Journal of Science*, Radiocarbon Supplement 2:197-223.

Jefferson, G.T. 2006. *Review of Salton Sea Restoration Program Draft Programmatic Environmental Impact Report*. On file at the Colorado Desert District Stout Research Center, Anza-Borrego Desert State Park.

Jefferson, G.T. 2007. *Salton Sea SRA 623, Paleontologic Resources Inventory and Management Recommendations: Geology and Paleontology*. Document on File, Colorado Desert District Stout Research Center, Department of Parks and Recreation, Borrego Springs, California. 10 p.

Jennings, C. W. 1967, Geologic Map of California: Salton Sea Sheet. California Division of Mines and Geology. Scale: 1:250,000.

Kirby, S.M., S.U. Janecke, R.J. Dorsey, B.A. Housen, K. McDougall, V. Langenheim, and A. Steely. 2007. "Pleistocene Brawley and Ocotillo Formations: Evidence for initial strikeslip deformation along the San Felipe and San Jacinto fault zones, California." *The Journal of Geology* 115: 43–62.

Lutz, A.T. 2005. *Tectonic controls on Pleistocene basin evolution in the central San Jacinto fault zone, California*. Master's Thesis, Department of Geological Sciences University of Oregon 136 pp.

Lutz, A.T., R.J. Dorsey, B.A. Housen, and S.U. Janecke. 2006. "Stratigraphic record of Pleistocene faulting and basin evolution in the Borrego Badlands, San Jacinto fault zone, Southern California." *Geological Society of America Bulletin* 118: 1377–1397.

Morton, P. K. 1977, Geology and mineral resources of Imperial County, California: California Division of Mines and Geology, County Report 7, 104 p.

Myncklei, W.L. 1979. Aquatic habitats and fishes of the lower Colorado River, southwestern United States. U.S. Department of the Interior, Bureau of Reclamation.

Orcutt, C.R., 1890. "The Colorado Desert." *California Mining Bureau Report* 10, p. 899-919.

PaleoServices of the San Diego Natural History Museum. 2011. Paleontological Resources Assessment for the Hudson Ranch II Geothermal Project, Imperial County, California. July.

Robinson, P.T., W.A. Elders, and J.L.P. Muffler. 1976. "Quaternary volcanism in the Salton Sea geothermal field, Imperial Valley, California." *Geological Society of America Bulletin* 87:347-360.

Ross, J.E., S.M. Kidwell, D.L. Dettman, J. Bright, R.J. Dorsey, and G.T. Jefferson, 2020. "Evidence of Pleistocene marine incursions into the Salton Basin." In *Changing Faces, The 2020 Desert Symposium and Proceedings*, edited by D. Miller. Desert Symposium, Inc. pp. 245-246.

Singer, E. No Date. *Geology of the Imperial Valley, California*. http://fire.biol.wwu.edu/trent/alles/SingerImperialValley.pdf

Stearns, R.E.C. 1901. "The fossil fresh-water shells of the Colorado Desert, their distribution, environment, and variation." *U.S. National Museum, Proceedings* 24(1256):271-299.

Steely, A.N., S.U. Janecke, R.J. Dorsey, and G.J. Axen. 2009. "Early Pleistocene initiation of the San Felipe fault zone, SW Salton Trough, during reorganization of the San Andreas fault system." *Geological Society of America Bulletin* 121: 663-687.

Society of Vertebrate Paleontology (SVP). 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*. http://vertpaleo.org/Membership/Member-Ethics/SVP_Impact_Mitigation_Guidelines.aspx.

Sylvester, A.G. and R.R. Smith. 1976. "Tectonic Transpression and Basement-controlled Deformation in San Andreas Fault Zone, Salton Trough, California." *American Association of Petroleum Geologists Bulletin* 60:12.

Tarbet, L.A., and W.H. Holman. 1944. "Stratigraphy and Micropaleontology of the West Side of Imperial Valley, California." *American Association of Petroleum Geologists Bulletin* 28:1781-1782.

University of California, Berkeley, Museum of Paleontology (UCMP). 2022. Collections catalog database. Accessed on May 4. http://ucmpdb.berkeley.edu/about.shtml.

Wagoner, J.L. 1977. *Stratigraphy and Sedimentation of the Pleistocene Brawley and Borrego Formations in the San Felipe Hills area, Imperial Valley, California, U.S.A*. Master of Science Thesis, Department of Geological Sciences, University of California, Riverside. 128 pp.

Whistler, D.P., E.B. Lander, and M. Roeder. 1995. "A diverse record of microfossils and fossil plants, invertebrates, and small vertebrates from the late Holocene Lake Cahuilla beds, Riverside County, California." In *Paleontology and Geology of the Western Salton Trough Detachment, Anza-Borrego Desert State Park, California*, edited by P. Remeika and A. Sturz, San Diego Association of Geologists, Field Trip Guidebook 1:109-118.

5.9 Public Health

This section describes and evaluates the potential public health effects from construction and operation of the Black Rock Geothermal Project (BRGP or "Project"). Section 5.9.1 provides an overview of the Project. Section 5.9.2 describes the affected environment. Section 5.9.3 presents the analysis of public health effects of construction and operation of the power plant and associated facilities. Section 5.9.4 discusses potential other public health concerns associated with the Project, including hazardous materials, odors, electromagnetic fields (EMFs), and Legionella from cooling tower operations. Section 5.9.5 discusses potential cumulative health effects. Section 5.9.6 presents proposed mitigation measures to avoid or minimize any adverse impacts. Section 5.9.7 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.9.8 provides agency contacts. Section 5.9.9 presents permit requirements and schedules. Section 5.9.10 contains references cited or consulted in preparing this section. Appendices 5.9A and 5.9B contain supporting data for the operational and construction public health analyses, respectively.

5.9.1 Project Overview as it Relates to Public Health

The Project consists of a proposed geothermal Resource Production Facility (RPF), a Power Generation Facility (PGF), and associated facilities in Imperial County, California. Figure 1-1 shows the Project regionally, and Figure 1-4 depicts the Project area, including proposed gen-tie line and pipelines. The Project will be owned by Black Rock Geothermal LLC (Project owner or "Applicant"), along with the associated gen-tie). A complete description of the Project is presented in Section 2.

Air will be the dominant pathway for public exposure to chemical substances released by Project construction and operation. Airborne construction-related emissions will consist primarily of combustion by-products from onsite, diesel-fired construction equipment and vehicles. Airborne operation-related emissions will consist primarily of combustion by-products from four diesel-fired emergency generators and one diesel-fired water pump and those generated by the processing, condensing, and venting of geothermal fluid from the RPF. Potential health risks from public exposure to combustion emissions and geothermal fluid-related emissions were assessed by conducting a health risk assessment (HRA). Although exposure will occur almost entirely by direct inhalation, additional pathways were conservatively included in the HRA. The HRA was conducted in accordance with guidance established by the California Office of Environmental Health Hazard Assessment (OEHHA) and the California Air Resources Board (CARB).

Emissions with established California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS), including nitrogen oxides (NO_x), carbon monoxide (CO), and fine particulate matter (PM_{10}/$PM_{2.5}$), are addressed in Section 5.1. However, some discussion of the potential health risks associated with these substances, in addition to the potential health risks associated with all toxic air contaminants (TACs), is presented in this section. Human health risks associated with the potential accidental release of stored acutely hazardous materials, such as ammonia, are discussed in Section 5.5.

5.9.2 Affected Environment

The Project site is located in a region of the Imperial Valley, southeast of the Salton Sea, characterized mostly by agriculture and geothermal power production, with more recent additions of utility scale solar power plants. The area surrounding the plant site is primarily agricultural land. The Imperial Valley is the southwest part of the Colorado Desert that merges northwestward into the Coachella Valley near the northern shore of the Salton Sea.

The PGF will be located on approximately 55 acres (plant site) of a 160-acre parcel (APN 020-110-008) (Township 11 South, Range 13 East, Section 33, NE 1/4 of SW 1/4) within the unincorporated area of Imperial County, California. The production wells will be located on the plant site and the injection wells will be located offsite. The plant site will include onsite and offsite laydown/parking areas, potentially a construction camp, and borrow pits. These construction laydown/parking areas, construction camp, and borrow pits also will be used by other Applicant-owned projects currently before the California Energy Commission (CEC) (the Elmore North Geothermal Project and Morton Bay Geothermal Project). The plant site is located northwest of the existing Vulcan Power Plant and the Hoch (Del Ranch) Power Plant.

The Project site is bounded by McKendry Road to the north, Boyle Road to the east, and Severe Road to the west. The town of Niland is approximately eight miles northeast of the plant site, and the town of Calipatria is approximately six miles southeast of the plant site. The Red Hill Marina County Park is approximately two miles east of the PGF. The Sonny Bono Wildlife Refuge Headquarters is approximately 0.75 mile northeast of the PGF. The Alamo River is approximately three miles southwest of the plant site, and the New River is approximately five miles southwest of the plant site.

Sensitive receptors are defined as groups of individuals that may be more susceptible to health risks due to chemical exposure. Schools, both public and private, day care facilities, convalescent homes, and hospitals are of particular concern. Although residences and worker receptors are not technically defined as "sensitive receptors" by OEHHA, they were conservatively analyzed as sensitive receptors in this analysis due to the lack of sensitive receptors near the facility, The nearby receptors of these types are included in Appendix 5.9A. The Project site is situated in Imperial County census tract 010102.1092, which has a population value of zero individuals per the 2020 census update (USCB 2022). Appendix 5.9A delineates data on the population by census tract within a six-mile radius of the Project site, as well as a comprehensive list of sensitive receptors analyzed in the HRA.

Statewide air quality and health risk data presented by CARB in the 2013 Almanac of Emissions and Air Quality (Almanac) show that, over the period from the mid-1990s through 2009, the average concentrations for the most prominent TACs have been substantially reduced; the associated statewide health risks are similarly showing a steady downward trend (CARB 2014). This statewide trend is expected to have occurred within the Salton Sea Air Basin (SSAB) as well. The Applicant is not aware of any recent (within the last five years) public health studies related to respiratory illnesses, cancers or related diseases concerning the local area within a six-mile radius of the Project site.

5.9.3 Environmental Analysis

The analysis of potential environmental effects on public health from construction and operation of the Project is presented in the following sections.

5.9.3.1 Risk Types

Three different types of risk were evaluated for this Project: cancer risk, non-cancer chronic risk, and non-cancer acute risk. Each of these risk types is described below.

Cancer Risk. Cancer risk is the probability or chance of contracting cancer over a human life span (assumed to be 30 years, which is equivalent to the projected Project lifetime). Carcinogens are not assumed to have a threshold below which there would be no human health effect. In other words, any exposure to a carcinogen is assumed to have some probability of causing cancer; the lower the exposure, the lower the cancer risk (i.e., a linear, no threshold model). Under various state and local regulations, an incremental cancer risk greater than 10 in one million due to a project is considered to be a significant effect on public health. For example, the 10 in one million risk level is used by the Air Toxics Hot Spots (Assembly Bill [AB] 2588) program and Proposition 65 as the public notification level for air toxic emissions from existing sources. When evaluating cancer risks from a single facility, it is important to note that the overall lifetime risk of developing cancer for the average male in the United States is approximately 43 in 100, or 430,000 per million, and about 41 in 100, or 420,000 per million for the average female (NIH 2022). In California, from 2015 to 2019, the cancer incidence rates were 4,883 per million for males and 4,233 per million for females. The cancer death rates in California in the same period (2015-2019) were 1,775 per million for males, and 1,287 per million for females (NIH 2023).

An incremental lifetime cancer risk of 1×10^{-6} (one in a million) is typically used as a screening threshold of significance for potential exposure to carcinogenic substances in air. The incremental cancer risk level of one in one million, which has historically been judged to be an acceptable risk, originates from efforts by the Food and Drug Administration to use quantitative HRA for regulating carcinogens in food additives in light of the zero tolerance provision of the Delany Amendment (Hutt 1985). The associated dose, known as a “virtually safe dose,” has become a standard used by many policy makers and the lay public for evaluating cancer risks. However, a study of regulatory actions pertaining to carcinogens found that an acceptable risk level can often be determined on a case-by-case basis. This analysis of 132 regulatory decisions found that regulatory action was not taken to control estimated risks below one in a million, which are called *de minimis* risks. *De minimis* risks are historically considered risks of no regulatory concern. Chemical exposures with risks above 4×10^{-3} (four in ten thousand), called *de manifestis* risks, were consistently regulated. *De manifestis* risks are typically risks of regulatory concern. The risks falling between these two extremes were regulated in some cases, but not in others (Travis, et al. 1987).

Since risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have estimated such risks by extrapolation from high to low doses. This modeling procedure is designed to provide a highly conservative estimate of cancer risks based on the most sensitive species of laboratory animal for extrapolation to humans. In other words, the assumption is that humans are as sensitive as the most sensitive animal species. Therefore, the true risk is not likely to be higher than risks estimated using unit risk factors and is most likely lower, and could even be zero.

Non-Cancer Risk. Non-cancer health effects can be classified as either chronic or acute. In determining the potential health risks of non-cancerous air toxics, it is assumed there is a dose of the chemical of concern below which there would be no effect on human health. The air concentration corresponding to this dose is called the Reference Exposure Level (REL). Non-cancer health risks are measured in terms of a hazard quotient, which is the calculated exposure of each contaminant divided by its REL. Hazard quotients for pollutants affecting the same target organ are typically summed with the resulting totals expressed as hazard indices for each organ system. A hazard index (HI) of less than 1.0 is considered to be an insignificant health risk. RELs used in the HI calculations of this HRA were those published in December 2022 by CARB/OEHHA (CARB 2022a).

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure, caused by chemicals accumulating in the body. Because chemical accumulation to toxic levels typically occurs slowly, symptoms of chronic effects usually do not appear until long after exposure commences. The lowest no effect chronic exposure level for a non-carcinogenic air toxic is the chronic REL. Below this threshold, the body is capable of eliminating or detoxifying the chemical rapidly enough to prevent its accumulation. Chronic hazard quotients are derived from modeling annual TAC emissions.

Acute toxicity is defined as adverse health effects caused by a brief chemical exposure of no more than 24 hours. For most chemicals, the air concentration required to produce acute effects is higher than the level required to produce chronic effects because the exposure duration is shorter. Because acute toxicity is predominantly manifested in the upper respiratory system at threshold exposures, all hazard quotients are typically summed to calculate the acute HI. One-hour average concentrations are divided by the acute RELs to obtain a hazard quotient for health effects caused by relatively high, short-term exposures to air toxics.

5.9.3.2 Significance Criteria

The Imperial County Air Pollution Control District (ICAPCD) does not have established health risk thresholds; therefore, this analysis has conservatively relied on the risk thresholds for the neighboring South Coast Air Quality Management District (SCAQMD), as presented in Table 5.9-1. These are consistent with the notification levels established by CARB for Imperial County under AB 2588 (CARB 2021).

Table 5.9-1. Health Risk Significance Threshold Levels for SCAQMD

Category	Risk Threshold	Source
Facility-wide	Incremental Cancer Risk $\geq 10x10^{-6}$ Acute/Chronic HI $\geq$ 1.0 Cancer Burden $\geq$ 0.5	SCAQMD CEQA Handbook (SCAQMD 2019)

Note:

CEQA = California Environmental Quality Act

5.9.3.3 TAC Emissions

The following sections present the TAC emissions used in the HRA.

5.9.3.3.1 Project Operation

Environmental consequences associated with the operation of the Project are potential human exposure to chemical substances emitted to the air. The human health risks potentially associated with these chemical substances were evaluated in an HRA. The chemical substances potentially emitted to the air by the Project are listed in Table 5.9-2; details of the Project's emission sources are provided in Section 5.1.

Table 5.9-2. TACs Potentially Emitted by the Project

TACs [a, b]		
Lead	Zinc (Zn)	Acrolein
Hydrogen sulfide (H_2S) [c]	Diesel Particulate Matter (DPM)	Benzene
Ammonia (NH_3)	Radon	Ethylbenzene
Arsenic (As)	Copper (Cu)	Formaldehyde
Mercury (Hg)	Manganese (Mn)	Naphthalene
Aluminum (Al)	Nickel (Ni)	Propylene
Antimony (Sb)	Selenium (Se)	Toluene
Barium (Ba)	Silica (Si)	Xylene
Beryllium (Be)	Silver (Ag)	Carbon dioxide (CO_2)
Cadmium (Cd)	Vanadium (V)	Methane (CH_4)
Chromium (Cr)	PAHs (excluding naphthalene)	Nitrous oxide (N_2O)
Cobalt (Co)	Acetaldehyde	
	1,3-Butadiene	

[a] Although the Project is also expected to emit argon, hydrogen, lithium, nitrogen, and strontium, they are not classified as TACs by OEHHA and CARB and have not been included in this analysis.

[b] Although CO_2, CH_4, and N_2O are classified as greenhouse gases, OEHHA and CARB have assigned health risk values for them.

[c] Refer to Section 5.9.4.1.2 for a discussion of H_2S.

Note:

PAHs = polynuclear (or polycyclic) aromatic hydrocarbons

Table 5.9-3 presents the hourly TAC emissions from operation of the facility processes, per modeled emissions source. These hourly estimates for geothermal facility processes are based only on routine operation of the cooling tower, sparger, and biological oxidation box. This is because emissions resulting from the production testing unit (PTU), rock muffler (RM), and cooling tower/sparger/biological oxidation box bypass operations are limited, infrequent, and not to occur in the same hour as routine operation of the cooling tower, sparger, and biological oxidation box. The annual TAC emission estimates for geothermal facility processes are based on a routine production year (i.e., a year in which once-per-lifetime commissioning activities are not occurring). Table 5.9-4 presents annual TAC emissions from a routine operating year including startups, shutdowns, and emission controls downtime, whereas Table 5.9-5 presents annual TAC emissions from a routine operating year assuming no facility downtime and 8,760 hours of continuous power generation. Combustion emissions from the diesel fire water pump and four diesel-fired emergency generators are included in both scenarios.

Emissions resulting from operation and maintenance (O&M) activities, including construction vehicles and equipment, were not included in the HRA. These vehicles and equipment operate in limited capacity throughout the year in varying locations throughout or near the plant site. As such, they are not expected to significantly contribute to long-term health risk impacts.

Detailed emissions calculations are provided in Appendix 5.1A, per the methodology described in Section 5.1. A description of each modeled emissions source is also included in Section 5.1.

Table 5.9-3. Operational Hourly TAC Emissions Estimates

	Hourly Emissions (lbs/hr) per Emissions Source [a]			
Pollutant	Fire Pump	2.7 MW Generator	3.49 MW Generator [b]	CT [c]
Lead	--	--	--	1.03E-07
NH_3	--	2.77E-01	3.37E-01	1.97E+01
As	--	--	--	5.91E-06
Hg	--	--	--	3.08E-05
Benzene	7.46E-04	3.74E-03	4.69E-03	7.63E-02
Toluene	3.27E-04	1.35E-03	1.70E-03	4.34E-03
Ethylbenzene	--	--	--	8.02E-04
Xylenes	2.28E-04	9.30E-04	1.17E-03	7.97E-04
1,3-Butadiene	3.13E-05	--	--	--
Al	--	--	--	2.06E-06
Sb	--	--	--	1.65E-07
Ba	--	--	--	3.07E-06
Be	--	--	--	2.06E-08
Co	--	--	--	2.06E-08
Cd	--	--	--	4.11E-08
Total Chromium	--	--	--	1.03E-07
Cu	--	--	--	6.17E-08
V	--	--	--	1.03E-07
Mn	--	--	--	1.22E-05
Ni	--	--	--	2.34E-07
Se	--	--	--	2.35E-06
Si	--	--	--	1.03E-04
Ag	--	--	--	1.03E-07
Zn	--	--	--	1.52E-05
DPM	5.72E-02	1.79E-01	2.31E-01	--
Formaldehyde	9.44E-04	3.80E-04	4.77E-04	--
PAHs (unspeciated, excluding naphthalene)	--	--	--	--
Naphthalene	6.78E-05	6.26E-04	7.86E-04	--
Acetaldehyde	6.14E-04	1.21E-04	1.52E-04	--
Acrolein	7.40E-05	3.80E-05	4.77E-05	--

Pollutant	Hourly Emissions (lbs/hr) per Emissions Source [a] Fire Pump	2.7 MW Generator	3.49 MW Generator [b]	CT [c]
Propylene	2.06E-03	1.34E-02	1.69E-02	--
Radon [d]	--	--	--	1.32E-04
Acenaphthylene	4.05E-06	4.45E-05	5.58E-05	--
Acenaphthene	1.14E-06	2.26E-05	2.83E-05	--
Fluorene	2.34E-05	6.17E-05	7.74E-05	--
Phenanthrene	2.35E-05	1.97E-04	2.47E-04	--
Anthracene	1.50E-06	5.93E-06	7.44E-06	--
Fluoranthene	6.09E-06	1.94E-05	2.44E-05	--
Pyrene	3.82E-06	1.79E-05	2.24E-05	--
Benz(a)anthracene	1.34E-06	3.00E-06	3.76E-06	--
Chrysene	2.82E-07	7.37E-06	9.26E-06	--
Benzo(b)fluoranthene	7.93E-08	5.35E-06	6.72E-06	--
Benzo(k)fluoranthene	1.24E-07	1.05E-06	1.32E-06	--
Benzo(a)pyrene	1.50E-07	1.24E-06	1.55E-06	--
Indeno(1,2,3-cd)pyrene	3.00E-07	2.00E-06	2.50E-06	--
Dibenz(a,h)anthracene	4.66E-07	1.67E-06	2.09E-06	--
Benzo(g,h,l)perylene	3.91E-07	2.68E-06	3.36E-06	--
CO_2	1.30E+02	3.93E+03	4.93E+03	1.50E+03
CH_4	5.29E-03	1.59E-01	2.00E-01	5.78E+00
N_2O	1.06E-03	3.19E-02	4.00E-02	--

[a] Although speciated emissions are presented for the fire pump and generators, only DPM (as a surrogate) and NH_3 (where applicable) were modeled.

[b] The Project includes a total of three 3.49 MW generators.

[c] Emissions are per each of the seven cooling tower cells.

[d] Radon emissions presented in units of curies per hour.

Notes:

-- = Pollutant not emitted by source

CT = Cooling Tower, Sparger, and Biological Oxidation Box

lbs/hr = pound(s) per hour

MW = megawatt(s)

Table 5.9-4. Operational Annual TAC Emissions Estimates – Routine Operating Year Including Startups, Shutdowns, and Emission Controls Downtime

Pollutant	Annual Emissions (lbs/yr) per Emissions Source [a] Fire Pump	2.7 MW Generator	3.49 MW Generator [b]	PTU	RM	CT [c]
Lead	--	--	--	--	--	8.03E-04
NH_3	--	1.39E+01	1.69E+01	1.99E+02	1.46E+03	1.54E+05
As	--	--	--	1.54E-02	1.13E-01	4.61E-02
Hg	--	--	--	7.60E-01	5.59E+00	2.41E-01

Pollutant	Annual Emissions (lbs/yr) per Emissions Source [a] Fire Pump	2.7 MW Generator	3.49 MW Generator [b]	PTU	RM	CT [c]
Benzene	3.73E-02	1.87E-01	2.35E-01	4.31E+01	3.17E+02	5.90E+02
Toluene	1.64E-02	6.77E-02	8.50E-02	2.43E+00	1.79E+01	3.36E+01
Ethylbenzene	--	--	--	4.29E-01	3.15E+00	6.20E+00
Xylenes	1.14E-02	4.65E-02	5.84E-02	4.01E-01	2.95E+00	6.17E+00
1,3-Butadiene	1.56E-03	--	--	--	--	--
Al	--	--	--	--	--	1.61E-02
Sb	--	--	--	--	--	1.29E-03
Ba	--	--	--	--	--	2.40E-02
Be	--	--	--	--	--	1.61E-04
Co	--	--	--	--	--	1.61E-04
Cd	--	--	--	--	--	3.21E-04
Total Chromium	--	--	--	--	--	8.03E-04
Cu	--	--	--	--	--	4.82E-04
V	--	--	--	--	--	8.03E-04
Mn	--	--	--	--	--	9.51E-02
Ni	--	--	--	--	--	1.83E-03
Se	--	--	--	--	--	1.84E-02
Si	--	--	--	--	--	8.03E-01
Ag	--	--	--	--	--	8.03E-04
Zn	--	--	--	--	--	1.19E-01
DPM	2.86E+00	8.93E+00	1.15E+01	--	--	--
Formaldehyde	4.72E-02	1.90E-02	2.39E-02	--	--	--
PAHs (unspeciated, excluding naphthalene)	--	--	--	--	--	--
Naphthalene	3.39E-03	3.13E-02	3.93E-02	--	--	--
Acetaldehyde	3.07E-02	6.07E-03	7.62E-03	--	--	--
Acrolein	3.70E-03	1.90E-03	2.38E-03	--	--	--
Propylene	1.03E-01	6.72E-01	8.44E-01	--	--	--
Radon [d]	--	--	--	7.44E-02	5.47E-01	1.02E+00
Acenaphthylene	2.02E-04	2.22E-03	2.79E-03	--	--	--
Acenaphthene	5.68E-05	1.13E-03	1.42E-03	--	--	--
Fluorene	1.17E-03	3.08E-03	3.87E-03	--	--	--
Phenanthrene	1.18E-03	9.83E-03	1.23E-02	--	--	--
Anthracene	7.48E-05	2.96E-04	3.72E-04	--	--	--
Fluoranthene	3.04E-04	9.71E-04	1.22E-03	--	--	--
Pyrene	1.91E-04	8.94E-04	1.12E-03	--	--	--
Benz(a)anthracene	6.72E-05	1.50E-04	1.88E-04	--	--	--
Chrysene	1.41E-05	3.69E-04	4.63E-04	--	--	--
Benzo(b)fluoranthene	3.96E-06	2.67E-04	3.36E-04	--	--	--

Pollutant	Annual Emissions (lbs/yr) per Emissions Source [a] Fire Pump	2.7 MW Generator	3.49 MW Generator [b]	PTU	RM	CT [c]
Benzo(k)fluoranthene	6.20E-06	5.25E-05	6.59E-05	--	--	--
Benzo(a)pyrene	7.52E-06	6.19E-05	7.77E-05	--	--	--
Indeno(1,2,3-cd)pyrene	1.50E-05	9.98E-05	1.25E-04	--	--	--
Dibenz(a,h)anthracene	2.33E-05	8.34E-05	1.05E-04	--	--	--
Benzo(g,h,l)perylene	1.96E-05	1.34E-04	1.68E-04	--	--	--
CO_2	6.52E+03	1.96E+05	2.47E+05	8.46E+05	6.22E+06	1.16E+07
CH_4	2.65E-01	7.97E+00	1.00E+01	3.27E+03	2.40E+04	4.47E+04
N_2O	5.29E-02	1.59E+00	2.00E+00	--	--	--

[a] Although speciated emissions are presented for the fire pump and generators, only DPM (as a surrogate) and NH_3 (where applicable) were modeled.

[b] The Project includes a total of three 3.49 MW generators.

[c] Emissions are per each of the seven cooling tower cells.

[d] Radon emissions presented in units of curies per year.

Notes:

-- = Pollutant not emitted by source

lbs/yr = pound(s) per year

Table 5.9-5. Operational Annual TAC Emissions Estimates – Routine Operating Year Assuming No Facility Downtime and 8,760 Hours of Continuous Power Generation

Pollutant	Annual Emissions (lbs/yr) per Emissions Source [a] Fire Pump	2.7 MW Generator	3.49 MW Generator [b]	PTU [c]	RM [c]	CT [d]
Lead	--	--	--	--	--	9.01E-04
NH_3	--	1.39E+01	1.69E+01	--	--	1.73E+05
As	--	--	--	--	--	5.17E-02
Hg	--	--	--	--	--	2.70E-01
Benzene	3.73E-02	1.87E-01	2.35E-01	--	--	6.68E+02
Toluene	1.64E-02	6.77E-02	8.50E-02	--	--	3.80E+01
Ethylbenzene	--	--	--	--	--	7.02E+00
Xylenes	1.14E-02	4.65E-02	5.84E-02	--	--	6.98E+00
1,3-Butadiene	1.56E-03	--	--	--	--	--
Al	--	--	--	--	--	1.80E-02
Sb	--	--	--	--	--	1.44E-03
Ba	--	--	--	--	--	2.69E-02
Be	--	--	--	--	--	1.80E-04
Co	--	--	--	--	--	1.80E-04
Cd	--	--	--	--	--	3.60E-04
Total Chromium	--	--	--	--	--	9.01E-04
Cu	--	--	--	--	--	5.40E-04

Pollutant	Annual Emissions (lbs/yr) per Emissions Source [a] Fire Pump	2.7 MW Generator	3.49 MW Generator [b]	PTU [c]	RM [c]	CT [d]
V	--	--	--	--	--	9.01E-04
Mn	--	--	--	--	--	1.07E-01
Ni	--	--	--	--	--	2.05E-03
Se	--	--	--	--	--	2.06E-02
Si	--	--	--	--	--	9.01E-01
Ag	--	--	--	--	--	9.01E-04
Zn	--	--	--	--	--	1.33E-01
DPM	2.86E+00	8.93E+00	1.15E+01	--	--	--
Formaldehyde	4.72E-02	1.90E-02	2.39E-02	--	--	--
PAHs (unspeciated, excluding naphthalene)	--	--	--	--	--	--
Naphthalene	3.39E-03	3.13E-02	3.93E-02	--	--	--
Acetaldehyde	3.07E-02	6.07E-03	7.62E-03	--	--	--
Acrolein	3.70E-03	1.90E-03	2.38E-03	--	--	--
Propylene	1.03E-01	6.72E-01	8.44E-01	--	--	--
Radon [e]	--	--	--	--	--	1.15E+00
Acenaphthylene	2.02E-04	2.22E-03	2.79E-03	--	--	--
Acenaphthene	5.68E-05	1.13E-03	1.42E-03	--	--	--
Fluorene	1.17E-03	3.08E-03	3.87E-03	--	--	--
Phenanthrene	1.18E-03	9.83E-03	1.23E-02	--	--	--
Anthracene	7.48E-05	2.96E-04	3.72E-04	--	--	--
Fluoranthene	3.04E-04	9.71E-04	1.22E-03	--	--	--
Pyrene	1.91E-04	8.94E-04	1.12E-03	--	--	--
Benz(a)anthracene	6.72E-05	1.50E-04	1.88E-04	--	--	--
Chrysene	1.41E-05	3.69E-04	4.63E-04	--	--	--
Benzo(b)fluoranthene	3.96E-06	2.67E-04	3.36E-04	--	--	--
Benzo(k)fluoranthene	6.20E-06	5.25E-05	6.59E-05	--	--	--
Benzo(a)pyrene	7.52E-06	6.19E-05	7.77E-05	--	--	--
Indeno(1,2,3-cd)pyrene	1.50E-05	9.98E-05	1.25E-04	--	--	--
Dibenz(a,h)anthracene	2.33E-05	8.34E-05	1.05E-04	--	--	--
Benzo(g,h,l)perylene	1.96E-05	1.34E-04	1.68E-04	--	--	--
CO_2	6.52E+03	1.96E+05	2.47E+05	--	--	1.31E+07
CH_4	2.65E-01	7.97E+00	1.00E+01	--	--	5.06E+04
N_2O	5.29E-02	1.59E+00	2.00E+00	--	--	--

[a] Although speciated emissions are presented for the fire pump and generators, only DPM (as a surrogate) and NH_3 (where applicable) were modeled.

[b] The Project includes a total of three 3.49 MW generators.

[c] The PTU and RM do not operate during this emissions scenario; as a result, emissions are reported as zero.

[d] Emissions are per each of the seven cooling tower cells.

[e] Radon emissions presented in units of curies per year.

Notes:

-- = Pollutant not emitted by source

Criteria pollutant emissions from Project operation were shown in Section 5.1 to comply with the NAAQS and CAAQS. The Project will also include emissions control technologies necessary to meet the criteria pollutant emission standards specified in ICAPCD's rules. Offsets will not be required because the Project will not be a major source under the ICAPCD's New Source Review (NSR) rule. The NAAQS and CAAQS are intended to protect the general public with a wide margin of safety. Therefore, the Project's criteria pollutant emissions are not anticipated to have a significant effect on public health.

5.9.3.3.2 Project Construction

The construction phase of the Project is expected to take approximately 29 months, with a few months on both ends for equipment delivery and demobilization (followed by several months of startup and commissioning). During this time, strict construction practices that incorporate safety and compliance with applicable LORS will be followed (see Section 5.9.6). In addition, mitigation measures to reduce criteria pollutant emissions from construction activities will be implemented, as described in Section 5.1.

The primary air toxic pollutant of concern associated with construction activities is DPM generated during movement of onsite diesel-fueled construction equipment and vehicles. The total DPM exhaust emissions from construction activities, calculated in Appendix 5.1D per methodology presented in Section 5.1, were averaged over the 29-month construction period and spatially distributed in the area associated with the construction of the Project. These modeled emission rates are presented in Table 5.9-6.[1]

Table 5.9-6. Construction TAC Emissions Estimates

Pollutant	Exhaust Emissions Total (tons/Project)	Annualized (tpy) [a]	Per Emissions Source (lbs/yr) [b]
DPM	0.45	0.19	0.93

[a] Annualized emissions were calculated by averaging the total emissions over a 29-month construction period.

[b] The model includes 396 construction point sources.

Note:

tpy = ton(s) per year

5.9.3.4 Air Toxics Exposure Assessment Methodology

5.9.3.4.1 Project Operation

Emissions of toxic pollutants potentially associated with operations of the Project were estimated using emission factors approved by CARB and the U.S. Environmental Protection Agency (EPA) or representative analytical data from other geothermal power plants in the area, as detailed in Section 5.1 and Appendix 5.1A. Concentrations of these pollutants in air potentially associated with the Project were estimated using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) dispersion modeling program, consistent with Section 5.1 methodology. Modeling allows the estimation of both short-term and long-term average concentrations in air for use in an HRA, accounting for site-specific terrain and meteorological conditions.

Health Risk Characterization. Health risks potentially associated with concentrations of carcinogenic air pollutants were calculated as estimated incremental lifetime cancer risks. The incremental lifetime cancer risk for a pollutant is estimated based on the concentration in air, breathing rates of the exposed person, inhalation cancer potency, oral slope factor, frequency and duration of exposure at the receptor, and age sensitivity factor.

Evaluation of potential non-cancer health risks from exposure to short-term and long-term concentrations in the air was performed by comparing modeled concentrations in air with the RELs. An REL is a

[1] Note that hourly emissions estimates were not required as there is no short-term health risk associated with exposure to DPM.

concentration in the air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential non-cancer effects were evaluated by calculating a ratio of the modeled concentration in the air and the REL to develop the hazard quotient.

Health Risk Modeling Software. Risk characterization from toxics emitted by the facility was carried out according to the procedures specified by OEHHA guidance for both carcinogenic and non-carcinogenic risks (OEHHA 2015), as summarized above. As recommended by the 2015 OEHHA Guidance, a Tier 1 assessment was performed. The Tier 1 assessment is the most conservative of the four tier assessment methodologies identified in the OEHHA guidance and uses a standard point-estimate approach with standard OEHHA assumptions.

Residential and sensitive cancer risks were evaluated using the 30-year continuous exposure duration scenario and worker cancer risk was evaluated using the 25-year exposure duration (eight hours per day starting at age 16 years old), as recommended in the OEHHA guidance (OEHHA 2015). Based on the OEHHA guidance, the derived (adjusted) method in HARP2 was used for the cancer risk evaluation, which uses the 95th percentile breathing rate from the third trimester to two years and the 80th percentile inhalation rate from two years to 70 years for residential cancer risk assessments (CARB 2015). The 30-year and 25-year exposure durations for residential and commercial/industrial receptors, respectively, are obtained from the OEHHA guidance (OEHHA 2015).

The exposure pathways included for each risk scenario in this HRA are specified in Table . The dose-risk assessment values and RELs used to characterize health risks associated with modeled concentrations in the air, as well as from other pathways, were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CARB 2022a).

Table 5.9-7. Summary of HARP2 Exposure Pathways

Risk Analysis	Model Exposure Pathways	Intake Rate Percentile
Acute	Inhalation	Not applicable
Non-cancer Chronic	Inhalation Soil Ingestion Dermal Absorption Mother's Milk Homegrown Produce Beef/Dairy (Farming) Pig/Chicken/Egg (Farming)	Not applicable
Cancer	Inhalation Soil Ingestion Dermal Absorption Mother's Milk Homegrown Produce Beef/Dairy (Farming) Pig/Chicken/Egg (Farming)	Risk Management Plan (RMP) Using the Derived Method

Health Risk Impact Locations. Health risks were evaluated for a hypothetical point of maximum impact (PMI) located at the receptor with the highest impact. The hypothetical PMI is an individual assumed to be located at the PMI location, where the highest concentrations of air pollutants associated with the Project emissions are predicted to occur, based on the air dispersion modeling. This location was assumed to be equivalent to a residential receptor exposed for the maximum Project lifetime of 30 years. Human health risks associated with emissions from the Project are unlikely to be higher at any other location than at the location of the PMI. If there is no significant effect associated with concentrations in air at the PMI location, it is unlikely that there would be significant effects in any location in the vicinity of the Project. The highest offsite concentration location represents the PMI.

Health risks were also evaluated at the maximally exposed individual resident (MEIR), maximally exposed individual worker (MEIW), and maximally exposed sensitive receptor locations. These locations correspond to the location of a residence, industrial/commercial business, and sensitive receptor, respectively, with the highest health risk impact. A list of the nearby sensitive receptors, including residences, is included in Appendix 5.9A. It was conservatively assumed that most receptors within the receptor grid could represent a worker location.

Cancer Burden. To evaluate population risk, regulatory agencies have used the cancer burden as a method to account for the number of incremental cancer cases that could potentially occur in a population. The population burden can be calculated by multiplying the cancer risk at a census block centroid multiplied by the number of people who live in the census block, and summing the cancer cases across the zone of impact. A census block is defined as the smallest entity for which the Census Bureau collects and tabulates decennial census information; it is bounded on all sides by visible and non-visible features shown on Census Bureau maps. A centroid is defined as the central location within a specified geographic area.

Cancer burden is calculated on the basis of OEHHA (70-year) risks and is independent of how many people move in or out of the vicinity of an individual facility. The number of cancer cases is considered independent of the number of people exposed, within some lower limits of exposed population size, and the length of exposure (within reason). For example, if 10,000 people are exposed to a carcinogen at a concentration with a $1\text{x}10^{-5}$ cancer risk for a lifetime, the cancer burden is 0.1, and if 100,000 people are exposed to a 1×10^{-5} risk, the cancer burden is 1.0.

There are different methods that can be used as a measure of population burden. Another potential measure of population burden is based upon the number of individuals residing within a 1×10^{-6}, 1×10^{-5}, and/or 1×10^{-4} isopleth. The approach used for this Project is based on this method using the 1×10^{-6} isopleth distance and the estimated population values within that established radius. Appendix 5.9A presents the data assumptions used to calculate cancer burden for the Project.

5.9.3.4.2 Project Construction

Although construction-related emissions are considered temporary and localized, resulting in no long-term effects to the public, a screening HRA was conservatively conducted to estimate potential health risks associated with public exposure to DPM during the Project construction. The construction HRA estimated the rolling cancer risks for each 29-month period[2] during a 30-year exposure duration (starting with exposure during the third trimester), aligned with the expected construction duration, at the PMI, MEIR, MEIW, and maximally exposed sensitive receptor. The incremental cancer risks were estimated using the following:

- Equations 5.4.1.1 and 8.2.4A from the Air Toxic Hot Spots Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015) for residential exposure
- Equations 5.4.1.2A, 5.4.1.2B, and 8.2.4B from the Air Toxic Hot Spots Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015) for worker exposure
- The maximum annual ground-level concentrations used to estimate risk were determined through dispersion modeling with AERMOD
- The AERMOD modeling approach followed that used to prepare the criteria pollutant modeling analysis described in Section 5.1, except that the receptor grid included census and sensitive receptors (see Appendix 5.1B for the AERMOD setup)
- The construction emission estimates modeled are presented in Table 5.9-6, and were developed per the methodology provided in Section 5.1

[2] Although Project construction is expected to last only 29 months, a rolling 3-year (i.e., 36-month) period was conservatively used for determining cancer risks.

Chronic risks were also estimated for the PMI, MEIR, MEIW, and maximally exposed sensitive receptor, based on the same emission rates and ground-level concentrations described above. To calculate chronic risk, as characterized by an HI, the maximum annual ground-level concentration was divided by the DPM REL of 5 $\mu g/m^3$ (CARB 2022a).

5.9.3.5 Air Toxics Exposure Assessment Results

5.9.3.5.1 Project Operation

Estimates of the incremental lifetime cancer risk and non-cancer HIs associated with operational-related concentrations in air for the PMI, MEIR, MEIW, and maximally exposed sensitive receptor are presented in Table 5.9-8 for comparison to the SCAQMD's CEQA significance thresholds.[3] The results presented reflect the worst-case estimates of the two operational year scenarios previously described in Section 5.9.3.3.1. The locations associated with these impacts are presented in Figure 5.9-1.

As shown, predicted facility-wide impacts are below the cancer risk threshold of 10 in one million at all locations, including the PMI. These facility-wide cancer risks are less than significant given the PMI does not constitute a location that would present a potential for long-term exposure as it is typically located along the Project fence line. As described previously, human health risks associated with operational emissions from the Project are unlikely to be higher at any location other than that of the PMI. In fact, human health risks at locations other than that of the PMI are often significantly lower, as evidenced by the risks at the MEIR and maximally exposed sensitive receptor. Furthermore, incremental lifetime cancer risks higher than one in one million may or may not be of concern, depending upon several factors. These include the conservatism of assumptions used in risk estimation, size of the potentially exposed population, and toxicity of the risk-driving chemicals. Additionally, as described in Section 5.9.6, the diesel fire water pump, diesel-fired emergency generators, and cooling tower will be equipped with emission control technologies to minimize TAC emissions where feasible.

The facility-wide chronic and acute risk impacts are below the HI threshold of 1.0 at all locations. Therefore, the predicted health risks associated with Project operation are less than significant.

Table 5.9-8. Operation HRA Summary – Project

Receptor Type	Receptor #	UTM E (m)	UTM N (m)	Cancer Risk (per million)	Chronic HI	Acute HI
PMI	54 [a] 2,277 [b]	628,375.53 [a] 627,725.00 [b]	3,670,628.05 [a] 3,671,075.00 [b]	9.9	0.30	0.69
MEIR	5,612 [a, b]	629,090.70 [a, b]	3,671,844.15 [a, b]	0.25	0.01	0.27
MEIW	54 [a] 2,277 [b]	628,375.53 [a] 627,725.00 [b]	3,670,628.05 [a] 3,671,075.00 [b]	0.70	0.30	0.69
Maximally Exposed Sensitive Receptor	5,612 [a, b]	629,090.70 [a, b]	3,671,844.15 [a, b]	0.25	0.01	0.27

[a] Receptor number and coordinates associated with cancer and chronic analyses.

[b] Receptor number and coordinates associated with acute analyses.

Notes:

E = Easting

m = meter(s)

N = Northing

UTM = Universal Transverse Mercator

[3] ICAPCD does not have its own established significance thresholds for health risk impacts.

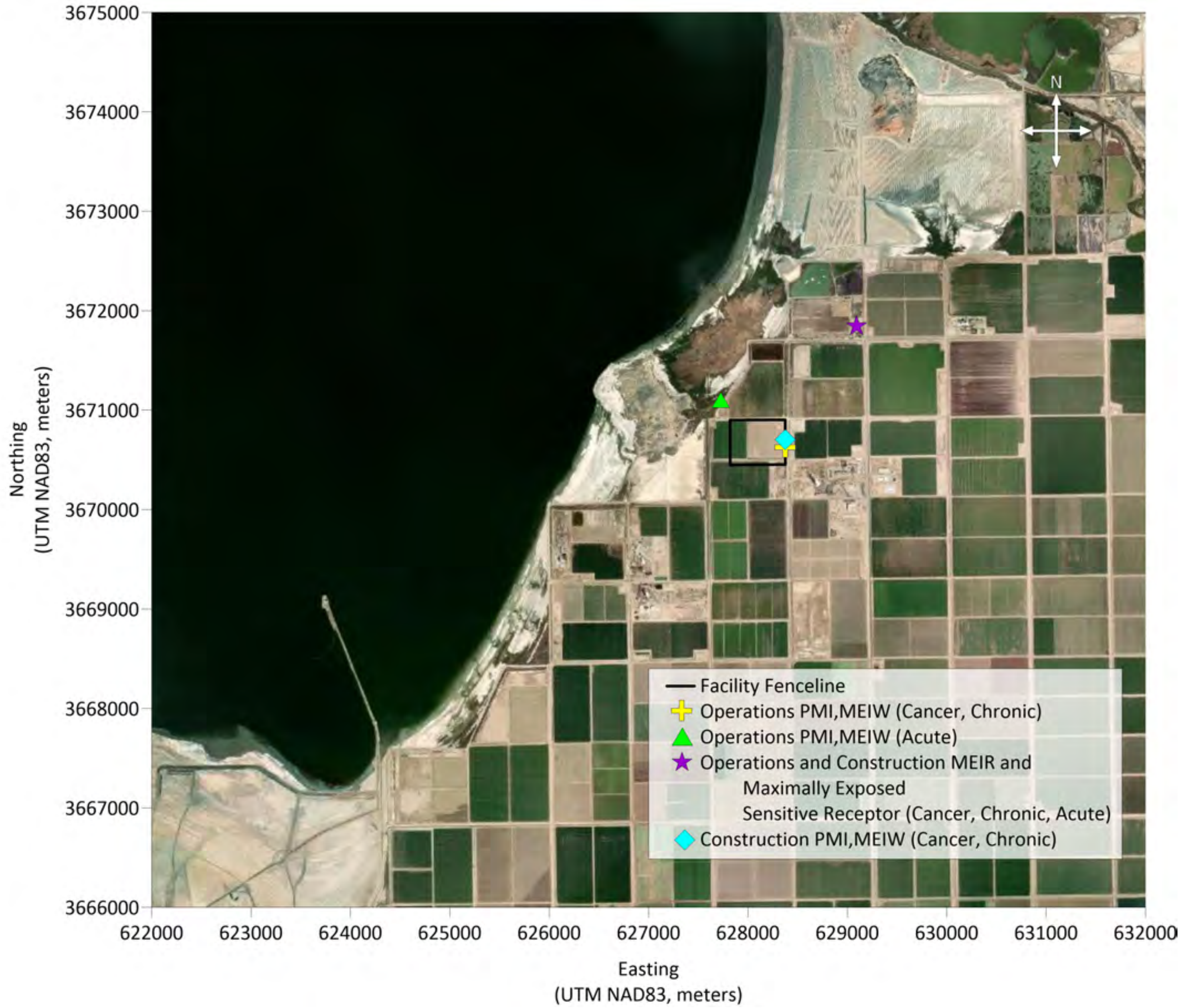


Figure 5.9-1
Facility Heath Risk Assessment Results Locations
Black Rock Geothermal Project
Imperial County, California

Jacobs

As described previously, human health risks associated with operational emissions from the Project are unlikely to be higher at any location other than that of the PMI. Therefore, the cancer risk for all individuals exposed to the Project's emissions would be lower (and in most cases, substantially lower) than 5.4 in one million. This is further supported by the estimated cancer burden of less than 0.001, which indicates that emissions from the Project would not be associated with any significant increase in cancer cases in the previously defined population. In addition, the cancer burden is less than the SCAQMD's significance threshold value of 0.5. As stated previously, the methods used in this calculation considerably overstate the potential cancer burden, further suggesting that Project emissions are unlikely to represent a significant public health effect in terms of cancer risk.

Detailed risk and hazard values provided in the HARP input and output files are included with this submission on compact disc and summarized in Appendix 5.9A.

5.9.3.5.2 Project Construction

Estimates of the facility-wide incremental lifetime cancer risk and chronic HI associated with construction-related concentrations in air for the PMI, MEIR, MEIW, and maximally exposed sensitive receptor are presented in Table 5.9-9, with locations presented in Figure 5.9-1. These risks are below the SCAQMD's CEQA significance thresholds of 10 in one million and one, respectively, with the exception of the PMI.[4] The construction period will be a finite duration, during which no long-term exposure is expected to occur at the PMI; therefore, it is not considered applicable for comparison to SCAQMD's CEQA significance thresholds. Therefore, predicted impacts associated with the finite construction activities are less than significant.

Table 5.9-9. Construction HRA Summary – Project

Receptor Type	UTM E (m)	UTM N (m)	Cancer Risk (per million)	Chronic HI	Acute HI
PMI	628,375.13	3,6707,02.92	25.3	0.02	--
MEIR	629,090.70	3,671,844.15	1.68	0.001	--
MEIW	628,375.13	3,6707,02.92	0.58	0.02	--
Maximally Exposed Sensitive Receptor	629,090.70	3,671,844.15	1.68	0.001	--

Note:
-- = Acute risk not estimated for construction activities

A cancer burden analysis was not performed for the construction phase of the Project as it is a temporary phase and will occur for no longer than 29 months. This duration is far less than the 70-year exposure period assumed for a cancer burden analysis. Therefore, it is assumed Project construction would have negligible impacts on cancer burden in the area.

Detailed risk and hazard values are provided in Appendix 5.9B and the air modeling input and output files are included with this submission on compact disc.

5.9.4 Other Public Health Concerns

5.9.4.1.1 Hazardous Materials

Hazardous materials may be used and stored at the Project site. The hazardous materials stored in significant quantities on-site and descriptions of their uses are presented in Section 5.5. Use of chemicals at the Project site will be in accordance with standard practices for storage and management of hazardous materials. Normal use of hazardous materials, therefore, will not pose significant risk to public health.

[4] ICAPCD does not have its own established significance thresholds for health risk impacts.

While mitigation measures will be in place to prevent releases, accidental releases that migrate off-site could result in potential effects to the public.

The California Accidental Release Prevention (CalARP) Program regulations and Code of Federal Regulations (CFR), Title 40, Part 68 under the Clean Air Act (CAA) establish emergency response planning requirements for acutely hazardous materials. These regulations require preparation of an RMP, which is a comprehensive program to identify hazards and predict the areas that may be affected by a release of a program-listed hazardous material. The Project will not be subject to these regulations because it is not expected to use any RMP-listed materials in quantities above the applicability thresholds.

5.9.4.1.2 Operational Odors

Project operation will result in emissions of hydrogen sulfide (H_2S), which is a known odorous compound. Specifically, the 1-hour H_2S CAAQS was adopted in 1969 for purposes of odor control and not for protection of public and environmental health. People have experienced eye irritation at concentrations of 50 parts per million (ppm). which is much greater than the CAAQS of 0.03 ppm (CARB 2022b). Therefore, temporary exceedances of the H_2S CAAQS would not result in elevated exposure of the public and environment to H_2S health-related risks but would be characterized as a nuisance and an odor impact.

As a result of the Project's location and nature of the standard, H_2S was analyzed similarly to nuisance related impacts caused by odorous compounds. Specifically, the 1-hour H_2S analysis follows the ICAPCD's CEQA Air Quality Handbook methodology for assessing odor-related impacts. Section 4.6(b) of the CEQA Air Quality Handbook states that H_2S emissions may result in impacts that would not be significant except as a nuisance if less than a specific screening distance from the point of release. Table 3 of the CEQA Air Quality Handbook further provides the respective screening distances for odor impacts, which is one mile for all facility types (ICAPCD 2017).

As shown in Figure 5.9-2, the nearest residences and sensitive receptors are located greater than one mile from the Project location. Given the location of these receptors and the ICAPCD CEQA guidelines, the 1-hour H_2S modeling analysis does not include any receptors within 1 mile of the Project. Any impacts within this one mile radius would be considered to be nuisance-related and not expose any nearby residences or sensitive receptors to any significant risk beyond potential nuisances.

The results of the dispersion modeling analysis, as presented in Section 5.1, indicate that the estimated routine operational impacts from the Project will be below the H_2S CAAQS at all receptors greater than one mile from the Project. Non-routine operations of the Project, including commissioning, startup, shutdown, and downtime of emission controls, would occur infrequently throughout the year and were not included in the modeled scenarios. These operational conditions would occur for unknown durations randomly during the year and are difficult to predict with any reasonable certainty given their strong dependence on meteorological conditions. The potential for these infrequent events to occur during meteorological conditions hindering dispersion is expected to be minimal.

The acute risk threshold for H_2S in the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* is equal to the 1-hour CAAQS of 42 micrograms per cubic meter (CARB 2022a), which was adopted for purposes of odor control. As a result of the acute threshold developed by OEHHA and the CAAQS being based upon the same concentration, the CAAQS analysis presented in Section 5.1 is considered sufficient for addressing short-term impacts and associated risks of H_2S. Therefore, this HRA does not analyze H_2S in the presented HARP2 modeling and associated health risk results.

5.9.4.1.3 EMF Exposure

EMFs occur independently of one another as electric and magnetic fields at the 60-hertz (Hz) frequency used in gen-tie lines, and both are created by electric charges. Electric fields exist when these charges are not moving. Magnetic fields are created when the electric charges are moving. The magnitude of both electric and magnetic fields falls off rapidly as the distance from the source increases (proportional to the inverse of the square of distance).

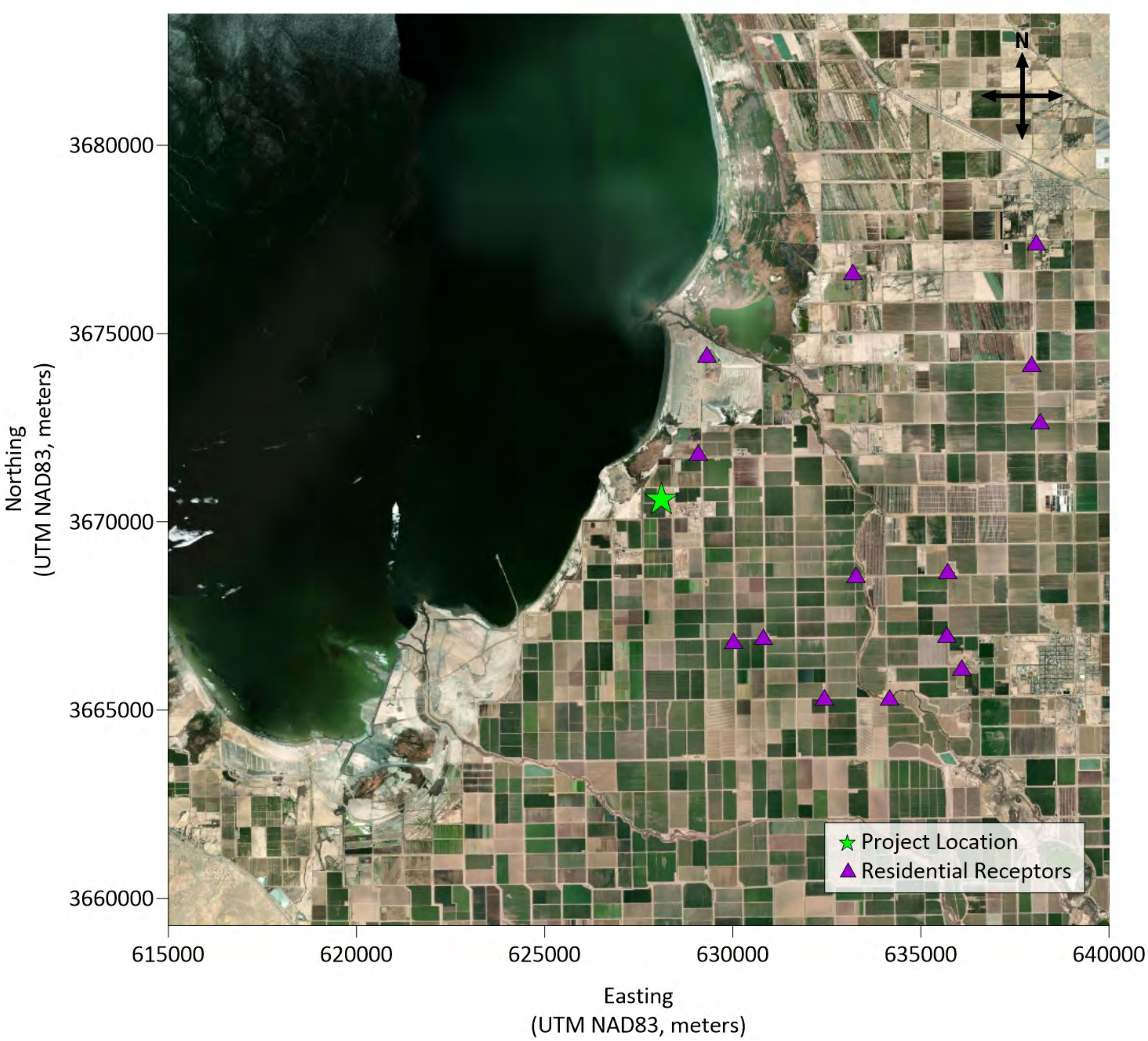


Figure 5.9-2
Nearby Residential Receptors
Black Rock Geothermal Project
Imperial County, California

Jacobs

Because the electric transmission lines do not typically travel through residential areas and based on findings of the National Institute of Environmental Health Sciences (NIEHS) (1999), EMF exposures are not expected to result in a significant effect on public health. The NIEHS report to the U.S. Congress found that "the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm" (NIEHS 1999).

Additional details regarding EMFs are included in Section 3.5.

5.9.4.1.4 Legionella

In addition to being a source of potential TACs, the possibility exists for bacterial growth to occur in cooling tower cells, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in man-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling tower cells and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

Legionella can grow symbiotically with other bacteria and can infect protozoan hosts. This provides Legionella with protection from adverse environmental conditions, including making it more resistant to water treatment with chlorine, biocides, and other disinfectants. Thus, if not properly maintained, cooling water systems and their components can amplify and disseminate aerosols containing Legionella.

The State of California regulates recycled water for use in cooling tower cells in California Code of Regulations (CCR), Title 22, Section 60303. This section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. This regulation does not apply to the Project since it does not intend to use reclaimed water for cooling purposes.

EPA published an extensive review of Legionella in a human health criteria document (EPA 1999). In this document, the EPA noted that Legionella may propagate in biofilms (collections of micro-organisms surrounded by slime they secrete, attached to either inert or living surfaces) and that aerosol-generating systems such as cooling tower cells can aid in the transmission of Legionella from water to air. EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore, sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Thus, the presence of even small numbers of Legionella bacteria presents a risk – however small – of disease in humans.

In 2008, the Cooling Tower Institute (CTI) issued its revised report and guidelines for the best practices for control of Legionella (CTI 2008). To minimize the risk from Legionella, the CTI noted that consensus recommendations included minimization of water stagnation, minimization of process leads into the cooling system that provide nutrients for bacteria, maintenance of overall system cleanliness, the application of scale and corrosion inhibitors as appropriate, the use of high-efficiency mist eliminators on cooling tower cells, and the overall general control of microbiological populations. Good preventive maintenance is very important in the efficient operation of cooling tower cells and other evaporative equipment. Preventive maintenance includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. The efficacy of any biocide in ensuring that bacteria, and in particular Legionella growth, is kept to a minimum is contingent upon a number of factors including but not limited to proper dosage amounts, appropriate application procedures, and effective monitoring.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, an appropriate biocide program and anti-biofilm agent monitoring program would be prepared and implemented for the cooling tower cells associated with the Project.

These programs would ensure that proper levels of biocide and other agents are maintained within wet cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup.

5.9.5 Cumulative Effects

The operational HRA indicates that the maximum cancer risk due to exposure to air toxics emitted by PGF operations will be approximately 9.9 in one million at the PMI, which is below the SCAQMD's "significant health risk" threshold of 10 in one million. The PMI's location represents the maximum possible cancer risk outside of the facility boundary. In actuality, cancer risks are expected to be much less in locations where long-term exposure is more likely to occur, such as at the locations of the MEIR, MEIW, and maximally exposed sensitive receptor. Cancer risks at these locations are 0.25, 0.70, and 0.25, respectively, which are also all less than the significance threshold, as is the estimated cancer burden rate. Non-cancer chronic and acute effects (i.e., HI values) from Project operations are also below the SCAQMD significance thresholds of 1.0 at all receptor locations. Additionally, emission control technologies for key TACs will also be installed as part of the Project, as described in Section 5.9.6, which will reduce TAC emissions to the extent technically feasible. Therefore, the potential cumulative health risk impacts from operation are expected to be less than significant.

The construction HRA indicates that the maximum cancer risk due to exposure to air toxics emitted by PGF construction will be approximately 25.3 in one million at the PMI, which is above the SCAQMD's "significant health risk" threshold of 10 in one million. Although this risk level is greater than the SCAQMD's "significant health risk" threshold, its location represents the maximum possible cancer risk outside of the facility boundary. In actuality, cancer risks are expected to be much less in locations where long-term exposure is more likely to occur, such as at the locations of the MEIR, MEIW, and maximally exposed sensitive receptor. Cancer risks at these locations are 1.68, 0.58, and 1.68, respectively, which are all less than the significance threshold. Non-cancer chronic and acute effects (i.e., HI values) from Project construction are also well below the SCAQMD significance thresholds of 1.0 at all locations. Additionally, the Project construction activities will be finite, and best available emission control techniques would be used throughout the 29-month construction period to control pollutant emissions. Therefore, the potential cumulative health risk impacts from construction are also expected to be less than significant.

Based on modeling studies conducted by CEC staff for other projects, an analysis of a project's cumulative impacts is typically only required if the proposed facility is generally within less than 0.5 mile of another existing, major or large toxics emissions source. Region 2 is another geothermal power plant owned by the Applicant, which is located less than 0.5 mile northeast of the Project. However, Region 2 is not a major source of air toxic pollutants. There are no other existing, major or large toxics emissions sources within 0.5 mile of the Project. Therefore, a cumulative impacts analysis for potential health risks is not required.

5.9.6 Mitigation Measures

5.9.6.1 Project Operation

Emissions of TACs to the air due to Project operation will be minimized through the use of high-efficiency drift eliminators and H_2S sparging, which are considered best available control technology (BACT) for the Project's cooling towers and geothermal processes, respectively. The diesel-fired emergency generators will be Tier 4 certified engines, meaning DPM and criteria pollutant emissions will be minimized through the use of Tier 4 controls, including selective catalytic reduction, diesel particulate filtration, and a diesel oxidation catalyst.

The potential health risk impacts presented in Section 5.9.3.5.1 indicate that the Project will not have a significant impact when compared to the SCAQMD's significance thresholds.[5] As a result, additional mitigation measures are not required for the air toxic emissions from operation of the Project.

[5] ICAPCD does not have its own established significance thresholds for health risk impacts.

5.9.6.2 Project Construction

The construction activities from the Project would be finite and best available control techniques would be used throughout the 29-month construction period to control criteria pollutant and DPM emissions. Construction impacts would further be reduced with the implementation of the additional construction mitigation measures presented in Section 5.1.

The potential health risk impacts presented in Section 5.9.3.5.2 indicate that the Project will not have a significant impact when compared to the SCAQMD's significance thresholds. As a result, additional mitigation measures are not required for the air toxic emissions from construction of the Project.

5.9.7 Laws, Ordinances, Regulations, and Standards

The relevant LORS that affect public health and are applicable to the Project are identified in Table 5.9-10, along with the conformity of the Project to each listed LORS. Table 5.9-10 also summarizes the agencies responsible for regulating public health under each of the applicable LORS.

Table 5.9-10. Summary of LORS – Public Health

LORS	Purpose	Regulating Agency	Project Conformance
CAA Title III	Establishes a plan for achieving significant reductions in emissions of hazardous air pollutants from major sources.	EPA Region 9 CARB ICAPCD	Based on the HRA results presented in Section 5.9.3.5, the Project's cancer, chronic, and acute health risks do not exceed acceptable levels. Emissions of criteria pollutants will be minimized by applying BACT to the Project, where feasible. Facility will comply with applicable federal, state, and ICAPCD rules and regulations.
40 CFR Part 68 (RMP), 19 CCR Sections 2735.1 to 2785.1 (CalARP Program), and California Health and Safety Code (CHSC) Sections 25531 to 25541	Prevents or minimizes accidental releases of acutely hazardous substances that can cause serious harm to the public and the environment.	EPA Region 9 Department of Toxic Substances Control (DTSC) Imperial Certified Unified Program Agency (CUPA)	A vulnerability analysis will be performed to assess potential risks from a spill or rupture from any affected storage tank, if required. An RMP is not expected to be required.
CHSC Section 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Provides notification of Proposition 65 chemicals.	OEHHA	The facility will determine Proposition 65 status and comply with all signage and notification requirements, as applicable. See Sections 5.5 and 5.15 for additional discussion regarding hazardous materials and water quality, respectively.

LORS	Purpose	Regulating Agency	Project Conformance
CHSC Sections 25500 to 25510	Establishes requirements for developing business and area plans relating to the handling and release of hazardous materials.	State Office of Emergency Services DTSC Imperial CUPA	An HMBP, including a hazardous materials inventory and emergency response plan, will be prepared for distribution to affected agencies, as required. Additionally, releases of hazardous materials will be immediately reported to affected agencies, as required. See Section 5.5 for additional discussion regarding hazardous materials.
CHSC Section 44300 to 44384 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	AB 2588 requires the development of a statewide inventory of TAC emissions from stationary sources. The program requires affected facilities to: (1) prepare an emissions inventory plan that identifies relevant TACs and sources of TAC emissions; (2) prepare an emissions inventory report quantifying TAC emissions; and (3) prepare an HRA, if necessary, to quantify the health risks to the exposed public. Facilities with significant health risks must notify the exposed population, and in some instances must implement RMPs to reduce the associated health risks.	CARB OEHHA ICAPCD	The Project will participate in the AB 2588 inventory and reporting program, as required and implemented by ICAPCD. Based on the HRA results presented in Section 5.9.3.5, cancer, chronic, and acute health risks do not exceed acceptable levels.
40 CFR Part 63 and ICAPCD Regulation X	Establishes National Emission Standards for Hazardous Air Pollutants (NESHAP). [a]	EPA Region 9 ICAPCD	The Project will comply with applicable NESHAP, including hexavalent chromium emissions from cooling towers and emissions from engines.
ICAPCD Rule 207	Requires preconstruction review and permitting of new or modified stationary sources of air pollution, including air toxics.	ICAPCD	An Authority to Construct and Permit to Operate will be obtained from ICAPCD prior to construction and operation of the Project, respectively. As a result, the Project will comply with the ICAPCD's permitting requirements.

[a] These are standards for air pollutants identified by the EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established.

HBMP = Hazardous Materials Business Plan

5.9.8 Agency Jurisdiction and Contacts

Table 5.9-11 presents the contact information for each agency contacted during the development of this Project which may exercise jurisdiction of public health issues and permitting.

Table 5.9-11. Agency Contacts for Public Health

Public Health Concern	Agency	Contact
Public exposure to air pollutants	CEC	Mr. Joseph Hughes Air Resources Supervisor 1 California Energy Commission 715 P Street Sacramento, CA 95814 Phone: 916-980-7951 E-mail: Joseph.Hughes@energy.ca.gov
	ICAPCD	Jesus Ramirez APC Division Manager 150 S. 9th Street El Centro, CA 92243-2839 Phone: 442-265-1800 E-mail: jesusramirez@co.imperial.ca.us

5.9.9 Permit Requirements and Schedules

Agency-required permits or plans related to public health may include an HMBP and an ICAPCD-issued Authority to Construct/Permit to Operate. These requirements are discussed in detail in Sections 5.5 and 5.1, respectively.

5.9.10 References

California Air Resources Board (CARB). 2014. *California Almanac of Emissions and Air Quality – 2013 Edition*. February. https://ww2.arb.ca.gov/our-work/programs/resource-center/technical-assistance/air-quality-and-emissions-data/almanac.

California Air Resources Board (CARB). 2015. *Risk Management Guidance for Stationary Sources of Air Toxics.* California Air Pollution Control Officers Association. July.

California Air Resources Board (CARB). 2021. “AB 2588 District Prioritization Scores and Risk Threshold Levels.” October. https://ww2.arb.ca.gov/ab-2588-district-prioritization-scores-and-risk-threshold-levels.

California Air Resources Board (CARB). 2022a. *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values*. December. https://ww2.arb.ca.gov/sites/default/files/classic/toxics/healthval/contable12092022.pdf.

California Air Resources Board (CARB). 2022b. “Hydrogen Sulfide and Health.” Accessed October 31, 2022. https://ww2.arb.ca.gov/resources/hydrogen-sulfide-and-health.

Cooling Tower Institute (CTI). 2008. *Legionellosis-Guideline-Best Practices for Control of Legionella*. WTB-148. July.

Hutt. P.B. 1985. *Use of Quantitative Risk Assessment in Regulatory Decision Making Under Federal Health and Safety Statutes*. Risk Quantitation and Regulatory Policy. Eds. D.G. Hoel, R.A. Merrill and F.P. Perera. Banbury Report 19, Cold Springs Harbor Laboratory.

Imperial County Air Pollution Control District (ICAPCD). 2017. *CEQA Air Quality Handbook*. December. https://apcd.imperialcounty.org/wp-content/uploads/2020/01/CEQAHandbk.pdf.

National Institute of Environmental Health Sciences (NIEHS). 1999. “Environmental Health Institute report concludes evidence is ‘weak’ that EMFs cause cancer.” Press release. National Institute of Environmental Health Sciences, National Institutes of Health.

National Institute of Health National Cancer Institute (NIH). 2022. *SEER 22 Registries Incidence and Mortality 2000-2019, with Kaposi Sarcoma and Mesothelioma*. April. https://surveillance.cancer.gov/devcan/canques.html.

National Institute of Health National Cancer Institute (NIH). 2023. “State Cancer Profiles. Quick Profiles: California.” Accessed February 2023. https://statecancerprofiles.cancer.gov/quick-profiles/index.php?statename=california#t=3.

Office of Environmental Health Hazard Assessment/California Air Resources Board (OEHHA). 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines*, Cal-EPA. February.

South Coast Air Quality Management District (SCAQMD). 2019. “South Coast AQMD Air Quality Significance Thresholds.” April. https://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2.

Travis, C.C., E.A.C. Crouch, R. Wilson and E.D. Klema (Travis, et al.). 1987. “Cancer Risk Management: A Review of 132 Federal Regulatory Cases.” *Environ. Sci. Technol.* 21: 415-420.

U.S. Census Bureau (USCB). 2022. “2020 Census Address Count Listing Files Viewer.” Accessed December 2022. https://www.census.gov/programs-surveys/geography/data/interactive-maps.html.

U.S. Environmental Protection Agency (EPA). 1999. *Legionella: Human Health Criteria Document*. November. https://nepis.epa.gov/Exe/ZyNET.exe/901Q0L00.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1995+Thru+1999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CTxt%5C00000019%5C901Q0L00.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL.

5.10 Socioeconomics

This section discusses the environmental setting, consequences, regional and local impacts, and mitigation measures associated with the socioeconomic aspects of Black Rock Geothermal LLC's Black Rock Geothermal Project (BRGP or Project). Section 5.10.1 describes the socioeconomic environment that might be affected by BRGP. Section 5.10.2 provides an environmental analysis of the construction and operation of the proposed development. Section 5.10.3 discusses whether there will be any cumulative effects from the project. Section 5.10.4 describes mitigation measures that will be implemented to avoid impacts. Section 5.10.5 discusses the applicable laws, ordinances, regulations, and standards (LORS). Section 5.10.6 lists the agencies involved and agency contacts. Section 5.10.7 discusses permits and permit schedules. Section 5.10.8 lists reference materials used in preparing this section. A screening-level environmental justice analysis is provided in Appendix 5.10A.

5.10.1 Affected Environment

The proposed site is located within the Salton Sea Known Geothermal Resource Area (SSKGRA). The BRGP will provide approximately 87 megawatts (MW) gross output and a maximum net output of approximately 77 MW. The Project will be located on approximately 55 acres of a 160-acre parcel within the unincorporated area of Imperial County, California and is bounded by McKendry Road to the north, Severe Road to the west, and Boyle Road to the east. The town of Niland is approximately eight miles to the northeast, and the city of Calipatria is approximately six miles southeast of the plant site. The Project includes up to nine parking and laydowns, two construction crew camps, and up to four borrow pits located throughout the region. Most of the laydown and parking areas for BRGP will be located throughout the region. However, all 15 sites may be used and will be shared between three proposed projects: BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project.

As the BRGP will be located in unincorporated Imperial County, California, the region of influence for purposes of evaluating the socioeconomic impacts associated with the Project will be Imperial County.

5.10.1.1 Population

Imperial County is located within the densely populated Southern California region. It is bordered by San Diego County to the west, Riverside County to the north, State of Arizona to the east and the international border with Mexico to the south.

Imperial County, with an estimated January 1, 2022, population of 179,329, is ranked 31st out of the 58 counties in California in terms of population (California Department of Finance [DOF] 2022a). Imperial County was the last to be established in California in 1907 and is the ninth largest California county encompassing 4,284 square miles (Imperial County 2022a).

There are seven incorporated cities in Imperial County; the closest to the Project is Calipatria. The City of El Centro with an estimated January 1, 2022 population of 44,508, is the largest city in the county. The cities of Brawley and Calipatria, with estimated January 1, 2022 populations of 26,952 and 6,367, are the third and fifth largest cities in the County, respectively (DOF 2022b). With a January 1, 2022 population of 2,004, the City of Westmorland is the smallest city in the county.

Historical population data for Imperial County and the State of California are summarized in Table 5.10-1. Annual average compounded population growth rates, based on this historical population data, are summarized in Table 5.10-2. During the 2000s, the population of Imperial County increased at an average annual rate of about 2.1 percent, higher than that of the State of California as a whole. The average annual growth rate for the 10 years from 2010 to 2020 was 0.3 percent for Imperial County and 0.6 percent for the State of California.

Table 5.10-1. Historical and Projected Populations

Area	2000	2010	2020	2022	2030 (projected)	2040 (projected)	2050 (projected)
Imperial County	142,361	174,528	179,702	179,329	206,486	222,307	235,339
California	33,873,086	37,253,956	39,538,223	39,185,605	41,860,549	43,353,414	44,049,015

Sources: DOF 2022a; DOF 2022b; DOF 2022c.

Table 5.10-2. Historical and Projected Annual Average Compounded Population Growth Rate

Area	2000-2010 (percent)	2010-2020 (percent)	2020-2022 (percent)	2022-2030 (percent)	2030-2040 (percent)	2040-2050 (percent)
Imperial County	2.06	0.29	-0.10	1.78	0.74	0.57
California	0.96	0.60	-0.45	0.83	0.35	0.16

Tables 5.10A-1 and 5.10A-2, provided as part of Appendix 5.10A, identifies the minority and the low-income- population distributions for the census tracts that are within a ten-mile radius of the BRGP site. The minority population in the census tracts within the ten-mile radius of the BRGP site makes up 84 percent of this total population. The low-income population in these census tracts accounts for 31.9 percent. The minority data are from the 2020 U.S. Census, and the income data are from the 2016-2020 American Community Survey 5-year estimates (U.S. Census Bureau 2022a; U.S. Census Bureau 2022b). Figures 5.10-1 and 5.10-2 show the percent distribution of minority and low-income populations by 2020 census tracts within a ten-mile radius of the BRGP site.

5.10.1.2 Housing

As shown in Table 5.10-3, housing stock for Imperial County as of January 1, 2022, was 57,917 units. Single-family homes accounted for 37,474 units; multiple-family dwellings accounted for 13,153 units; and mobile homes accounted for 7,017 units (DOF 2022a). As of January 1, 2022, the vacancy rate for Imperial County was 8.1 percent (DOF 2022a). As the vacancy rate is above the federal standard vacancy rate of five percent, housing in Imperial County is not considered to be limited.

Table 5.10-3. Housing Estimates by County and State, January 1, 2022

Area	Total Units	Single-Family	Multi-Family	Mobile Homes	Percent Vacant
Imperial County	57,917	37,747	13,153	7,017	8.1
California	14,583,998	9,352,428	4,669,343	562,223	6.7

Source: DOF 2022a

5.10.1.3 Economy and Employment

Imperial County is represented by the El Centro Metropolitan Statistical Area (MSA) of the California Employment Development Department. Between 2016 and 2021, employment in the El Centro MSA increased by 400 jobs, or about 0.1 percent average annual growth. This 0.1 percent annual average increase in employment is about half that of California's trend (0.2 percent) over the same period (California Employment Development Department [CEDD] 2022a). As shown in Table 5.10-4, on a percentage increase basis, the Manufacturing sector followed by the Mining, Logging and Construction sector experienced the largest increase in employment while the Information sector had the highest reduction. The highest contributions to employment are from the Government, Services, Agriculture, and Retail trade sectors.

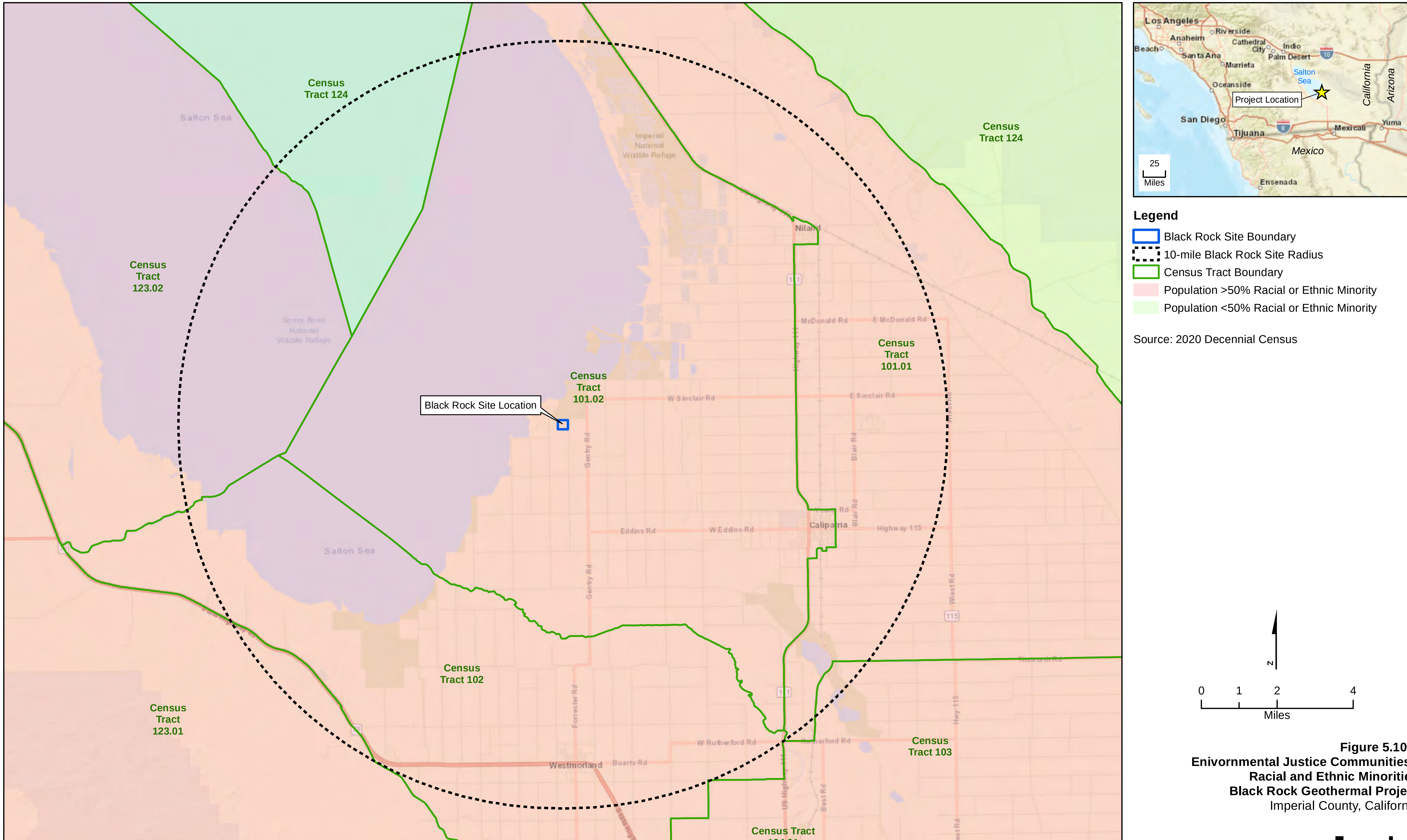


Figure 5.10-1
Enivornmental Justice Communities -
Racial and Ethnic Minorities
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\EJ\Black_Rock_Fig_1_221209.mxd

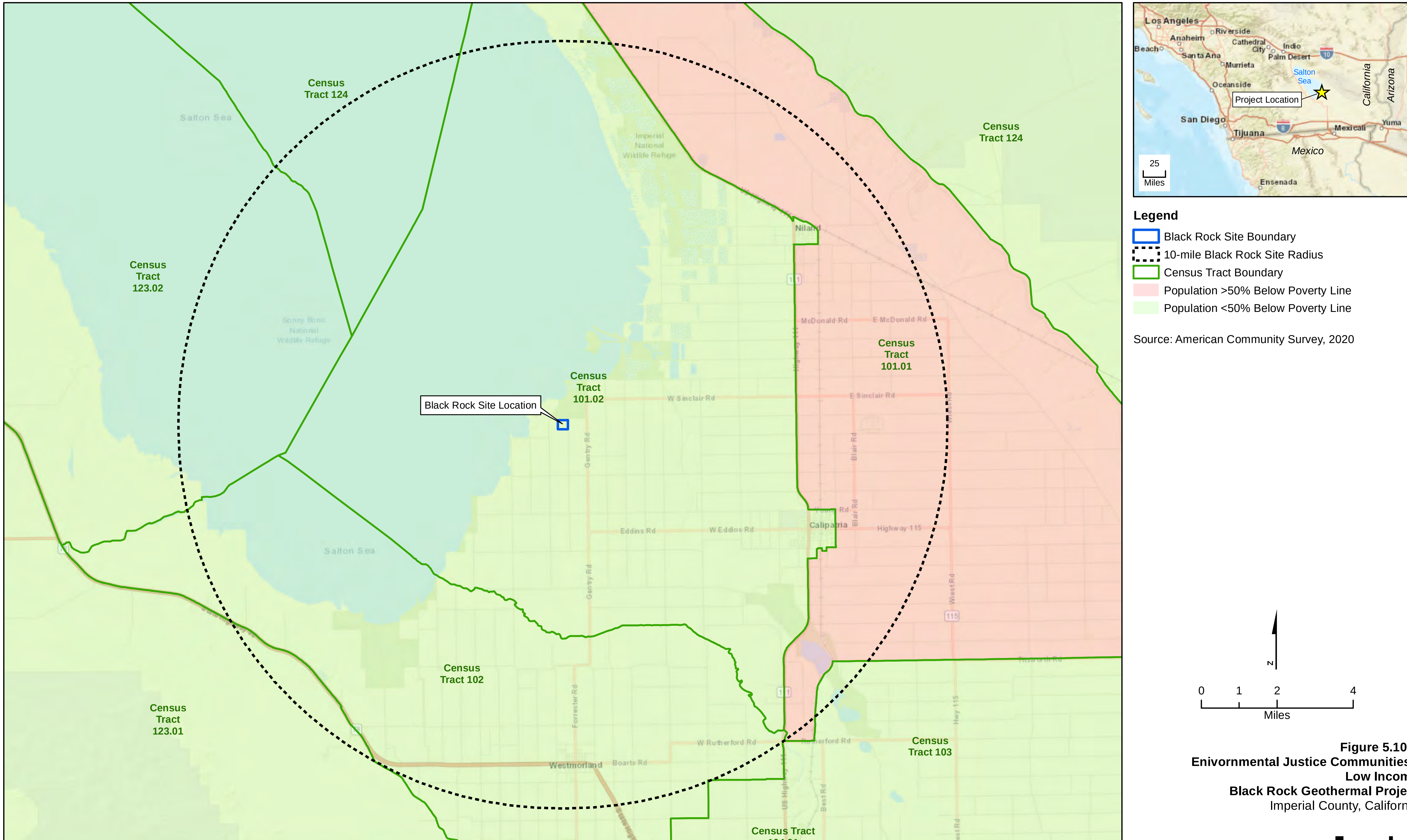


Figure 5.10-2
Enivornmental Justice Communities - Low Income
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\EJ\Black_Rock_Fig_2_221209.mxd

Table 5.10-4. Employment Distribution in El Centro MSA (Imperial County), 2016 to 2021

	2016		2021		2016-2021	
Industry	Number of Employees	Employment Share (percent)	Number of Employees	Employment Share (percent)	Percentage Change	Average Annual Compound Growth Rate (percent)
Agriculture	12,100	19.1	10,600	16.6	-12.4	-2.6
Mining, Logging, and Construction	1,800	2.8	1,900	3.0	5.6	1.1
Manufacturing	1,200	1.9	2,100	3.3	75.0	11.8
Wholesale Trade	1,800	2.8	1,700	2.7	-5.6	-1.1
Retail Trade	8,000	12.6	7,900	12.4	-1.3	-0.3
Transportation, Warehousing, and Utilities	2,200	3.5	2,300	3.6	4.5	0.9
Information	300	0.5	200	0.3	-33.3	-7.8
Financial Activities	1,400	2.2	1,100	1.7	-21.4	-4.7
Services	16,700	26.3	17,600	27.5	5.4	1.1
Government	18,200	28.7	18,500	29.0	1.6	0.3
Total Employment	**63,500**	**100.0**	**63,900**	**100.0**	**0.6**	**0.1**

Source: CEDD 2022a

Table 5.10-5 provides details on the characteristics of the civilian labor force. It shows 2021 annual average employment data for the El Centro MSA compared to California. The unemployment rate in El Centro MSA is more than twice that for the state. The CEDD does not project future unemployment rates.

Table 5.10-5. Employment Data, Annual Average, 2021

Area	Labor Force	Employment	Unemployment	Unemployment Rate (percent)
El Centro MSA (Imperial County)	69,100	57,100	12,000	17.3
California	18,923,200	17,541,900	1,381,200	7.3

Source: CEDD 2022a; CEDD 2022b

5.10.1.4 Fiscal Resources

The local agency with taxing authority is Imperial County. The County's General Fund expenditures and revenues are presented in Table 5.10-6, which shows that General Fund revenues declined by about 23 percent from fiscal year (FY) 2018 to FY 2019 and by about 1.8 percent from FY 2019 to FY 2020.

Table 5.10-6. Imperial County General Fund Revenues and Expenditures (in $ thousands)

	FY 2018	FY 2019	FY 2020
Expenditures			
General Government	22,781	22,816	25,469
Public Protection	81,535	78,843	75,900
Health and Sanitation	58,494	0	0
Public Assistance	114,036	112,113	112,462
Public Ways and Facilities	895	802	37
Total Expenditures	277,741	214,574	213,868
Revenues			
Taxes	40,895	40,998	41,440
Licenses and permits	2,372	1,321	1,316
Fines, forfeitures & penalties	5,595	5,166	4,831
Use of money & property	788	938	990
Intergovernmental aid	114,148	90,366	127,155
Federal aid	65,469	40,449	0
Charges for Services	28,814	19,235	18,947
Other revenues	0	-	144
Total Revenue	258,081	198,473	194,823

Sources: Imperial County 2022b; 2022c; 2022d

Note: Numbers may not add up because of independent rounding.

In FY 2018, taxes made up approximately 16 percent of Imperial County's total general fund revenues. The contribution of taxes to the county's general fund revenues increased to 21 percent during FY 2019 and FY 2020.

5.10.1.5 Education

There are a total of 17 school districts with 76 schools at different levels in Imperial County (CDE 2023). The area in which BRGP is located is served by the Calipatria Unified School District, which has two elementary schools (one serving Niland and the other Calipatria), one middle school, and one high school (Medina 2023). Past enrollment figures for the Calipatria Unified School District are presented in Table 5.10-7. Current (2022-2023) and projected enrollment figures are not available.

Table 5.10-7. Historic and Current Enrollment by Grade

	Calipatria Unified School District		
Grade Level	(2019-20)	(2020-21)	(2021-22)
Kindergarten	103	95	109
First	82	91	93
Second	95	79	81
Third	80	93	72
Fourth	89	86	92
Fifth	80	86	83
Sixth	93	81	86
Seventh	77	89	86

Grade Level	Calipatria Unified School District (2019-20)	(2020-21)	(2021-22)
Eighth	90	81	88
Ninth	99	89	101
Tenth	94	103	81
Eleventh	74	85	93
Twelfth	84	69	78
Total	1,140	1,127	1,143

Source: California Department of Education (CDE) 2022

5.10.1.6 Public Services and Facilities

This section describes public services in the BRGP area.

5.10.1.6.1 Law Enforcement

The Project site is under the jurisdiction of the Imperial County Sheriff's Office (ICSO). The Sheriff's Office is headquartered at 328 Applestill Road in El Centro. The ICSO's Niland sub-station, located at 218 E 1st St, in Niland is the substation that will respond to emergency calls from the project site. The Niland substation is approximately 12 miles from the project site. There is also the ICSO's substation in Brawley at 220 Main Street, approximately 18 miles from the project site. The ICSO has 100 full-time deputies. The response time to an emergency at the project will be less than 20 minutes (Kelly 2023).

The California Highway Patrol is the primary law enforcement agency for state highways and roads (i.e., Interstate 5). Services include law enforcement, traffic control, accident investigation, and the management of hazardous materials spill incidents.

5.10.1.6.2 Fire Protection

The BRGP site is within the jurisdiction of the City of Calipatria's Fire Department (CFD). The CFD has one station located at 125 North Park Avenue and is approximately seven miles southeast of the project site. The CFD has total of 16 personnel who are on call. There are two to three firefighters on call seven days a week during working hours, and two to three-night shift personnel on call (Nadarro 2023). Response time to an emergency call from the BRGP site would be approximately 15 to 20 minutes (Nadarro 2023). The CFD has a mutual aid agreement with surrounding fire stations. If additional assistance is needed, the Niland Fire District located at 8071 Luxor Avenue in Niland and the California State Prison Fire Department will respond.

5.10.1.6.3 Emergency Response

The Imperial County Fire Department (ICFD) is responsible for commanding all hazardous materials incidents at the project site and for all hazmat training for stations in cities and the county (Nadarro 2023).

5.10.1.6.4 Hospitals

The nearest hospital to the project site is the Pioneers Memorial Healthcare District (PMHD) located at 207 W. Legion Road in Brawley. The Pioneers Memorial Healthcare District is a designated level four Trauma Center with 16 emergency beds and a total capacity of 107 beds (PMHD 2023).

The second nearest hospital to the project site is the El Centro Regional Medical Center (ECRMC). This hospital, at 1415 Ross Avenue, El Centro, is about 14 miles from Pioneers Memorial. The ECRMC Emergency Department is classified as a level four basic emergency medical service. The ECRMC

Emergency department has 20 emergency beds with 16 of these beds equipped with cardiac monitoring technology (ECRMC 2023).

5.10.1.7 Utilities

This section describes public utilities available in the Project area.

5.10.1.7.1 Electricity and Gas

Electricity generated by the BRGP will be delivered to a new switching station located at the corner of Garst Rd and W Sinclair Road via an approximately 2.2-mile-long generation interconnection transmission line (gen-tie line). This switching station will deliver energy through to the Imperial Irrigation District (IID) distribution system. Further, IID will provide auxiliary power to the Project.

No natural gas lines will be located at the Project.

5.10.1.7.2 Water

BRGP will use water supplied by IID via the Vail 4A Lateral, Gate 459 or 460. The primary water service connection will be via a proposed buried pipeline from the Vail 4A lateral at Boyle Road east of the site. A secondary service water connection will run directly east from the site to Vail 4 Lateral. The water will be used for cooling tower makeup and other process uses as well as the reverse osmosis (RO) potable water system. For more information regarding water supply, see Section 5.15, Water Resources.

5.10.1.7.3 Wastewater Discharge

During construction, wastewater will be generated by construction workers use of portable toilets at the construction site and portable restrooms, showers, and kitchens at the crew construction camps. The portable facilities will store wastewater for removal and disposal at an appropriate wastewater facility. The amount of wastewater generated will be accommodated by existing wastewater facilities.

Sanitary waste from restroom, kitchen, and similar facilities will be directed to a septic tank constructed to Imperial County specifications. Sludge from the septic system will either be sent to an onsite leach field, or will be periodically removed and trucked offsite for disposal. al.

5.10.2 Environmental Analysis

This section assesses the potential environmental impacts of the Project and linear facilities.

5.10.2.1 Potential Environmental Impacts

Local environmental impacts were determined by comparing Project demands during construction and operation with the socioeconomic resources of the region of influence (i.e., the El Centro MSA which is comprised of Imperial County). A proposed power-generating facility could impact employment, population, housing, public services and utilities, and/or schools. Impacts could be local and/or regional, although generally impacts tend to be more local (city/county) than regional (outside the county).

5.10.2.2 Significance Criteria

The criteria used to determine the potential significance of BRGP-related socioeconomic impacts are set forth in Appendix G to the California Environmental Quality Act Guidelines. BRGP-related impacts from construction and operations of the facility are potentially significant if they:

- Induce substantial unplanned population growth or concentration of population.
- Displace a large number of people or impact existing housing necessitating the construction of replacement housing elsewhere.

- Result in substantial adverse impacts on the local economy and employment.
- Create adverse fiscal impacts on the community.
- Result in substantial adverse impacts on educational facilities.
- Result in substantial adverse impacts on the provision of utility services.
- Result in substantial adverse impacts associated with the provision of public services.

Other impacts may be significant if they cause substantial change in community interaction patterns, social organization, social structures, or social institutions; substantial conflict with community attitudes, values, or perceptions; or substantial inequities in the distribution of the BRGP cost and benefit.

5.10.2.3 Construction Impacts

The overall project schedule for the BRGP construction and commissioning is expected to take approximately 29 months, including up to four months of post-commercial operation wrap up activities. Construction will commence second quarter 2024 with commercial operation expected June 2026.

5.10.2.3.1 Construction Workforce

The primary trades required for construction will include craft workforce such as carpenters, electricians, ironworkers, laborers, cement finishers, operators, and pipefitters. Table 5.10-8 provides an estimate of craft personnel requirements for the facility's construction.

Total construction personnel requirements will be approximately 5,655 person-months over the 29-month construction period. Construction personnel requirements will peak at approximately 426 workers in month 18 of the construction period. Average workforce over the 29-month construction period is 195 workers.

Available skilled labor in the El Centro MSA was evaluated by surveying the Building and Trades Council (Table 5.10-9) and contacting CEDD (Table 5.10-10). Both sources show that the workforce in El Centro MSA will be adequate to fulfill BRGP's construction labor requirements. Therefore, the BRGP will not place an undue burden on the local workforce. As shown in Table 5.10-4, the construction workforce in the El Centro MSA increased over the last five years at an annual rate of 1.1 percent. The additional workforce requirement by the BRGP is still not expected to place undue burden since Imperial County has one of the highest unemployment rates in the state and is close to the San Diego metropolitan area, which has a large construction workforce.

Table 5.10-8. Construction Workforce Personnel by Month

	2024												2025												2026												Man Mths	Days/ Mo.	Man Days
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec			
No demolition anticipated																																							
Construction Craft Labor																																							
Piling (6 person Crew)						18	24	24	24																												90	23	2,070
Carpenters							20	20	20	20	20	12	12	12	10	8	8	8	6	6	6	6	6	4	4	4				4	4						220	23	5,060
Laborers					4	8	10	12	12	12	12	12	12	12	12	10	10	10	8	8	8	8	8	8	8	8				6	4	4					226	23	5,198
Teamsters				2	4	7	7	7	8	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	6	6	6	6	6	12	12	8					273	23	6,279
Electricians							4	4	4	4	4	24	24	24	24	40	40	40	40	40	40	40	40	40	40	40	10	10	10	4	4	6					600	23	13,800
Ironworkers							10	10	10	10	10	10	10	10																							80	23	1,840
Millwrights										6	6							12	16	24	24	24	24	24	18	18	6	6	6								214	23	4,922
Boilermakers																																					0	23	0
Plumbers															4	4					6	6															20	23	460
Pipefitters									20	40	60	60	120	120	120	120	120	120	120	120	120	120	120	120	80	60											1,760	23	40,480
Insulation workers											20	20	20	40	40	40	40	60	60	80	80	80	60	60	60	60	40										860	23	19,780
Operating Engineers				6	6	12	12	12	12	12	14	14	14	14	16	16	16	16	16	16	18	18	18	18	12	12	6	6									332	23	7,636
Oilers / Mechanics										2	2	2	2	2						4	4	4	4	2													28	23	644
Cement Finishers							8	8	8	8	8	6	6	6	6	6	6	6	6	6																	94	23	2,162
Masons																																					0	23	0
Sheetrockers																				10	10	12	12														44	23	1,012
Roofers																	10																				10	23	230
Sheetmetal Workers																				10	20	10															40	23	920
Sprinkler Fitters																		8	8	10	10																36	23	828
Painters																			6	6				6	6	6											30	23	690
I & C - Control Room																				12	12	12	12	12	10	10	10	10									100	23	2,300
Cooling Tower subcontract																				12	16	16	16	16													76	23	1,748
Clarifier subcontract																		10	20	20	24	24	24	24													146	23	3,358
Total Craft Labor	**0**	**0**	**0**	**8**	**14**	**45**	**95**	**97**	**118**	**122**	**168**	**172**	**232**	**252**	**244**	**256**	**262**	**302**	**318**	**396**	**410**	**392**	**356**	**346**	**244**	**224**	**78**	**38**	**22**	**26**	**24**	**18**	**0**	**0**	**0**	**0**	**5,279**	**23**	**121,417**
Total Supervision	**0**	**0**	**0**	**4**	**4**	**4**	**8**	**8**	**12**	**12**	**12**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**18**	**18**	**20**	**20**	**20**	**20**	**12**	**4**	**2**	**2**	**0**	**0**	**0**	**0**	**376**	**23**	**32,378**
Total Manpower	**0**	**0**	**0**	**12**	**18**	**49**	**103**	**105**	**130**	**134**	**180**	**188**	**248**	**268**	**260**	**272**	**278**	**318**	**334**	**412**	**426**	**408**	**374**	**364**	**264**	**244**	**98**	**58**	**34**	**30**	**26**	**20**	**0**	**0**	**0**	**0**	**5,655**	**23**	**153,795**

Table 5.10-9. Labor Union Contacts in Imperial County

Labor Union	Contact	Phone Number
Imperial County Building Trade Council	Daniel Machain, President	(760) 335-3000

Table 5.10-10. Available Labor by Skill in El Centro, 2018-2028

Occupational Title	Annual Averages		Absolute Change	Percentage Change	Average Annual Compounded Growth Rate (percent)
	2018	2028			
Carpenters	150	170	20	13.3	-1.2%
Cement Masons and Concrete Finishers	70	80	10	14.3	-1.3%
Painters, Construction, and Maintenance	100	110	10	10.0	-0.9%
Metal Workers and Plastic Workers	100	90	-10	-10.0	1.1%
Electricians	130	150	20	15.4	-1.4%
Industrial Truck and Tractor Operators	280	300	20	7.1	-0.7%
Operating Engineers and Other Construction Equipment Operators	180	210	30	16.7	-1.5%
Helpers, Construction Trades	40	40	0	0.0	0.0%
Construction Laborers	370	410	40	10.8	-1.0%
Plumbers, Pipefitters, and Steamfitters	200	240	40	20.0	-1.8%
Administrative Services Managers	80	90	10	12.5	-1.2%
Engineers	170	180	10	5.9	-0.6%
Engineering Technicians	40	50	10	25.0	-2.2%
Plant and System Operators	270	280	10	3.7	-0.4%

Source: CEDD 2022c

5.10.2.3.2 Induce Substantial Growth or Concentration of Population

It is anticipated that most of the construction workforce will be drawn from Imperial County. However, a portion of the construction workforce could also be drawn from other nearby counties. For the purposes of this analysis, because of the size of the local construction workforce, it was assumed that 80 percent of the construction workers will be from the local area. Because most workers are expected to commute to the BRGP site or stay in one of the construction crew camps near the Project, they will not contribute to a significant increase in the population of the area.

5.10.2.3.3 Displace a Large Number of People or Impact Existing Housing

The construction workforce will most likely commute daily to the BRGP site; however, if needed, there are hotels/motels in Calipatria and Brawley as well as across Imperial County to accommodate workers who may choose to commute to the BRGP site on a workweek basis. In addition to the available hotel/motel accommodation, there are recreational vehicle parks and campgrounds close to the BRGP site as well as the Project construction crew camps in the immediate vicinity. As a result, construction of the BRGP is not expected to significantly increase the demand for housing.

5.10.2.3.4 Result in Substantial Adverse Impacts on the Local Economy and Employment

The capital cost for the BRGP is estimated to be between $475 million and $800 million. The estimated value of materials and supplies that will be purchased locally during construction is $52.2 million. All cost estimates are in constant 2022 dollars, as are the economic benefits figures cited later in this section.

The BRGP will provide about $95.9 million in construction payroll, at an average rate of $72 per hour, including benefits. The anticipated payroll for employees, as well as the purchase of materials and supplies during construction, will have a slight beneficial impact in Imperial County. Assuming conservatively that 80 percent of the construction workforce will reside in Imperial County, it is expected that approximately $76.7 million will stay in the local area during the 29-month construction and commissioning period. These additional funds will cause a temporary beneficial impact by creating the potential for other employment opportunities for local workers in other service areas, such as transportation and retail. No significant adverse impacts are expected to result related to the local economy and employment.

Indirect and Induced Economic Impacts from Construction. Construction activities will result in secondary economic impacts (indirect and induced impacts) within Imperial County. Indirect and induced employment effects include the purchase of goods and services by firms involved with construction, and induced employment effects include construction workers spending their income within the county. In addition to these secondary employment impacts, there are indirect and induced income effects arising from construction.

Indirect and induced impacts were estimated using an IMPLAN input/output model of the Imperial County economy. The IMPLAN model package includes county-level data to describe the local economy in a given year (in this case 2021) and an online platform. The estimated annual indirect and induced employment within Imperial County will be 543 and 82 jobs, respectively. These additional jobs result from the $21.6 million in local construction expenditures and the $31.8 million in spending by local construction workers. The $31.8 million represents the local portion of the annual construction payroll (here assumed to be 80 percent of $39.7[1] million). Assuming an annual average direct construction employment of 2,340, the employment multiplier associated with the construction phase of the project is approximately 1.3 (i.e., (2,340 + 543 + 82)/2,340). This project construction phase employment multiplier is based on a Type SAM model.

Indirect and induced income impacts were estimated at $33,751,600 and $3,739,600, respectively. Assuming a total annual local construction expenditure (e.g., payroll, materials, and supplies) of approximately $53.4 million ($31.8 million in payroll plus $21.6 million in materials and supplies), the project construction phase income multiplier based on a Type SAM model is approximately 1.7 (i.e., [$53,364,600 + $33,751,600 + $3,739,600] / $53,364,600).

5.10.2.3.5 Create Adverse Fiscal Impacts in the Community

The capital cost for the BRGP is estimated to be between $475 million and $800 million. The estimated value of materials and supplies that will be purchased locally (within Imperial County) during construction of BRGP is $52.2 million. The effect on fiscal resources during construction will be from sales taxes realized on equipment and materials purchased in the county and from sales taxes from other expenditures. The purchases of equipment and materials are assumed to be made within the County. The sales tax rate in Imperial County is 7.75 percent as of October 1, 2022. Of this, six percent goes to the state, 1.25 percent goes to the county operations, and 0.5 percent goes to county transportation funds (California Department of Tax and Fee Administration [CDTFA)] 2022). The total local sales tax expected to be generated during construction is about $4,045,500 (i.e., 7.75 percent of local sales). Assuming all local sales are made in Imperial County, the estimated sales tax the County could receive will be about $913,500 (1.75 percent of $52.2 million) during the construction period. No significant adverse fiscal impacts are expected to result from BRGP construction.

[1] Annual local portion of construction payroll = $95.9 million/(29/12) = $39.7 million.

The County and the Applicant have reached an agreement to identify additional sales tax revenues outside of the sales tax revenues calculated above. Additionally, the Applicant is applying for the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) credit and has an agreement with the County to provide additional sales tax revenues on equipment procured outside the County.

5.10.2.3.6 Result in Substantial Adverse Impacts on Educational Facilities

The schools in the Calipatria Unified School District are not currently considered overcrowded (Medina 2023). Construction of the BRGP will not cause significant population changes or housing impacts on the region because most construction workers will commute to the BRGP site from areas within the county or from the San Diego metropolitan area, as opposed to relocating to the area. As a result, BRGP construction will not cause a significant increase in demand for school services.

5.10.2.3.7 Result in Substantial Adverse Impacts on Provision of Utility Services

BRGP construction will not make significant adverse demands on local water, sanitary sewer, or electricity. Impacts will involve the extension of existing utility lines. Water requirements for construction are relatively small. Given the number of workers and temporary duration of the construction period, the impacts on the local sanitary sewer system will not be significant.

5.10.2.3.8 Result in Substantial Adverse Impacts on the Provision of Public Services

The construction of the BRGP may have minor impacts on police, fire, or hazardous materials handling resources. However, construction is not expected to place a burden on public service providers. Copies of the records of conversation with CFD and ICSO are provided as Appendix 5.10B. Construction sites may hold a higher risk of emergency because of the types of activities taking place. However, with the implementation of safety procedures for the construction site as required by applicable regulations and standards, BRGP construction is not expected to create significant adverse impacts on public services in the area.

5.10.2.4 Operational Impacts

This section discusses the potential changes to the local economy as a result of BRGP operations.

5.10.2.4.1 Operational Workforce

Table 5.10-11 shows the anticipated job classifications for the operations workforce for the BRGP facility. The BRGP is expected to employ 61 workers.

Table 5.10-11. BRGP Operation Workforce

Classification	Number
Operations Manager	1
Control Operator	4
Shift Supervisor	2
Operators	11
Plant Operators	4
Project Analyst	1
Planner	1
Process Engineer	1
Maintenance Technician III	3
Instrument & Electrical Technician	2

Classification	Number
Maintenance Technician IV - Welder/Valve	2
Turbine	1
Project Analyst	1
Resource Technician I	1
Resource Technician III	1
Resource Supervisor	1
Drilling Supervisor	1
Project Analyst	1
DVC Support	2
Lab Tech I	1
Lab Tech II	1
Lab Tech III	1
Potable Water	1
Lab Supervisor	1
Project Engineer	1
Sr Project Engineer	1
NDE Techs	1
NDE Supervisor	1
Drafting	1
Project Analyst	1
Lab or Engineering Manager	1
Environmental Engineer	1
Environmental Coordinator	1
Sr. Environmental Coordinator	1
Hazard Waste Coordinator	1
90 Day Crew	1
Health and Safety	1
Warehouse Staff	1
Procurement Specialist	1
Total	61

5.10.2.4.2 Induce Substantial Growth or Concentration of Population

It is anticipated that the operational workforce will be drawn from the local population within Imperial County, though it is quite possible that some may commute from other neighboring counties on a daily basis or may choose to permanently relocate in nearby cities within Imperial County such as Brawley. All workers would be expected to reside within commuting distance of the facility and would not be expected to require relocation. However, even assuming all 61 operations staff relocate to the area, operations will not create a significant influx of new workers to the community and will not induce substantial growth or concentration of population.

5.10.2.4.3 Displace a Large Number of People or Impact Existing Housing

Based on the housing vacancy data in Table 5.10-3, there are 4,667 available housing units in Imperial County for any of the 61 operations staff. Hence, the operation of the BRGP will neither induce substantial growth or concentration of population, nor displace a large number of people or impact existing housing.

5.10.2.4.4 Result in Substantial Adverse Impacts on the Local Economy and Employment

BRGP operation will generate a permanent beneficial impact by creating employment opportunities for workers through local expenditures for materials (e.g., maintenance materials, office supplies and services as well as payroll). There will be an annual operations and maintenance (O&M) budget on materials, supplies and services of approximately $11.5 million, all of which is estimated to be spent locally (i.e., within Imperial County). There will also be an annual payroll of $7 million, all of which is also expected to be spent within Imperial County and The additional spending will generate long-term employment opportunities and spending in Imperial County. All cost estimates are in constant 2022 dollars, as are the economic benefits noted in this section. No adverse impacts on the local economy and employment are expected to result from Project operations.

Indirect and Induced Economic Impacts from Operations. Operation of the BRGP will result in indirect and induced economic impacts that will occur within Imperial County and elsewhere. The indirect and induced impacts will result from annual expenditures on payroll and O&M.

Estimated indirect and induced employment within Imperial County and elsewhere from BRGP economic activity will be 65 and 18 permanent jobs, respectively. The indirect and induced income impacts are estimated at $9,545,400 and $847,600, respectively. These additional jobs and income result from the $18.5 million in annual O&M budget and payroll.

5.10.2.4.5 Create Adverse Fiscal Impacts on the Community

The annual O&M budget, excluding payroll, is expected to be approximately $11.5 million (in 2022 dollars), all of which is assumed to be spent locally within Imperial County.

During operations, additional sales tax revenues will be obtained by Imperial County on the approximately $11.5 million in annual local O&M expenditures. The estimated sales tax revenues generated annually from the $11.5 million in annual O&M expenditures will be approximately $891,250. The overall anticipated increase in sales tax revenue of about 4.5 percent of the city's FY 2020 total general fund revenues of $194.8 million (Table 5.10-6) will be beneficial.

BRGP will bring increased property tax revenue to Imperial County. The BOE has jurisdiction over the valuation of a power -generating facility for property tax purposes if the power plant produces 50 megawatts (MW) or more. Because the BRGP is a 77-MW (net) power -generating facility, the BOE is responsible for assessing property value. Although the BOE assesses the property value, the property tax rate is set by the Imperial County Assessor's Office. For the current property, this rate is 1.2478 percent for FY 2022 (Imperial County Auditor Controllers Office 2023). Assuming a capital cost of $475 million to $800 million, the BRGP will generate approximately $5.9 million to $10 million in property taxes annually. Because the property taxes are collected at the county level, their disbursement is also at the county level.

In FY 2020, Imperial County's total general fund revenues were estimated at $194.8 million (Table 5.10-6). Of this amount, $41.4 million was in property tax revenues. The increase in property tax revenues resulting from the BRGP will be between three percent and five percent of the county's FY 2020 general fund total revenues and between 14 and 24 percent of the county's FY 2020 general fund property tax revenues. The overall anticipated increase in property tax revenue will be beneficial.

5.10.2.4.6 Result in Substantial Adverse Impacts on Educational Facilities

The schools in the Calipatria Unified School District are currently not overcrowded (Medina 2023). Any industrial development in the Calipatria Unified School District is charged a one-time developer fee of $0.27 per square foot of commercial development (Medina 2023).

Based on 10,000 square feet of enclosed structures and the $0.27 per square foot of developer fee, BRGP will pay $2,700 in school impact fees. With the payment of these fees, impacts will be less than significant.

5.10.2.4.7 Result in Substantial Adverse Impacts on Provision of Utility Services

BRGP operation will not make significant adverse demands on local water, sanitary sewer, or electricity because adequate supply and capacity currently exist.

5.10.2.4.8 Result in Substantial Adverse Impacts on the Provision of Public Services

The BRGP's operation is not expected to result in significant impacts on either the CFD or the ICSO. The BRGP's operation will not create significant adverse impacts on medical resources in the area. Copies of the records of conversation with the police and fire departments are included in Appendix 5.10B.

5.10.2.4.9 Environmental Justice

President Clinton's Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was signed on February 11, 1994. The purpose of this Executive Order is to consider whether a project may result in disproportionately high and adverse human health or environmental effects on any minority or low-income population.

The federal guidelines set forth the following three-step screening process:

1. Identify which impacts of the project, if any, are high and adverse.
2. Determine whether minority or low-income populations exist within the high and adverse impact zones.
3. Examine the spatial distribution of high and adverse impact areas to determine whether these impacts are likely to fall disproportionately on the minority and/or low-income population.

According to the guidelines established by the U.S. Environmental Protection Agency (1996) to assist federal agencies to develop strategies to address this circumstance, a minority and/or low-income population exists if the minority and/or low-income population percentage of the affected area is 50 percent or more of the area's general population. The guidance suggests using two or three standard deviations above the mean as a quantitative measure of disproportional effects.

A screening-level analysis of environmental justice is presented in Appendix 5.10A. As indicated in this Application and as summarized in that analysis, the BRGP does not create any significant or "high and adverse" impacts. Therefore, there are no "high and adverse" environmental impacts that are likely to fall disproportionately on minority and /or low income members of the community.

5.10.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code Section 21083; Title 14, California Code of Regulations, Sections 15064[h], 15065[c], 15130, and 15355). Cumulative socioeconomic impacts may occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by local labor, resulting in an influx of nonlocal workers and their dependents and resulting in excessive demand on public services.

Appendix 5.6A is a list of projects currently under development. Although the various projects may require a labor supply agreement for construction in roughly the same time period, there is a sufficient supply of skilled labor in Imperial County, according to union officials. Additional workforce needs are also likely to be met from the San Diego metropolitan area, which has a large construction workforce. Other kinds of cumulative socioeconomic impacts are also unlikely because the BRGP's effects on housing, schools, and public services will be negligible.

5.10.4 Mitigation Measures

Because there are no significant adverse impacts caused by the BRGP, no socioeconomic specific mitigation measures are proposed.

However, because the BRGP will be located within the Calipatria Unified School District service area, the BRGP will be subject to school impact fees. Any industrial development within the Calipatria Unified School District is currently charged a one-time assessment fee of $0.27 per square foot of enclosed structures (Medina 2023). Based on 10,000 square feet of enclosed structures and the $0.27 per square foot of developer fee, BRGP will pay $2,700 in school impact fees. These school impact fees are considered full mitigation for any impacts on these school districts.

5.10.5 Laws, Ordinances, Regulations, and Standards

A summary of the LORS, including the project's conformance to them, is presented in Table 5.10-12.

Table 5.10-12. LORS for Socioeconomics

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
Civil Rights Act of 1964	Prohibits discrimination on the basis of race, color, or national origin. Applies to all federal agencies and agencies receiving federal funds.	Office of Civil Rights	Section 5.10.2
Executive Order 12898	Avoid disproportionately high and adverse impacts on minority and low-income members of the community. Applies only to federal agencies.	EPA	Section 5.10.2.4
State			
Government Code Sections 65996-65997	Establishes that the levy of a fee for construction of an industrial facility be considered mitigating impacts on school facilities. Calipatria Unified School District may charge a one-time assessment fee to mitigate potential school impacts.	Calipatria Unified School District	Section 5.10.2.4
Education Code Section 17620	Allows a school district to levy a fee against any construction within the boundaries of the district for the purpose of funding construction of school facilities. Calipatria Unified School District may charge a one-time assessment fee to mitigate potential school impacts.	CDE	Section 5.10.2.4

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Local			
County of Imperial General Plan (2015)	Goal: Encourage adequate industrial uses to develop within the incorporated cities, unincorporated urban centers, and designated industrial Existing Communities to meet the manufacturing, processing, fabrication, and service needs of the local, regional, and global economy, and to meet the employment needs of county residents. Applies to facilities constructed and operated within County of Imperial Boundaries.	County of Imperial	Section 5.10.5.3

5.10.5.1 Federal LORS

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires federal agencies to consider whether the project may result in disproportionately high and adverse human health or environmental effects on any minority or low-income population by performing an environmental justice analysis. Since the signing of the Executive Order 12898, CEC has included this topic in its power plant siting decisions to ensure that any potential adverse impacts are identified and addressed.

5.10.5.2 State LORS

Government Code Sections 65996 and 65997 provide the exclusive methods of considering and mitigating impacts on school facilities that might occur as a result of the development of real property. Education Code Section 17620, listed in Government Code Section 65997 as an approved mitigation method, allows school districts to levy a fee or other requirement against construction within the boundaries of the school district for the purpose of funding construction of school facilities.

5.10.5.3 Local LORS

5.10.5.3.1 Imperial County

The Imperial County 2020 Strategic Plan (2015) calls for increased economic growth in the county. Goal 2, Economic Development and Job Creation, calls for the development of mechanisms to foster a robust economy, solid educational opportunities, and jobs (Imperial County 2005). Goal 4, Infrastructure/Sustainability, calls for the fostering efficient utilization of all resources in Imperial County: human, natural and environment.

5.10.6 Agencies and Agency Contacts

Table 5.10-13 provides a list of agencies and contacts of potentially responsible agencies. Copies of records of conversation are provided in Appendix 5.10B.

Table 5.10-13. Agency Contacts for Socioeconomics

Issue	Agency	Contact
School impact fees, enrollment data, potential enrollment impacts	Calipatria Unified School District	Rosa Medina Business Manager 501 W. Main St., Calipatria, CA 92233 (760) 348-2892 romedina@calipat.com
Available resources, potential impacts on resources and average response times	Imperial County Sheriff's Office	Ryan Kelley Chief Deputy 328 Applestill Road. El Centro, CA 92243 (442) 265-2003 rkelley@icso.org
Available resources, potential impacts on resources and average response times	Calipatria Fire Department	Nydia Nadarro Engineer 125 North Park Avenue Calipatria, CA 92602 (760) 348-44144
Availability of labor	Imperial County Building Trades Council	Daniel Machain President P. O. Box 1327 El Centro, CA 92244-1327 (760) 335-3000 (work) dmachain@ibew569.org

5.10.7 Permits and Permit Schedule

Permits dealing with the effects on public services are addressed as part of the building permit process. For example, school development fees are typically collected when BRGP pays in lieu building permit fees to the county. No permits are required to comply with the socioeconomic impacts of the BRGP.

5.10.8 References

California Department of Tax and Fee Administration (CDTFA). 2022. California City and County Sales and Use Tax Rates Available online: https://www.cdtfa.ca.gov/formspubs/cdtfa95.pdf. Accessed October 7.

California Department of Education (CDE). 2022. Data and Statistics, DataQuest – District level Enrollment. Available online: http://dq.cde.ca.gov/dataquest. Accessed November 2.

California Department of Education (CDE). 2023. Data and Statistics, Public Schools and District Data Files. Available online: http://dq.cde.ca.gov/dataquest. Accessed February 24.

California Department of Finance (DOF). 2022a. Demographic - Estimates. *E-4 Population Estimates for Cities, Counties, and the State, 2001-2010, with 2000 & 2010 Census Counties*. Available online: https://dof.ca.gov/forecasting/Demographics/estimates/estimates-e4-2000-2010/. Accessed October 10.

California Department of Finance (DOF). 2022b. Demographic - Estimates. *E-5 Population and Housing Estimates for Cities, Counties and the State, January 2021-2022, with 2020 Benchmark.* Available online: https://dof.ca.gov/forecasting/Demographics/estimates/e-5-population-and-housing-estimates-for-cities-counties-and-the-state-2020-2022/. Accessed October 10.

California Department of Finance (DOF). 2022c. P-2A: Total Population for California and States *(5-year increments)*. Available online: http://www.dof.ca.gov/Forecasting/Demographics/Projections/. Accessed November 1.

California Employment Development Department (CEDD). 2022a. Employment by Industry Data. *El Centro Metropolitan Statistical Area (MSA) – Historical Annual Average Data, 1990-2021*. Available online: https://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html. Accessed November 1.

California Employment Development Department (CEDD). 2022b. Employment by Industry Data. *California – Historical Annual Average Data, 1990-2021*. Available online: http://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html. Accessed November 1.

California Employment Development Department (CEDD). 2022c. Occupational Employment Projections. Available online: http://www.labormarketinfo.edd.ca.gov/data/employment-projections.html. Accessed November 4.

California Employment Development Department (CEDD). 2022d. Industry Projections. Available online: http://www.labormarketinfo.edd.ca.gov/data/employment-projections.html. Accessed December 9.

El Centro Regional Medical Center (ECRMC). 2023. Emergency services. Available online: https://www.ecrmc.org/medical-services/emergency-services/. Accessed January 13.

Imperial County. 2022a. Our County. Available online: imperialcounty.org. Accessed October 10.

Imperial County. 2022b. County of Imperial Comprehensive Annual Financial Report (CAFR) – Fiscal Year Ending June 30_2018.pdf. Available online: https://auditor.imperialcounty.org/wp-content/uploads/2020/02/2018Financials.pdf. Accessed September 26.

Imperial County. 2022c. County of Imperial Comprehensive Annual Financial Report (CAFR) – Fiscal Year Ending June 30_2019. Available online: https://auditor.imperialcounty.org/wp-content/uploads/2020/05/2019-County-of-Imperial-Financial-Statements-Report.pdf. Accessed September 26.

Imperial County. 2022d. County of Imperial Comprehensive Annual Financial Report (CAFR) – Fiscal Year Ending June 30_2020. Available online: https://auditor.imperialcounty.org/wp-content/uploads/2021/12/ImperialCountyFSR20.pdf. Accessed September 26.

Kelly, R. 2023. Personal communication between Fatuma Yusuf of Jacobs and Ryan Kelly Chief Deputy, Imperial County Sheriff's Office. March 8.

Medina, R. 2023. Personal communication between Fatuma Yusuf of Jacobs and Rosa Medina, Business Manager, Calipatria Unified School District. February 16.

Machain, D. 2022. Personal communication between Fatuma Yusuf of Jacobs and Daniel Machain, President, Imperial County Building Trades Council. December 8.

Nadarro, N. 2023. Persona communication between Emma McGinty of Jacobs and Nydia Nadarro, Engineer, City of Calipatria Fire Department. January 30.

Pioneers Memorial Healthcare District (PMHD). 2023. Pioneers Memorial Healthcare District Main Campus. Available online: https://pmhd.org/ and https://pmhd.org/emergency/. Accessed January 13.

U.S. Census Bureau. 2022a. 2020 Redistricting Data SF (PL 94-171) – *Hispanic or Latino, and Not Hispanic or Latino By Race*. Available online: http://factfinder2.census.gov/. Accessed December 12.

U.S. Census Bureau. 2022b. 2020 American Community Survey (ACS) 5-Year Estimates – *Poverty in the Past 12 Months*. Available online: http://factfinder2.census.gov/. Accessed December 12.

U.S. Environmental Protection Agency (EPA). 1996. Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses, July 12, 1996.

5.11 Soils and Agricultural Resources

This section describes the potential effects of the construction and operation of the Black Rock Geothermal Project (BRGP or Project) on soil resources and agriculture and is organized as follows: Section 5.11.1 describes the existing environment, including soil types and their use. Section 5.11.2 presents the environmental analysis for BRGP. Section 5.11.3 discusses cumulative effects. Section 5.11.4 presents mitigation measures. Section 5.11.5 presents the laws, ordinances, regulations, and standards (LORS) applicable to soils and their use. Section 5.11.6 provides agency contacts for all involved agencies. Section 5.11.7 describes permits required for BRGP. Section 5.11.8 provides the references that were used to develop this section.

5.11.1 Affected Environment

The BRGP site is located within the Salton Sea Known Geothermal Resource Area (in the southern portion of Imperial County, California). The Project site is located in the Imperial County Geothermal Renewable Energy Overlay Zone, established in Imperial County's Renewable Energy and Transmission Element (Title 9, Division 17, Geothermal Ordinance), where approximately 12 geothermal production facilities currently exist, and similar new large-scale geothermal development is planned. This region of the Imperial Valley is used predominately for agriculture and geothermal power production.

5.11.1.1 Regional Setting

Imperial County is a rural agricultural county in the southern portion of the Imperial Valley. The region has a long growing season and low precipitation (approximately three inches per year). Precipitation occurs primarily from mid-fall to mid-spring. Summers are long and hot; winters are mild. Imperial County is a leading agricultural area because of both environmental and cultural factors including good soils, a year-round growing season, the availability of adequate water supply transported from the Colorado River by a complex canal system, extensive areas committed to agricultural production, a gently sloping topography, and a climate that is well-suited for growing crops and raising livestock. Approximately 20 % of Imperial County is irrigated for agricultural purposes (588,416 acres). Irrigated agriculture in Imperial Valley is extremely diverse and includes many types of vegetable crops including lettuce, carrots, onions, tomatoes, cauliflower, and broccoli; alfalfa, Sudan grass, and other animal feed; sugar beets; wheat and other grains; melons; cotton; and various citrus, fruits, and nuts (Imperial County Programmatic Environmental Impact Report Renewable Energy & Transmission Element Update (IC PEIR 2015).

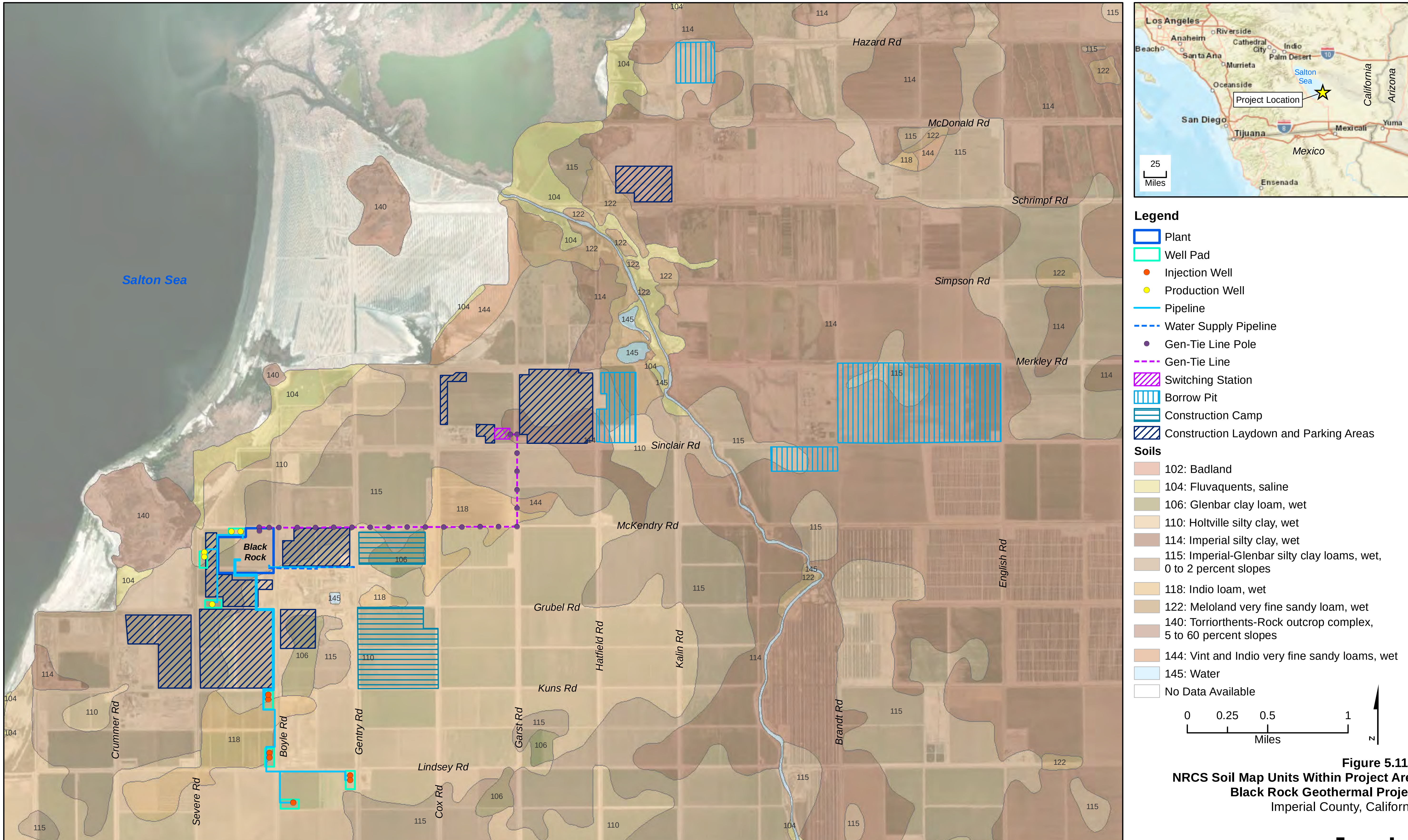
In June 1901, the California Development Corporation began delivering irrigation water to the Imperial Valley by diverting it from the Colorado River through a channel originating from Mexico to the Alamo River. In 1905 the Colorado River flooded and ran uncontrolled through Imperial Valley, inundating 488 square miles of farmland and creating the Salton Sea. In 1911, the Imperial Irrigation District (IID) began operating the water delivery system and improved it over the next several decades with the construction of the All American Canal, which replaced the Alamo Canal in 1941. The IID water service area is generally level, with low levels of natural erosion. Erosion is dependent on soil texture (clay, sand, or silt content), moisture content, and agronomic practices (cropped, fresh-tilled, or fallow soil). Lacustrine basin soils in the IID water service area formed on nearly level lakebeds in the vicinity of prehistoric Lake Cahuilla consist of silty clays, silty clay loams, and clay loams that are deep and highly calcareous, containing gypsum and soluble salts. The central areas of the IID water service area typically have fine-textured silts, which are primarily used for crops. Soils within Imperial County have no potential for farming unless irrigated, because of the dry climate. Continued agricultural use of soils within the IID water service area requires both irrigation and the installation of subsurface tile drains to transport water and salts that would otherwise build up in the soils and prevent crop growth (IID Water Conservation and Transfer Project/ Draft Habitat Conservation Plan, Draft Environmental Impact Report [EIR]/ Environmental Impact Statement [EIS] 2002).

The BRGP site is located in and surrounded by agricultural land uses prevalent in the Project vicinity and recreation/open space land uses associated with the Salton Sea to the northwest. The BRGP site is located on the southwest corner of McKendry Road and Boyle Road approximately eight miles southwest of the town of Niland and approximately six miles northwest of the town of Calipatria. The Project site is in an active agricultural field currently in Bermuda grass crop. The Project site is bounded on the east by a concrete-lined irrigation water delivery canal and Boyle Road (dirt) and on the north by McKendry Road (gravel). Agricultural fields are located to the south, west, north, and east of the site. The Vulcan and Hoch Geothermal Power Plants are located adjacent to the southeast corner of the Project site. The Salton Sea is located northwest of the Project site with an approximately eight-foot tall embankment (levee) separating the sea from the Project site.

5.11.1.2 Affected Soils

Soil types in the vicinity of the BRGP site are described and mapped based on the interpretation of Soil Surveys of the Imperial Valley Area published by the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS). BRGP consists of seven well pads, including five production wells on three well pads and seven geothermal fluids injection wells on four well pads, geothermal fluids and steam handling facilities, a solids handling system, brine pond, service water pond, distribution pipelines from the Project site to the wells, and a gen-tie line from the onsite substation to the IID switching station. In addition, the Project includes up to nine laydown and parking areas, two construction crew camps, and up to four borrow pits located throughout the region. Most of the laydown and parking areas for BRGP will be located adjacent to the site immediately south and east. However, all 15 sites may be used and will be shared between three proposed Projects: BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project, as described in Section 2, Project Description. Three soil-mapping units (Holtville silty clay, wet, Imperial-Glenbar silty clay loams, wet, and Indio loam, wet) will be potentially affected by the construction of the BRGP, production and injection well sites, and respective distribution pipelines. The IID switching station will potentially affect a fourth soil mapping unit (Imperial silty clay, wet) and the gen-tie line between the BRGP site and the IID switching station may impact a fifth soil unit type (Vint and Indio very fine sandy loams, wet). The temporary work areas associated with the potential borrow pit, construction camp, gen-tie line, and laydown/parking areas may affect two additional soil units (Meloland very fine sandy loam, wet and Glenbar clay loam, wet). The seven soil mapping units potentially affected by BRGP areas are shown in Figure 5.11-1.

The two soil types found at the BRGP site also exist in predominately all other BRGP work areas. Imperial-Glenbar Silty Clay Loams, wet, is a moderately well-drained soil with moderately high-water movement in the most restrictive layer. This soil type is susceptible to moderate-to-high water erosion and moderate wind erosion. Holtville Silty Clay (wet) is a moderately well-drained soil. It has moderate-to-high water erosion and moderate wind erosion potential. Water movement for the most restrictive layer is very low to moderately low for this soil type. This soil type is neither flooded nor ponded. Soil types found at the injection well pads and along the injection pipeline right of ways (ROWs) are Holtville Silty Clay (wet), Imperial-Glenbar Silty Clay Loams (wet), and Indio Loam (wet). Indio Loam soils are moderately well drained, with moderate permeability. Water movement for the most restrictive layer is moderately high to high. Imperial Silty Clay, wet is an additional soil unit type found at the IID switching station, which is a moderately well-drained soil consisting of clayey alluvium derived from mixed and clayey lacustrine deposits. These soils are all generally composed of a significant amount of clay particles, which can expand (absorb water) or contract (release water). These shrink and swell characteristics can result in structural stress. Table 5.11-1 provides a summary of soil characteristics associated with the soil mapping units in the BRGP area including slope, depth to bedrock, wind and water erosion factors, soil unit descriptions, and the Project components located in each soil type.



Legend

- Plant
- Well Pad
- Injection Well
- Production Well
- Pipeline
- Water Supply Pipeline
- Gen-Tie Line Pole
- Gen-Tie Line
- Switching Station
- Borrow Pit
- Construction Camp
- Construction Laydown and Parking Areas

Soils

- 102: Badland
- 104: Fluvaquents, saline
- 106: Glenbar clay loam, wet
- 110: Holtville silty clay, wet
- 114: Imperial silty clay, wet
- 115: Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes
- 118: Indio loam, wet
- 122: Meloland very fine sandy loam, wet
- 140: Torriorthents-Rock outcrop complex, 5 to 60 percent slopes
- 144: Vint and Indio very fine sandy loams, wet
- 145: Water
- No Data Available

0 0.25 0.5 1
Miles

N

Figure 5.11-1
NRCS Soil Map Units Within Project Area
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Soils\BR_5.11-1_230212.mxd

Table 5.11-1. NRCS Soil Map Unit Descriptions and Characteristics*

Map Unit	Description
110	**Holtville Silty Clay, wet** ▪ **Location:** Plant Site, Well Pads, Distribution Piping, Gen-tie Line, Borrow Pits, Laydown Yards, Construction Camp, and Water Supply Line ▪ Slope: 0-2% ▪ Depth of Bedrock (inches): >80 ▪ Drainage class: Moderately Well drained ▪ Runoff class: Low ▪ Water (k_{sat} factor): Very low to moderately low (0.00 to 0.06 in/hr) ▪ Wind Erosion: Moderate (4) ▪ Depth to water table: More than 80 inches ▪ Frequency of flooding: None ▪ Frequency of ponding: None ▪ Hydrologic Soil Group: D ▪ Ecological site: R031XY007CA – Lacustrine Basin and Large River Floodplain ▪ Hydric soil rating: No ▪ Farmland classification: Prime farmland if irrigated and drained ▪ Unit Description: Nearly level, very deep stratified soil formed in alluvial sediment on flood plains and alluvial basin floors. Irrigation has caused a perched water table at a depth of 36 to 60 inches, and the water table can rise to within 18 inches of the surface during periods of heavy irrigation. Soil is light brown silty clay from 0 to 17 inches, light brown to very pale brown silty clay and silt loam from 17 to 24 inches, very pale brown loamy silty clay from 24 to 35 inches, and very pale brown loamy very fine sand with silty clay discontinuous stratum from 35 to 60 inches.
115	**Imperial-Glenbar Silty Clay Loams, wet, 0 to 2 % slopes** ▪ **Location:** Plant Site, Well Pads, Distribution Piping, IID Switching Station, Gen-tie Line, Borrow Pits, Laydown Yards, Construction Camps, and Water Supply Line ▪ Slope: 0-2% ▪ Depth of Bedrock (inches): >80 ▪ Drainage class: Moderately well drained ▪ Runoff class: Low ▪ Water (Ksat): Moderately high (0.20 to 0.57 in/hr) ▪ Wind Erosion: Moderate (4 and 4L) ▪ Depth to water table: More than 80 inches ▪ Frequency of flooding: None ▪ Frequency of ponding: None ▪ Hydrologic Soil Group: C ▪ Ecological site: R031XY007CA – Lacustrine Basin and Large River Floodplain ▪ Hydric soil rating: No ▪ Farmland classification: Farmland of statewide importance ▪ Unit Description: Nearly level, very deep calcareous soils formed in alluvial deposits on flood plains and lakebeds within the irrigated areas of Imperial Valley. Irrigation has caused a perched water table commonly at a depth of 36 to 60 inches, but which can rise to a depth of 18 inches during periods of heavy irrigation. This map unit averages about 41 % Imperial silty clay loams and 40 % Glenbar silty clay loams.

Map Unit	Description
118	**Indio Loam, wet** **Location:** Well Pads, Distribution Piping, Gen-tie Line, Laydown Yards, and Construction Camps ▪ Slope: 0-2% ▪ Depth of Bedrock (inches): >80 ▪ Drainage class: Moderately well drained ▪ Runoff class: Low ▪ Depth to water table: More than 80 inches ▪ Frequency of flooding: None ▪ Frequency of ponding: None ▪ Water (k_{sat} factor): Moderately high to high (0.57 to 1.98 in/hr) ▪ Wind Erosion: Moderate (4L) ▪ Hydrologic Soil Group: B ▪ Ecological site: R031XY007CA – Lacustrine Basin and Large River Floodplain ▪ Hydric soil rating: No ▪ Farmland classification: Prime farmland if irrigated and drained ▪ Unit Description: Nearly level, very deep soils formed in alluvium and eolian sediments on flood plains and basin floors. Irrigation has caused a perched water table commonly at a depth of 36 to 60 inches, but which can rise to a depth of 18 inches during periods of heavy irrigation. Soil is a pinkish gray loam from 0 to 12 inches, and stratified, very pale brown and pink light silt loam and loamy very fine sand from 12 to 60 inches or more. In some places the surface layer is silt loam, very fine sandy loam, or fine sandy loam, or there is silty clay at a depth between 40 and 60 inches.
106	**Glenbar Clay Loam, wet** **Location**: Temporary work areas such as the construction camps, Laydown Yards, and Gen-tie Line Right of Way ▪ Slope: 0-1% ▪ Depth of Bedrock (inches): >80 ▪ Water (k_{sat} factor): Moderately high: (0.2- to 0.57) ▪ Wind Erosion: Moderate (4L) ▪ Drainage class: Moderately well drained ▪ Runoff class: Low ▪ Depth to water table: More than 80 inches ▪ Frequency of flooding: None ▪ Frequency of ponding: None ▪ Hydrologic Soil Group: C ▪ Ecological site: R031XY007CA – Lacustrine Basin and Large River Floodplain ▪ Hydric soil rating: No ▪ Farmland classification: Prime farmland if irrigated and drained ▪ Unit Description: Nearly level, very deep soils formed in alluvial sediment on flood plains and in alluvial basins within irrigated areas. Irrigation has caused a perched water table at a depth of 36 to 60 inches, and the water can rise to a depth of 18 inches during periods of heavy irrigation. Soil is pinkish gray clay loam from 0 to 13 inches and is stratified, light brown clay loam, and silty clay loam from 13 to 60 inches. Strata of silty clay may occur between 10 and 60 inches; or a thick stratum of silt loam or very fine sandy loam may occur between 20 to 36 inches.

Map Unit	Description
114	**Imperial silty clay, wet** **Location:** Gen-tie Line, IID Switching Station, and temporary work areas at Borrow Pits, Laydown Yards, and the Project site ▪ Slope: 0-2% ▪ Depth of Bedrock (inches): >80 ▪ Drainage class: Moderately well drained ▪ Runoff class: Low ▪ Water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr) ▪ Depth to water table: More than 80 inches ▪ Frequency of flooding: None ▪ Frequency of ponding: None ▪ Hydrologic Soil Group: C ▪ Ecological site: R031XY007CA – Lacustrine Basin and Large River Floodplain ▪ Hydric soil rating: No ▪ Farmland classification: Farmland of statewide importance ▪ Unit Description: Nearly level, very deep soils formed in clayey sediments on flood plains and in basins and lakebeds. Irrigation has caused a perched water table at a depth of 36 to 60 inches, which can rise to a depth of 18 inches during periods of heavy irrigation. Soil is pinkish gray and light brown silty clay from the surface to 60 inches or more. Silty clay from 1 to 12 inches and sility clay loam from 12 to 60 inches. Efflorescences of gypsum and brown stains are common in the cracks and pores. Surface layer is silty clay loam or clay loam.
122	**Meloland very fine sandy loam, wet** **Location:** Temporary Laydown Yards and Borrow Pits ▪ Slope: 0-2% ▪ Depth of Bedrock (inches): >80 ▪ Drainage class: Moderately well drained ▪ Runoff class: Low ▪ Water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr) ▪ Depth to water table: More than 80 inches ▪ Frequency of flooding: None ▪ Frequency of ponding: None ▪ Hydrologic Soil Group: D ▪ Ecological site: R031XY007CA – Lacustrine Basin and Large River Floodplain ▪ Hydric soil rating: No ▪ Farmland classification: Prime farmland if irrigated and drained ▪ Unit Description: Nearly level, very deep, soils formed in alluvial or eolian sediments on flood plains and alluvial basin floors. Irrigation has caused a perched water table at a depth of 24 to 36 inches. Soil is light brown very fine sandy loam from 0 to 12 inches, stratified, very pale brown loamy fine sand and silt loam from 12 to 14 inches, and pink silty clay from 14 to 71 inches. In some places, the surface layer is silt loam, loam, or fine sandy loam.

Map Unit	Description
144	Vint and Indio very fine sandy loams, wet Location: Gen-tie Line ▪ Slope: 0-2% ▪ Depth of Bedrock (inches): >80 ▪ Drainage class: Moderately well drained ▪ Runoff class: Very low ▪ Water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr) ▪ Depth to water table: More than 80 inches ▪ Frequency of flooding: None ▪ Frequency of ponding: None ▪ Hydrologic Soil Group: B ▪ Ecological site: R031XY007CA – Lacustrine Basin and Large River Floodplain ▪ Hydric soil rating: No ▪ Farmland classification: Prime farmland if irrigated and drained ▪ Unit Description: This undifferentiated unit consists of deep to very deep, nearly level soils formed in alluvial and eolian sediments on the bed of old Lake Cahuilla. Irrigation has caused a perched water table at a dept of 36 to 60 inches. The water table may rise to a depth of 18 inches below the surface during periods of heavy irrigation. The Vint soil is light brown very fine sandy loam from 0 to 10 inches, stratified light brown and pink loamy fine sand with thin lenses of silt loam from 10 to 40 inches, and pinkish gray and light brown silty clay from 40 to 60 inches. In some places the surface layer is clay loam or sandy clay loam. In other places the silty clay substratum is at a depth of less than 40 inches. The Indio soil is light brown very fine sandy loam from 0 to 12 inches, stratified light brown and pink light silt loam and loamy very fine sand from 10 to 40 inches, and pinkish gray and light brown silty clay from 40 to 60 inches.

* Phases of the same soil unit (those with the same soil series name, surface texture, landform, and typical profile) are grouped together in this table for brevity.

Note:

Soil characteristics are based on soil descriptions available on the NRCS Web Soil Survey (accessed September 2023) and NRCS Official Soil Series Descriptions (accessed 2022). Soil descriptions provided above are limited to those soil units that could be directly affected by BRGP.

5.11.1.3 NRCS Soil Map Units

Table 5.11-1 describes the properties of the NRCS soil map units found in the vicinity of the Project site. The major soil map units for each feature are discussed briefly in the following sections.

As shown in Figure 5.11-1, three mapping units (Holtville Silty Clay, wet, Imperial-Glenbar Silty Clay Loams, wet, and Indio Loam, wet) are associated with the BRGP site, production and injection well sites, and respective distribution pipelines. The IID switching station will potentially affect a fourth soil mapping unit (Imperial silty clay, wet) and the gen-tie line between the BRGP site and the IID switching station may impact a fifth soil unit type (Vint and Indio very fine sandy loams, wet). Two additional mapping units (Meloland very fine sandy loam, wet, and Glenbar Clay Loam, wet) are associated with the temporary borrow sites, construction camps, gen-tie line, and laydown construction work areas.

BRGP is underlain by soil mapping-units formed primarily on flood plains and alluvial basin floors and is generally composed of very deep soils, with slow to moderately rapid permeabilities, slow runoff, and low to high shrink-swell potential. Because of extensive irrigation in the vicinity, a perched water table is often present at depths of 36 to 80 inches and can rise to a depth of 18 inches during periods of heavy irrigation.

Most surficial deposits at the Project site consist predominantly of silty clay loams overlying fine sands of the Imperial-Glenbar and Holtville soil groups. The native surface clays likely exhibit high swell potential (Expansion Index, EI = 110 to 132). The clay is expansive when wetted and can shrink with moisture loss (drying). In addition, the native soil is severely corrosive to metals and contains sufficient sulfates and chlorides. Subsurface agricultural tile drainage pipelines (4-inch diameter plastic or clay perforated pipelines encapsulated by sand/gravel envelopes) exist at a depth of five to seven feet below this site and are used to remove salts accumulating from agricultural irrigation and crop production. Design recommendations in the BRGP geotechnical report will mitigate these existing soil conditions for construction.

The following paragraphs provide a brief description of the soil-mapping units potentially affected by construction of BRGP.

5.11.1.3.1 Holtville silty clay, wet

This nearly level, moderately well-drained, low runoff soil, with very low to moderately low permeability, very deep soil forms on flood plains and alluvial basin floors in the Project area. The representative soil profile is greater than 60 inches. The surface texture of this soil type is silty clay. This soil is moderate to highly susceptible to water erosion and moderately susceptible to wind erosion. The soil's permeability is slow to rapid and the shrink-swell potential ranges up to high. This soil has a high seasonal water table because of irrigation. This soil unit generally has severe limitations for traditional building development because of the soil's high shrink-swell potential and low soil strength and will require appropriate building foundation design.

Approximately 8 acres of the BRGP plant facility, 25 acres of well pads, 0.1 acre of gen-tie line poles, and 20 acres of distribution pipeline are underlain by this soil-mapping unit. Temporary impacts to the soil unit exist at approximately 10 acres of borrow pits, 150 acres of construction camp, and 140 acres of laydown areas.

5.11.1.3.2 Imperial-Glenbar silty clay loams, wet, 0 to 2 % slope

This nearly level, very deep, moderately well-drained, calcareous soil forms in floodplains and lakebeds with irrigated portions of the Project area. The representative soil profile is greater than 60 inches. The surface soil texture is silty clay loam. The soil is highly susceptible to water erosion and moderately susceptible to wind erosion. The permeability is slow to rapid and the shrink-swell potential ranges from moderate to high. This soil unit generally has severe limitations for traditional building development because of the soil's shrink-swell potential and low soil strength and will require appropriate building foundation design.

Approximately 50 acres of the plant facility is underlain by this soil-mapping unit. This soil-mapping unit is also mapped beneath: approximately 7 acres of well pads, less than 0.5 acres of gen-tie line poles, 5 acres of distribution pipeline, and 4 acres of the IID switching station. Temporary impacts to the soil unit exist at approximately 120 acres of borrow pits, 10 acres of construction camp, and 300 acres of lay-down areas.

5.11.1.3.3 Indio loam, wet

This nearly level, very deep, well or moderately well-drained soils formed in alluvium derived from mixed rock sources forms on flood plains and basin floors in the Project area. The representative soil profile is greater than 72 inches. The soil's surface texture is loam. The soil is moderately susceptible to water erosion and moderately susceptible to wind erosion. This soil has a seasonal high-water table because of irrigation. The permeability is moderate and the shrink-swell potential is low.

This soil-mapping unit is mapped beneath: approximately five acres of the well pads, two acres of distribution pipeline, and 0.1 acre of gen-tie line poles. Temporary impacts to the soil unit exist at approximately one acre of construction camp, one acre of the gen-tie line, and five acres of the distribution pipeline work areas.

5.11.1.3.4 Glenbar clay loam, wet

This moderately well drained, nearly level, very deep soil forms on flood plains and alluvial basins within irrigated portions of the Project area. The representative soil profile is greater than 60 inches. The surface texture of this soil type is clay loam and it has a seasonal shallow perched water table because of irrigation. The shrink-swell potential of this soil type is moderate. The susceptibility of the soil to erosion from water and wind is moderate.

This soil-mapping unit is mapped beneath approximately 25 acres of construction camp and 20 acres of laydown yards.

5.11.1.3.5 Imperial silty clay

This nearly level, very deep well and moderately well drained; slow or very slow runoff except on low scarps; very slow permeability soil forms on flood plains, basin floors, and lakebeds in the Project area. The representative soil profile is greater than 60 inches. The soil texture is silty clay throughout the entire soil profile. This soil is highly susceptible to water erosion and moderately susceptible to wind erosion. The soil's permeability is slow and the shrink-swell potential is high.

This soil-mapping unit is mapped beneath approximately two acres of the IID switching station, 270 acres of borrow pits, 0.5 acre of gen-tie line, and 80 acres of potential laydown areas.

5.11.1.3.6 Meloland very fine sandy loam, wet

This nearly level, very deep, moderately-well drained soil forms on flood plains and basin floors in the Project area. The representative soil profile is greater than 71 inches. The soil's surface texture is very fine sand. The soil is moderately to highly susceptible to water erosion and moderately susceptible to wind erosion. This soil has a seasonal high water table because of irrigation. The permeability is slow and the shrink-swell potential is low.

This soil-mapping unit is mapped beneath approximately 20 acres of temporary borrow pit and less than 0.5 acre of laydown areas.

5.11.1.3.7 Vint and Indio very fine sandy loams, wet

This moderately well-drained, nearly level, deep to very deep soil forms in old lakebed sediments within the Project area. The representative soil profile is greater than 60 inches. The soil's surface texture is very fine sandy loam. The soil has a low to high susceptibility to water erosion and moderate susceptibility to wind erosion. This soil has a seasonal high water table because of irrigation. The permeability is moderately rapid and the shrink-swell potential is low to high.

This soil-mapping unit is mapped beneath approximately 0.1 acre of the gen-tie line right of way.

5.11.1.4 Agricultural Use

The majority of the BRGP site consists of irrigated agricultural land. Two major IID agricultural distribution canals exist along the east and west borders of the BRGP site, which supply water to subsurface irrigation systems in the Project area. Vale Lateral 5 is adjacent to the west side of the site and Vale Lateral 4A is adjacent to the east side of the site. Vegetable crops that have been or could be grown at the BRGP site include carrots, wheat, broccoli, lettuce, asparagus, cantaloupes (and other melons), cauliflower, onions, cabbage, sweet corn, and tomatoes. Field crops that have or could be grown at the BRGP site include Bermuda grass, sugar beets, alfalfa, Sudan grass, and field corn. There have historically been two crops harvested per year at the BRGP site location (Signorotti 2002). Agricultural water consumption in this area is approximately five acre-feet per year (afy). None of the BRGP site components traverse land covered by Williamson Act contracts.

5.11.1.4.1 Important Farmland

Important farmland areas are assessed using the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP) Soil Candidate Listings for Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. These four categories are collectively described as "Important Farmland" in Imperial County's 2015 Renewable Energy Programmatic Environmental Impact Report.

Approximately 538,326 acres, or 19%, of the land in Imperial County is classified as Important Farmland. Lands classified as Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland are concentrated in an approximately 30-mile-wide column near the center of the County, extending from the southern edge of the Salton Sea to the Mexican border. As of 2012, Imperial County had 192,950 acres of Prime Farmland; 305,614 acres of Farmland of Statewide Importance; 2,074 acres of Unique Farmland; and 37,688 acres of Farmland of Local Importance. Of these amounts, 26,145.71 acres of Prime Farmland; 46,006.41 acres of Farmland of Statewide Importance; 379.75 acres of Unique Farmland; and 19,581.93 acres of Farmland of Local Importance were located within the Renewable Energy Overlay Zone (IC PEIR 2015). Approximately 17% of the Important Farmland in Imperial County is located within the County designated Renewable Energy Overlay Zone.

The following soil-mapping units located within the BRGP area meet the criteria for Prime Farmland, if irrigated and drained:

- Holtville silty clay, wet
- Indio loam, wet
- Glenbar clay loam, wet
- Meloland very fine sandy loam, wet
- Vint and Indio very fine sandy loams, wet

The following soil mapping units located within the BRGP area meet the criteria for Farmland of Statewide Importance, if irrigated:

- Imperial-Glenbar silty clay loams, wet
- Imperial silty clay, wet

Based on a review of Soil Candidate Listings for Important Farmland in Imperial County (FMMP 2023), the BRGP site, adjacent production and injection well pads, associated pipelines, the IID switching station, gen-tie line, borrow pits, lay-down areas, and construction camps are located in or traverse through, areas designated as Prime Farmland, Farmland of Statewide Importance, or Local Importance. Farmland zoning designations for the various Project components are listed by acreage in Table 5.11-2 and are illustrated in Figure 5.11-2. Of the total 63.10 acres of permanent impacts associated with the BRGP site, approximately 96% are located on Important Farmland, consisting of approximately 7.33 acres of Prime farmland, 50.94 acres of farmland of Statewide Importance, and 2.25 acres of farmland of Local Importance. Impacts associated with the well pads and distribution pipelines are not considered in evaluating Important farmland impacts because the land will continue to be used for farming purposes during Project operation. Immediately following construction, temporary work areas, including laydown yards, construction camps, borrow sites, and work areas associated with gen-tie line, pipeline, plant, and switching station construction will be restored and returned to pre-construction conditions or left in conditions specified by the landowner. Temporary construction areas within the ROWs will be restored to pre-construction conditions and continue to be used as agricultural roads, naturally vegetated areas, or agricultural fields, as applicable.

Table 5.11-2. Important Farmland Zoning Acreage for Black Rock Project Components

Project Component	Prime (acres)	Statewide (acres)	Local (acres)	% Important
Permanent Impacts [a]				
Plant (63.10 acres)	**7.33**	**50.94**	**2.25**	**96**
Well Pads[b] (39.17 acres)	31.69	6.11	0	97
Pipelines[b] (20.57 acres)	17.11	2.17	0	94
Gen-Tie Line[c] (0.54 acre)	0.23	0.28	0.03	100
IID Switching Station[c] (6.15 acres)	0.00	6.15	0.00	100
Total Permanent Impacts (129.53 acres)	**56.36**	**65.65**	**2.28**	**96%**
Temporary Impacts				
Total Temporary Impacts[d] (1,282.71 acres)	412.09	606.71	154.06	91%

[a] GIS impacts per Project component were calculated to account for Project component overlaps where the Project site, well pads, pipelines, gen-tie line, and switching station impacts overlap. Permanent Impacts include 50-foot buffer surrounding Project features with the exception of 0-foot buffer for gen-tie line.

[b] Well pads and associated distribution pipeline impacts are not considered in evaluating Important farmland impacts because the land will continue to be used for farming purposes during Project operation. Distribution pipeline acreage includes a 50-foot ROW.

[c] The IID Switching Station will be shared by multiple geothermal projects including Black Rock, Elmore North, and Morton Bay.

[d] Temporary impacts consisting of borrow pits, construction camps, and laydown yards will be used by multiple geothermal projects including Black Rock, Elmore North, and Morton Bay. Temporary impacts also include temporary work areas associated with the gen-tie line, pipelines, plant, well pads, and IID Switching Station.

5.11.1.5 Wetlands

Irrigation canals are located along Severe and Boyle Roads adjacent to the BRGP site. In addition, freshwater ponds and lakes associated with the Salton Sea exist outside of the BRGP site west of Severe Road. Detailed information regarding wetlands is included in Section 5.2 Biological Resources.

5.11.2 Environmental Analysis

The potential environmental impacts of the BRGP with respect to soil and agricultural resources are primarily related to the construction and operation of the Project components and the conversion of agricultural land to non-agricultural uses. The potential environmental impacts related to soils are presented in Section 5.11.2.2. The potential environmental impacts related to agricultural resources are presented in Section 5.11.2.3.

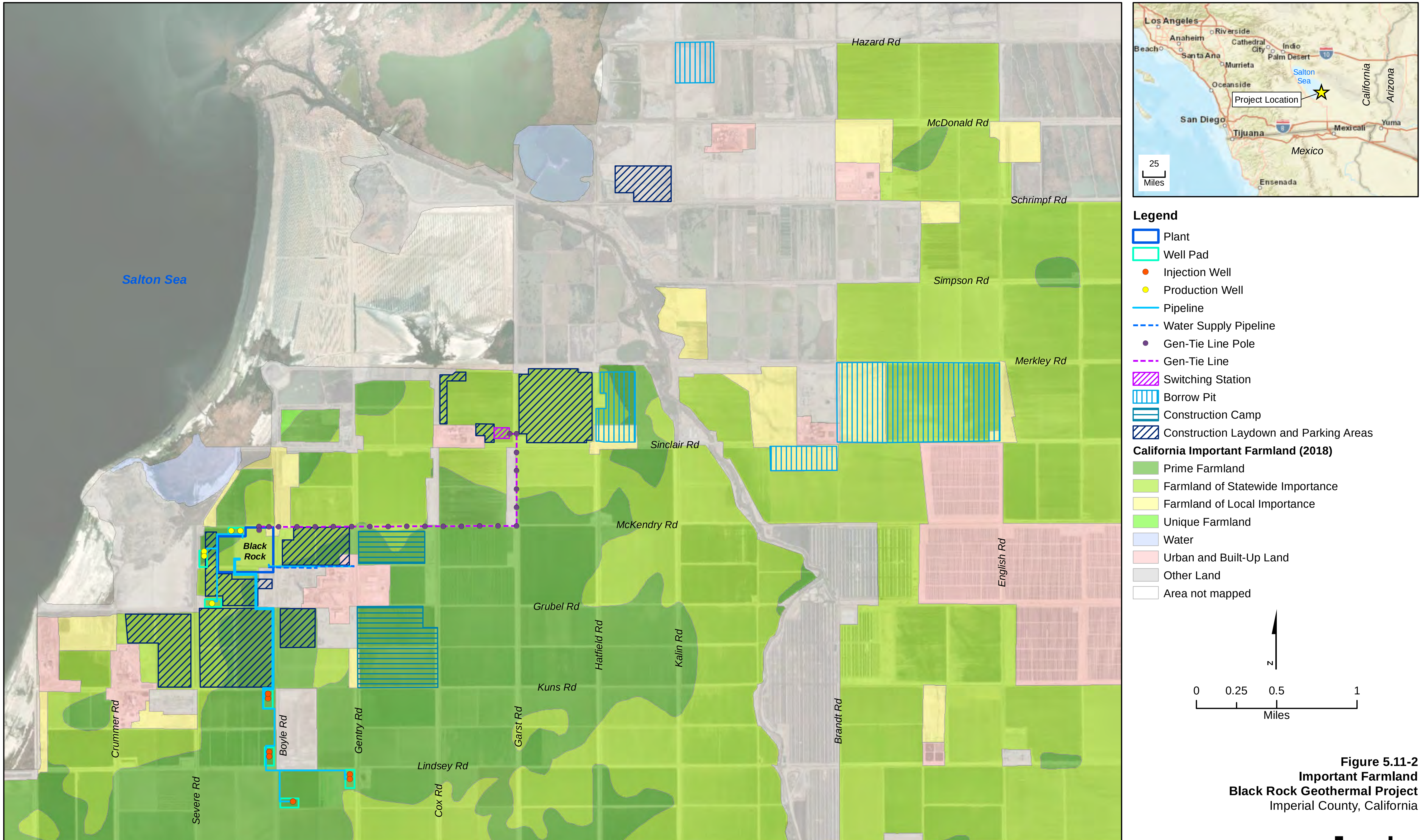


Figure 5.11-2
Important Farmland
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Farmland\BR_5.11-2_230212.mxd

5.11.2.1 Significance Criteria

Appendix G of California Environmental Quality Act (CEQA) identifies the following criteria for determining significance of impacts to soils resources:

- Whether the Project results in substantial soil erosion or loss of topsoil, degradation of soils or farmland, changes in topography, or unstable soil conditions.
- Whether the Project is located on a soil that is unstable, or that would become unstable as a result of the Project, and potentially result in landslide, lateral spreading, subsidence, liquefaction, or collapse. (This criteria is evaluated in Section 5.4 Geological Hazards).
- Whether the Project is located on expansive soil, as defined in Table 18-1 of the Uniform Building Code (International Conference of Building Officials 1994), creating substantial risks to life or property. (This criterion is evaluated in Section 5.4 Geological Hazards).
- Whether the Project would place septic tanks or alternative wastewater disposal systems on soils incapable of adequately supporting these systems where sewer is not available for the disposal of wastewater.

The assessment of potential impacts to soil resources is based on soils information presented in the published NRCS soil survey information covering the Project area and consideration of the Applicant's committed mitigation measures. BRGP area soil conditions include nearly level topography and extensive actively farmed agricultural areas under these conditions. The use of erosion control best management practices (BMPs) to control water and wind erosion during construction activities and the placement of impervious surfaces and BMPs on disturbed areas within the BRGP site will be implemented to effectively control soil loss during and after construction. Consequently, quantitative calculations of potential soil loss using the Universal Soil Loss and Chepil Wind Erosion Equations, which are typically used to quantify water and wind-induced soil loss for agricultural operations, were not evaluated. Potential impacts of the proposed Project on the soil resources are evaluated based on those caused by construction activities and those related to facility operation.

5.11.2.2 Impacts to Soils

The direct and indirect impacts to soil resources and proposed mitigation measures are presented below by Project element. Impacts analysis related to both construction and operation are provided for each element, along with proposed mitigation measures deemed necessary to reduce impacts to less than significant.

5.11.2.2.1 Project Plant Site

Construction-Related Impacts

Construction-related impacts to the soil resources associated with the BRGP, primarily involve vegetation removal, excavation, grading, and temporary stockpiling. During construction at the BRGP site two soil unit types may be impacted, as shown in Figure 5.11-1. The proposed site improvements include excavation for an approximately 180,000 square foot service water pond, an approximately 760-foot by 85-foot "U" shaped brine pond, an approximately 127,500 square foot retention basin approximately six feet deep, construction of an earthen berm surrounding the site approximately five feet in height with 2:1 side slopes, and minor grading for structure pads, utilities, and surface water flow drainage.

The existing site topography is generally level, but some cut and fill will be required to provide a level area for the facility at about elevation -223 aboveground. During demolition activities, approximately 45.34 acres of the site will be graded smooth to match surrounding elevations. Abandoned foundations located in 2-acres of the north-east portion of the agricultural field will be demolished. The foundations will be filled in and graded smooth to match surrounding elevations. Approximately 100 cubic yards of cut and fill will be required to demolish these foundations, conduct minor clearing and grubbing, and smooth minor undulations of the row crops in the field. During construction, approximately 63.43-acres will be disturbed during grading activities, including well pad areas located outside of the process plant berms (9-acres). Approximately 249,345 cubic yards of cut will be required for foundation and pond excavations at the plant and approximately 73,800 cubic yards of fill will be required to construct the 100-year flood elevation berm. During this process, approximately 175,545 cubic yards of excess spoils from foundation excavations will be stockpiled onsite for use onsite or future haul-off. Approximately 12 acres of the Project site will be paved and 15 acres will be surfaced with gravel.

Excavation work will consist of the removal, storage, and disposal of earth, sand, gravel, vegetation, organic and deleterious material, loose rock, boulders, and debris to the lines and grades necessary for construction. Materials suitable for backfill will be stored in stockpiles at designated locations using proper erosion protection methods. Excess materials will be removed from the site and disposed of at an acceptable location. Typical cut and fill depths of less than two to three feet are anticipated. Areas to be backfilled will be prepared by removing unsuitable materials and rocks. The bottom of the excavations will be examined for loose or soft areas. Such areas will be excavated fully and backfilled with compacted fill. Ground improvement operations to mitigate the site for settlement-sensitive improvements are discussed in Section 5.4-Geological Hazards.

Impacts during construction of the BRGP may include alteration of the existing soil profile, increased soil erosion, and soil compaction. Alteration of the existing soil profiles, including mixing of soils and rock, will alter the physical, chemical and biological characteristics of the native soils and underlying geology. Clearing the protective vegetative cover and subsequent soil disturbance will likely result in short-term water and wind erosion rates increases. The loss of topsoil can increase the sediment load in surface receiving waters downstream of the construction site. Soil compaction can decrease infiltration rates, resulting in increased runoff and erosion rates. Abandoning and plugging the agricultural subsurface drainage pipelines can allow groundwater levels to rise variably across the site. Cutting the subsurface tile drain pipelines with utility trenches will likely result in some localized trench flooding. The flat topography and series of berms and levies in the Project area will limit soil erosion to minor or moderate impacts. The mitigation measures outlined in Section 5.11.4 and recommendations in the BRGP geotechnical report provided as Appendix 5.4 would further reduce impacts to soil resources resulting from the construction of the BRGP. These impacts are considered less than significant levels.

BMPs will be implemented during construction in accordance with the site specific- stormwater pollution prevention plan (SWPPP) that is required under the Clean Water Act (CWA) for all construction Projects over one acre in size. The California Energy Commission (CEC) also requires that Project Owner develop and implement a drainage, erosion, and sediment control plan (DESCP) to reduce the impact of runoff from construction sites. Monitoring will involve inspections to ensure that the BMPs are properly implemented and effective. Temporary work areas will be restored to preconstruction condition, therefore, impacts from soil erosion via water are expected to be less than significant.

The clay-type soils at the BRGP site have a potential for moderate wind erosion. Soil BMPs will be implemented throughout construction. Wind erosion potential is highest when dry, fine sandy, or silty material is left exposed. The compaction of site soils is expected to reduce the overall potential for wind erosion. Soil stockpiles will be covered if they are not active prior to precipitation events, protected with a temporary sediment barrier during the rainy season, and located away from stormwater and drainage collection areas. Regular watering of exposed soils and the establishment of short- and long-term erosion control measures will be used to further reduce soil loss attributable to erosion. For these reasons, impacts from soil erosion via wind are expected to be less than significant.

Operation-Related Impacts

During operation, the BRGP plant facility will be surrounded by an approximately five-foot high berm, in accordance with the County’s flood protection requirements. The BRGP plant facility will be covered with a facility building, concrete, asphalt, and crushed aggregate. The perimeter drainage berm and interior stormwater retention basin are designed to control potential flooding events at the site. Therefore, no impacts to soil resources are anticipated from operations at the BRGP site.

The BRGP will be equipped with a septic system designed to conform to applicable state and local LORS that will be periodically pumped out by a qualified contractor. Therefore, the BRGP will not cause soil impacts associated with septic systems.

5.11.2.2.2 Production and Injection Well Pads

Construction-Related Impacts

Construction-related impacts to soil resources associated with the development of the five production wells located onsite on three well pads and seven injection wells located offsite on four well pads primarily involve grading operations and drilling of the geothermal wells. The proposed improvements include the construction of raised earthen berms, minor grading for well pads, and construction of an access road, potentially impacting three soil unit types, as shown in Figure 5.11-1.

The well pads will range in size from approximately four-five acres. The elevation of the well pads will be raised one to 1.5 feet above the adjacent grade. During construction, approximately 9-acres will be disturbed during grading activities associated with the well pad areas located outside of the process plant berms. Approximately six acres of the offsite well pad areas will be paved and approximately 20 acres will be graveled. Wells will be directionally drilled and completed to minimize the well pad size, thereby minimizing soil disturbance.

The surficial soils at the well pads have moderate to high susceptibility to water erosion and have moderate susceptibility to wind erosion. These soils have low soil strength and the shrink-swell potential ranges up to high. Other impacts associated with construction and operation of the production and injection well pads will be similar to those described earlier.

The applicant will obtain an Underground Injection Control (UIC) permit from the California Geologic Energy Management (CalGEM) for the construction of the injection wells. The Project Owner will not construct or discharge to these wells without the final permit in place or emergency/temporary authorization from CalGEM or U.S. Environmental Protection Agency (EPA) Region IX. With implementation of the mitigation measures outlined in Section 5.1.4 and recommendations in the geotechnical report, impacts to soil resources resulting from the construction of the production and injection well pads will be reduced to less than significant levels.

Operation-Related Impacts

During operation potential impacts to soil resources from the operation of the well pads include increased erosion. The well pads and access to them will be surfaced with paving or Class 2 road base material. The perimeter berm around each well pad will also reduce soil erosion. During operation, the Project Owner will also provide monitoring reports in accordance with the UIC permit issued by CalGEM and the Waste Discharge Requirements (WDR) issued by the Colorado Regional Water Quality Control Board (RWQCB). With implementation of the measures outlined in Section 5.11.4, impacts to soil resources from operation of the well pads will be reduced to a less than significant level.

5.11.2.2.3 Production and Injection Pipelines

Construction-Related Impacts

Construction-related impacts associated with the construction of above-ground distribution pipeline from the BRGP site to the production and the injection wells primarily involve clearing and grubbing, excavation for pipeline supports, pipe handling, and welding. Offsite production and injection distribution piping will consist primarily of up to 36-inch piping made of corrosion-resistant alloy or functional equivalent and 12-inch carbon steel well warmup piping supported on drilled pier cast-in-place foundations. Site clearing and preparation (removing vegetation and minor leveling) would require the use of heavy diesel-powered earthmoving equipment, including bulldozers, scrapers, dump trucks, and front-end loaders. Site clearing and preparation would occur at all locations where piping will be constructed or installed.

The pipelines will have a 50-foot ROW plus an additional 10 % to accommodate several expansion loops required along the length of the pipelines. The ROW established along the length of the pipelines adjacent to existing County roads, IID facilities, and private land would be prepared by removing debris and land leveling as each pipeline component is being constructed. Construction and lay-down areas associated with the pipeline construction would be located within the pipeline ROWs. Previously disturbed areas will be used during construction to the maximum extent practical. Erosion control measures would include reducing the time between clearing and construction and installing silt fencing. Surplus soils that cannot be used for restoration on site would be sent to a soils broker or the local, state-approved landfill.

Existing maintenance roads and previously disturbed areas will be used during construction to the maximum extent practical within the pipeline ROW. Road improvements may be required to enable the passage of construction vehicles. Temporary culverts or other drainage structures may be installed to allow the passage of heavy equipment across drainages to prevent damage to existing drainage banks. Following construction, disturbed road sections will be restored to their original contours. Some permanent road improvements may be left in place where necessary for operation, maintenance, or where the County requires. All existing roads would be left in a condition equal to or better than their condition prior to the construction of the pipeline.

The three soil-mapping units along the distribution pipeline alignment are highly to moderately susceptible to erosion from water and wind. The shrink-swell potential for soil units ranges up to high. Potential impacts during the construction of the proposed distribution pipeline on soil resources will be similar to those identified earlier and include alteration of the existing soil profile, soil erosion, and soil compaction. Construction of the pipeline will result in soil impacts because of excavation and vehicle traffic. Increased soil compaction may decrease the ability of vegetation to reestablish itself within the ROW following disturbance, which may result in increased erosion as well, however, these impacts would be localized and limited to the disturbed areas in the existing road ROWs.

Temporarily disturbed pipeline construction work areas will be restored to pre-existing or better conditions. Following construction, areas surrounding the pipeline will be allowed to naturally re-vegetate, or be developed as agricultural fields, as applicable. The mitigation measures outlined in Section 5.11.4 would reduce impacts to soil resources resulting from the construction of the pipeline to less than significant levels.

Operation-Related Impacts

During operation, activities will be limited to pipeline maintenance and operation activities leaving the areas susceptible to increased erosion because of decreased infiltration rates, increased runoff rates, and increased soil compaction may occur. With the implementation of the mitigation measures outlined in Section 5.11.4, impacts to soil resources resulting from the operation and maintenance of the production and injection well pipelines will be reduced to less than significant levels.

5.11.2.2.4 IID Switching Station Construction

Construction-related Impacts

Electricity generated by BRGP will be delivered to the substation switchyard near the northeast corner of the site. This switchyard will have an interconnection to the IID system via the new IID switching station located approximately 2.3 miles northeast of BRGP. The new switching station will be located near the northwest intersection of Garst Road and West Sinclair Road (Figure 3.12). Construction-related impacts to soil resources associated with the development of the switching station primarily involve vegetation removal, excavation, grading, and temporary stockpiling. During construction activities associated with the IID switching station, will potentially impact two soil unit types, as shown in Figure 5.11-1. Proposed improvements at the site will consist of the installation of electrical transformers, switches, circuit breakers, and associated storage, including one approximately 12-foot by 14-foot prefabricated structure, which will be monitored remotely and visited periodically. No staffed buildings, restrooms, or sanitation facilities will be constructed onsite. Stormwater will sheet flow offsite to an adjacent field below the switching station finish grade elevation. These improvements will require minor grading for foundation pads, electrical conduit runs, and drainage for surface water flow. The bottom of the excavations will be examined for loose or soft areas. Areas to be backfilled will be prepared by removing unsuitable materials and rocks. Such areas will be excavated fully and backfilled with compacted native fill to balance the site. Ground improvement operations to mitigate the site for settlement-sensitive improvements are discussed in Section 5.4-Geological Hazards and the BRGP Geotechnical Report.

Impacts during the construction of the switching station may include alteration of the existing soil profile, increased soil erosion, and soil compaction. Alteration of the existing soil profiles, including mixing of soils and rock, will alter the physical, chemical, and biological characteristics of the native soils and underlying geology. Clearing of the protective vegetative cover and subsequent soil disturbance will likely result in short-term increases in water and wind erosion rates. Soil compaction can decrease infiltration rates, resulting in increased runoff and erosion rates. The mitigation measures outlined in Section 5.11.4 and recommendations in the geotechnical report would further reduce impacts to soil resources resulting from the construction of the switching station. These impacts are considered less than significant.

BMPs will be implemented during construction to reduce the impact of runoff from the construction site. Monitoring will involve inspections to ensure that the BMPs are properly implemented and effective. Therefore, impacts from soil erosion via water are expected to be less than significant.

The clay-type soils at the switching station site have a potential for moderate wind erosion. Soil BMPs will be implemented throughout construction. Wind erosion potential is highest when dry, fine sandy, or silty material is left exposed. The compaction of site soils is expected to reduce the overall potential for wind erosion. Soil stockpiles will be covered if they are not active prior to precipitation events, protected with a temporary sediment barrier during the rainy season, and located away from stormwater and drainage collection areas. Regular watering of exposed soils and the establishment of short- and long-term erosion control measures will be used to further reduce soil loss attributable to erosion. Temporary work areas will be restored to preconstruction conditions. For these reasons, impacts from soil erosion via wind are expected to be less than significant.

Operation-related Impacts

During operation, the switching station site will be covered with a small, prefabricated structure, concrete, asphalt, and crushed aggregate. Sheet flow drainage to the adjacent field and percolation into the existing soil will prevent potential flooding events at the site. The switching station will be an unmanned facility, which will be monitored remotely, therefore no sanitation facilities, septic systems, or leach field are required. Therefore, no impacts to soil resources are anticipated from operations at the switching station site.

5.11.2.2.5 Gen-tie Line

Construction-Related Impacts

Construction-related impacts associated with the construction of the gen-tie line from the BRGP site switchyard to the IID switching station primarily involve access road construction, ROW and worksite clearing, foundation installation, structure assembly and erection, pulling, tensioning, splicing, installation of ground wires, conductors, counterpoise/ground rods, cleanup, and site reclamation. At each structure site, a work area of approximately 200 square feet will be used for the construction of structure footings, assembly of the structure, and the necessary crane maneuvers. Each tensioning site will be situated in an area of approximately 200 feet by 200 feet. The work areas would be cleared of vegetation only to the extent necessary. After line construction, all pads not needed for normal gen-tie line maintenance would be restored to natural contours to the greatest extent possible and be revegetated where required. An approximately 50-foot-wide ROW will be established along the length of the gen-tie line adjacent to County roads, IID facilities, and private land, potentially impacting five soil unit types, as shown in Figure 5.11-1.

Existing roads and previously disturbed areas will be used during construction to the maximum extent practical within the gen-tie line ROW. Following construction, disturbed road sections will be restored to their original contours. Some permanent road improvements may be left in place where necessary for operation and maintenance, or where the landowner or land managing agency requests. All existing roads will be left in a condition equal to or better than their condition prior to the construction of the gen-tie line.

Potential impacts during construction of the proposed gen-tie line on soil resources will be similar to those identified earlier. and include alteration of the existing soil profile, soil erosion, and soil compaction. Construction of the gen-tie line would result in soil impacts because of excavation and vehicle traffic caused during stringing activities. Increased soil compaction may decrease the ability of vegetation to reestablish itself within the ROW following disturbance, which may result in increased erosion as well. These impacts would be localized and limited to the disturbed areas in the existing ROWs. The mitigation measures outlined in Section 5.11.4 and recommendations in the geotechnical report would reduce impacts to soil resources resulting from the construction of the gen-tie line to less than significant levels.

Operation-Related Impacts

During operation, pole site locations will be maintained and monitored for signs of increased erosion and potential scour. Maintenance vehicle traffic will travel on existing access roads to monitor and maintain the pole site locations. The erosion control and post-construction monitoring mitigation measures outlined in Section 5.11.4, would reduce impacts to soil resources from gen-tie line operations to a less than significant level.

5.11.2.2.6 Laydown Yards and Construction Camps

Construction-Related Impacts

Temporary construction-related impacts to soil resources associated with the development of the potential laydown yards and the construction camps primarily involve vegetation removal, excavation, minor grading, gravel application, mobile trailer installations, temporary utility construction, material/equipment staging and storage, temporary stockpiling, and worker reporting/parking. Up to approximately 769 acres of land may temporarily be disturbed during construction activities associated with the 11 potential construction laydown areas, construction camps, and parking areas located throughout the region, and shared between the BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project, potentially impacting six soil unit types, as shown in Figure 5.11-1. The proposed improvements include BMP installation, clearing and leveling the sites, installation of temporary ground cover/gravel suitable for material and equipment staging areas, parking, power and security site lighting installation, perimeter fencing, portable construction trailers, camp facilities, and associated utility construction.

The existing site topography is generally level at these sites, but minor leveling of the sites will be required to provide a level area for temporary construction use. Areas will be prepared by removing unsuitable materials and rocks and gravel may be installed. Impacts during the construction of the laydown yards may include alteration of the existing soil profile, increased soil erosion, and soil compaction. Alteration of the existing soil profiles, including mixing of soils and rock, will alter the physical, chemical, and biological characteristics of the native soils and underlying geology. Clearing of the protective vegetative cover and subsequent soil disturbance will likely result in short-term increases in water and wind erosion rates. The loss of topsoil can increase the sediment load in surface receiving waters downstream of the construction site. Soil compaction can decrease infiltration rates, resulting in increased runoff and erosion rates.

BMPs will be implemented during construction. Monitoring will involve inspections to ensure that the BMPs are properly implemented and effective. Therefore, impacts from soil erosion via water are expected to be less than significant. The clay- type soils at the laydown areas have a potential for moderate wind erosion. Soil BMPs will be implemented throughout construction. Wind erosion potential is highest when dry, fine sandy, or silty material is left exposed. The compaction of site soils and the application of gravel is expected to reduce the overall potential for wind erosion. Soil stockpiles will be covered if they are not active prior to precipitation events, protected with a temporary sediment barrier during the rainy season, and located away from stormwater and drainage collection areas. Regular watering of exposed soils and the establishment of short- and long-term erosion control measures will be used to further reduce soil loss attributable to erosion. For these reasons, impacts from soil erosion via wind are expected to be less than significant.

Operation-Related Impacts

Work at the laydown areas/construction camps will be temporary, as the sites will be restored at the end of construction. Thus operational impacts at the laydown yards will not exist.

5.11.2.2.7 Borrow Pit

Construction-Related Impacts

In the event that cut material salvaged from the Project site is unsuitable for reuse onsite as fill, suitable backfill material may be obtained from the borrow sites shown in Figure 11-1. Excess cut quantities not used for backfill at the Project site will be exported to the four potential borrow pit sites, as needed to restore the preconstruction contour elevations at the borrow sites, after export from the borrow sites to the Project site is completed. Up to approximately 460 acres of land may temporarily be disturbed during construction activities associated with the four potential borrow sites located throughout the region, and shared between the BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project, potentially impacting four soil unit types.

Potential construction-related impacts to soil resources associated with the borrow pits primarily involve vegetation removal, excavation, grading, and temporary stockpiling. Topsoil removed from the Project site will be segregated and stockpiled at the borrow sites as feasible. After necessary fill material has been procured from the borrow sites, the stockpiled topsoil will be used to backfill the borrow sites. Thus, returning the borrow sites to conditions approximating those currently present.

Impacts during excavation and export of material to the Project site may include alteration of the existing soil profile, increased soil erosion, and soil compaction. Alteration of the existing soil profiles, including mixing of soils and rock, will alter the physical, chemical, and biological characteristics of the native soils and underlying geology. Clearing of the protective vegetative cover and subsequent soil disturbance will likely result in short-term increases in water and wind erosion rates. The loss of topsoil can increase the sediment load in surface receiving waters downstream of the construction sites. Soil compaction can decrease infiltration rates, resulting in increased runoff and erosion rates. The mitigation measures outlined in Section 5.11.4 would further reduce impacts to soil resources resulting from excavation and export work at the borrow sites, and these impacts are considered less than significant levels.

The Surface Mining and Reclamation Act of 1975 (Surface Mining and Reclamation Act [SMARA], Public Resources Code [PRC], Sections 2710-2796) provides a comprehensive surface mining and reclamation policy for the regulation of surface mining operations to assure that adverse environmental impacts are minimized, and excavated lands are reclaimed to a usable condition. The County enacts ordinances to implement SMARA at the local level and acts as the lead agency for the issuance of permits, development of reclamation plans, and is the holder of reclamation financial assurances. BMPs will be implemented during construction to reduce the impact of runoff from the construction site. Monitoring will involve inspections to ensure that the BMPs are properly implemented and effective. Therefore, impacts from soil erosion via water are expected to be less than significant.

The clay-type soils at the borrow sites have a potential for moderate wind erosion. Soil BMPs will be implemented throughout construction. Wind erosion potential is highest when dry, fine sandy, or silty material is left exposed. The compaction of site soils is expected to reduce the overall potential for wind erosion. Soil stockpiles will be covered if they are not active prior to precipitation events, protected with a temporary sediment barrier during the rainy season, and located away from stormwater and drainage collection areas. Regular watering of exposed soils and the establishment of short- and long-term erosion control measures will be used to further reduce soil loss attributable to erosion. For these reasons, impacts from soil erosion via wind are expected to be less than significant.

Operation-Related Impacts

Work at the borrow sites will be temporary, as the sites will be restored in accordance with an approved reclamation plan per SMARA, at the end of construction. Thus, operational impacts at the borrow site will not exist.

5.11.2.3 Agricultural Resources

Appendix G of CEQA and Imperial County guidelines identify the following criteria for determining the significance of impacts to agricultural resources:

- Whether the Project converts Prime Farmland, Unique Farmland, Farmland of Statewide Importance, or Farmland of Local Importance, as shown on maps prepared pursuant to the FMMP, to nonagricultural uses.
- Whether the Project conflicts with existing zoning for agricultural use or a Williamson Act contract.
- Whether the Project involves other changes in the existing environment which, because of their location or nature, could result in the conversion of farmland to nonagricultural use.

The following sections evaluate potential Project impacts to agriculture and important farmland based upon the criteria above.

5.11.2.3.1 Conversion of Important Farmland to Nonagricultural use

The FMMP and Imperial County utilize the following four farmland classifications to describe Important Farmland: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. Accordingly, these four categories are collectively used to describe Important Farmland in the following impact analysis.

As shown in Table 11-2, of the total 63.10 acres of land permanently affected by the BRGP site, 96% are located on land described by FMMP and Imperial County as Important Farmland. BRGP would permanently convert approximately 7.33 acres of Prime farmland, 50.94 acres of farmland of Statewide Importance, and 2.25 acres of farmland of Local Importance from agricultural production to activities associated with geothermal production during Project use (approximately 40 years). Based on the approximately 538,326 acres of land in Imperial County classified as Important Farmland, this acreage represents a loss of approximately 0.01% of the total net acreage in agricultural production, which is not a substantial loss of farmland. In addition, most soils in the Project area designated as Prime and Statewide Important soil types will be reserved for reuse, as feasible. Well pads and associated distribution pipeline impact areas would continue to be used for farming purposes during Project operation. Laydown yards, borrow pits, and construction camps, would only be used during construction and will be restored and returned to preconstruction conditions, as required post-construction.

BRGP is located entirely within Imperial County’s designated Geothermal Overlay Zone, which is committed to the development of geothermal energy facilities. Geothermal facilities constructed within this planning area will minimize impacts to Important Farmland because geothermal energy facilities typically have fewer impacts to agricultural resources than solar energy facilities. Solar energy facility Project footprints are typically much larger than geothermal facilities because of the vast open space required for the installation of solar panels. Geothermal facility footprints on the other hand are limited to the power plant, production and injection wells, and associated piping, which do not require as large of a land area. Consequently, the development limitations of the Geothermal Overlay Zone will serve to minimize the conversion of the most valuable Important Farmland categories. (IC PEIR 2015)

In addition, BRGP would provide an economic benefit to the community in terms of job creation and training in the production of renewable energy over the life of the Project, which is estimated at approximately 40 years. The County Board of Supervisors determined in Resolution 2012-005 that although renewable energy facilities may result in socioeconomic impacts due to agricultural job loss, these impacts may be mitigated to a level less than significant through implementation of the mitigation measures identified in Section 5.11.4.

Therefore, with the implementation of the mitigation measures in Section 5.11.4, the conversion of agricultural land required for the BRGP site will not result in significant impacts to Important farmland.

5.11.2.3.2 Conflict with existing zoning for agricultural use or a Williamson Act contract

Imperial County does not participate in Williamson Act contracts and there are no active contracts within the County. On February 23, 2010, the Board of Supervisors approved Minute Order #10a which forced all existing Williamson Act contracts into non-renewal and denied all proposed contracts. The last Williamson Act contracts expired in 2020. BRGP is consistent with land-use zoning in the County designated Geothermal Overlay Zone. The Project will provide economic benefits to the community in the form of job creation and provide renewable energy to the state. Although Prime Farmland, Farmland of Statewide Importance, and Farmland of Local Importance will be converted from agricultural to non-agricultural use, the Imperial County Programmatic EIR determined that this is not a significant impact for geothermal facilities located within the designated Geothermal Overlay Planning Zone, with the implementation of the Mitigation Measures described in 5.11.4. Therefore, the development of the proposed BRGP does not represent a significant impact to agricultural resources.

5.11.2.3.3 Potential changes to the existing environment which, because of their location or nature, could result in the conversion of farmland to a nonagricultural use

Operation of the BRGP plant facility will expose soils and vegetation near the plant facility to slightly increased levels of air pollutants, as discussed in Section 5.1, Air Quality. These emissions will not adversely impact plant habitats. Surrounding agricultural crops are typically rotated at least twice a year. This short duration of plant growth and harvesting decreases the likelihood that significant air pollutant absorption would impact plants. Based on the type of emissions, the short residency time of the surrounding vegetation, and the implementation of the emission control devices identified in Section 5.1, impacts to the soil vegetation system from BRGP facility emissions are expected to be insignificant.

5.11.3 Cumulative Effects

A proposed Project may have a cumulative impact when the incremental effect of the Project is considerable when viewed in connection with other past, present, and reasonably foreseeable future projects (PRC Section 21083; California Code of Regulations [CCR], Title 14, Sections 15064[h], 15065[c], 15130, and 15355). Eight potential projects were identified and considered in this cumulative impact assessment. These projects include:

1. Wilkinson Solar Farm
2. Lindsey Solar Farm
3. Midway Solar Farm IV
4. Ormat Wister Solar
5. Hell's Kitchen Geothermal Exploration Project
6. Energy Source Mineral ALTiS
7. Elmore North Geothermal Project
8. Morton Bay Geothermal Project

None of these projects identified within the geographic scope of potential cumulative impacts would intersect or be additive to the Project’s site-specific soils impacts; therefore, no cumulative effects are identified for soils. In general, soils impacts are site-specific and limited to the boundaries of each individual Project rather than cumulative in nature. With the implementation of measures to control erosion and sedimentation, including good construction practices and the mitigation measures described in Section 5.11-4 below, the Project impacts would be less than significant.

A berm surrounding the entire Project site will prevent stormwater runoff from leaving the site, thereby avoiding potential downstream erosion and sedimentation. Other projects in the area would be required to comply with the same regulatory programs (e.g., National Pollution Discharge Elimination System (NPDES) permits, grading ordinances), and would be expected to control erosion under these regulations. Thus, the cumulative soils impacts in the general area would be expected to be less than significant.

Cumulative impacts on agricultural resources consider the proposed Project's impacts as well as those likely to occur as a result of other existing, proposed, and reasonably foreseeable projects. As discussed in Section 5.11.2.3, Agricultural Resources, implementation of the Project would result in the conversion of approximately 7.33 acres of Prime farmland, 50.94 acres of farmland of Statewide Importance, and 2.25 acres of farmland of Local Importance to geothermal use, amounting to a 0.01% decrease in Important farmland in Imperial County, contained within the committed Geothermal Overlay Zone, where such conversion is planned and mitigated under the County approved mitigation measures identified in Section 5.11.4 below.

BRGP will not have a significant effect on soils or agriculture with the implementation of the mitigation measures identified in Section 5.11.4 and design measures recommended in the BRGP geotechnical report. The BRGP site and surrounding area are designated and currently developed for geothermal energy production and distribution. Given the requirements of the permitting and construction compliance processes that the BRGP and other approved Projects must go through, it is very unlikely that these or other Projects would have adverse impacts on soil or agricultural resources that, combined with those of BRGP, would reach the level of significance.

5.11.4 Mitigation Measures

5.11.4.1 Soils Measures

This section describes Applicant-committed mitigation measures that will be implemented to reduce Project-related potential impacts to soil resources.

The following mitigation measures will be implemented to reduce potentially significant soils impacts to insignificant levels. An acceptable level of soil erosion, as used herein, is defined as that amount of soil loss that would not affect (i.e., limit) the potential long-term beneficial uses of the soil as a growth medium or adversely affect water resources because of accelerated erosion and subsequent sedimentation. Refer to Section 5.4 for additional measures to mitigate slope instability conditions, liquefaction, landslides, subsidence, flooding, and Section 5.15 for mitigation measures related to potential impacts to water quality associated with soil erosion.

5.11.4.2 Preparation of a SWPPP

The Project Owner will comply with all requirements of the General NPDES Permit for Discharges of Storm Water Associated with Construction Activity. The Project Owner will develop and implement a Storm Water Pollution Prevention Plan (SWPPP), in accordance with State Water Resources Control Board Water Quality Order No. 2009-0009 Division of Water Quality and any other documents as necessary for the construction of the entire Project, including all areas of disturbance associated with the gen-tie and pipeline routes, switching station, and offsite borrow areas. Prior to beginning site mobilization associated with any Project element, the Project Owner will submit to the Compliance Project Manager (CPM) a copy of the Notice of Intent for Construction (and any other necessary documents) accepted by the State Water Resources Control Board (SWRCB) and obtain Energy Commission CPM approval of the construction activity SWPPP for Project, as well as any other documents required by the permit.

5.11.4.3 Preparation of a Construction DESCP

The Project Owner will obtain approval for a site-specific DESCP that addresses all Project elements. The plan will address revegetation and be consistent with the approved grading and drainage plan. The plan will include design plans that have been developed in accordance with Imperial County Code Title 12, Chapter 12.10.020 Section B and include an analysis demonstrating that the site storm retention facilities can store the volume required, are capable of handling overflow situations while maintaining structural integrity and ensure that the facilities are designed to completely drain in 72 hours.

5.11.4.4 Preparation of an Operational DESCP

The Project Owner will obtain approval for a site-specific Facility Operation DESCP that addresses all Project site elements. The plan will include detailed plans and information for the following:

1. a narrative discussion and appropriate site maps and plans showing how stormwater and sediment erosion will be managed during plant operation, including locations of permanent BMPs to be employed.
2. a narrative discussion of what permanent BMPs and materials management practices will be employed at the site.
3. a narrative discussion and schedule detailing how and when inspections and maintenance of all plant operation stormwater management structures will be undertaken.

5.11.4.5 Implementation of an Underground Injection Control Permit

The Project Owner will apply for and receive a UIC permit issued by the CalGEM for the construction and operation of the geothermal fluids and wastewater disposal injection wells.

5.11.4.6 Compliance with Brine Pond Waste Discharge Requirements

The Project Owner will apply for and receive WDRs for the construction and operation of the Project's brine ponds.

5.11.4.7 Implementation of Onsite Septic System Design Standards

The on-site septic system will be designed according to the applicable county standards and the Project Owner will submit the final designs for the septic system for review and approval to the CEC and to the Imperial County Environmental Health Services, County Health Department for comment.

5.11.4.8 Implementation of Imperial County Floodproofing Criteria

The Project Owner will provide certification by a California registered civil engineer or architect that the floodproofing methods for the Project meet the floodproofing criteria in Section 74301(c)(2) of the Imperial County Flood Damage Prevention Regulations.

5.11.4.9 Participation in Regional Subsidence Monitoring

The Project Owner will participate in regional subsidence monitoring conducted by Imperial County and the CalGEM.

5.11.4.10 Preparation of a Surface Mining and Restoration Plan

The Project Owner will submit to the California State Mining and Geology Board (SMGB) or its designee, such as the County of Imperial (County), a plan detailing the surface mining activities and resultant restoration for all areas disturbed at borrow pits. All disturbed areas will be restored to pre-existing use as quickly as practicable after borrow pit activities are complete.

5.11.4.11 Agricultural Measures

Imperial County has established measures to mitigate impacts to agricultural resources based on guidance received from the Department of Conservation Division of Land Resource Protection, which are applicable to geothermal energy technology. Farmland mitigation will be provided in conformance with Imperial County requirements.

5.11.5 Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local LORS applicable to soils are discussed below and summarized in Table 5.11-3.

Table 5.11-3. Laws, Ordinances, Regulations, and Standards for Soils

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
1972 Amendments to Federal Water Pollution Control (CWA, including 1987 amendments)	Regulates stormwater and non-storm water discharges from construction and industrial activities	RWQCB – Colorado River Basin (7) and SWRCB. EPA has oversight authority.	Section 5.11.5.1
NRCS (1983), *National Engineering Handbook*, Sections 2 and 3	Standards for soil conservation	NRCS	Section 5.11.5.1
State			
Porter-Cologne Water Quality Control Act	A NPDES California General Activities Construction Permit is necessary if an area greater than one acre will be disturbed. Industrial facilities (including power plants) with potential to affect storm water discharges are required to obtain an NPDES permit during operation (Industrial Storm Water General Permit).	RWQCB – Colorado River Basin (7) and SWRCB	Section 5.11.5.2

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Warren-Alquist Act, PRC, Section 25000 et seq.	This law gives the CEC authority to certify the construction and operation of thermal electric power plants 50 megawatts (MW) or larger. However, geothermal production wells and related facilities are not included in the definition of thermal power plant and are therefore excluded from the certification process (PRC Section 25120). The Energy Commission certification is also "in lieu of" any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law (PRC Section 25500).	CEC	Section 5.11.5.2
Cal. Pub. Res. Code § 25523(a)	Provisions relating to the manner in which the proposed facility is to be designed, sited, and operated to protect environmental quality and assure public health and safety.	CEC	Section 5.11.5.2
Cal. Pub. Res. Code §21000 et. seq.; Guidelines for Implementation of CEQA, Appendix G	Environmental checklist form, evaluation of erosion or siltation and conversion of agricultural lands.	CEC	Sections 5.11.5.2, 5.11.2.1, 5.11.2.3
Williamson Act	The Act creates an arrangement whereby private landowners' contract with counties and cities to voluntarily restrict land to agricultural and open space uses. Provides for lowered property taxes for lands maintained in agricultural and certain open space uses.	CEC, RWQCB Colorado River Basin Region 7	Sections 5.11.5.2, 5.11.2.3.2
SMARA of 1975, PRC, Division 2, Chapter 9, Section 2710 et seq.	The California SMARA requires that all surface mines in the state be reclaimed both to minimize any adverse effects from the mining and to ensure that mined lands are returned to a usable condition and creates no danger to public health and safety. The law requires local jurisdictions to enact ordinances to implement SMARA at the local level and to act as lead agency for issuance of permits, development of reclamation plans, and holder of reclamation financial assurances.	Imperial County Planning/Building Department	Sections 5.11.5.2, 5.11.4.1, 5.11.2.2, 5.4 Geologic Hazards

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Title 14, CCR, Division 2, Chapter 8, Subchapter 1, SMGB Reclamation Regulations, Section 3500 et seq.	These regulations further clarify and implement the provisions of SMARA by establishing standards for reclamation plans and financial assurances, as well as administrative procedures for lead agency oversight and decision appeals.	Imperial County Planning/Building Department	Sections 5.11.5.2, 5.11.4.1; 5.4 Geologic Hazards
CCR, Division 20, Chapter 6.5, Article 4, Section 25143.1, Health and Safety Code	This regulation defines the terms "waste" and "wastewater" and exempts wastes resulting from drilling for geothermal resources from management requirements set for managing hazardous wastes, because those wastes are regulated by the California RWQCBs.	State RWQCBs.	Section 5.11.5.2
Local			
Imperial County Land Use Code, Title 9, Division 3, Chapter 1, Sections 90301.02, 90301.03; Chapter 2, Section 90302.13	County ordinance establishes development standards. Regulations pertaining to fugitive dust control during grading. Regulations describing submittal requirements related to grading projects; description of soil test required for grading permit.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County Land Use Code, Title 9, Division 10, Chapter 10	County grading ordinance regulations pertaining to excavation, grading, and construction permits. These code sections establish minimum standards and permitting requirements for building construction, site grading, and sewage disposal systems within Imperial County. The Uniform Plumbing Code requirements are established in Chapter 4 (starting with Section 91004.00); grading permit requirements are provided in Chapter 10 (starting with section 91010.00); and septic tank and sewage disposal system requirements are provided in Chapter 12 (starting with section 91012.00).	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County Land Use Code, Title 9, Division 16, Chapter 3, Section 91603.00, Chapter 4, Section 91604.00; Chapter 5, Section 91605.04	This chapter identifies development permit requirements for special flood hazard areas.	Imperial County Planning/Building Department	Section 5.11.5.3

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Imperial County Land Use Code, Title 9, Division 17, Chapter 1, Section 91701.01; Chapter 2, Sections 91702.00.	Requirements pertaining to soil investigations. Specific standards regulations regarding protection of usable agricultural land and erosion control measures. Grading permit required.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County General Plan, Policy	Landscaping should be required in all developments to prevent erosion on graded sites and, if the area is contiguous with undisturbed wildlife habitat, the plan should include revegetation with native plant species.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County General Plan, Section 5.3 Agriculture and Soils, Goal 1	Environmental resources shall be conserved for future generations by minimizing environmental impacts in all land use decisions.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County General Plan, Section 5.3 Agriculture and Soils, Goal 4, Objective 4.2	The County will actively conserve and maintain contiguous farmlands and prime soil areas to maintain economic vitality and the unique lifestyle of the Imperial Valley. Control and prevent soil erosion when possible.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County General Plan, Section 5.3 Agriculture and Soils, Goal 8	The County will conserve, protect, and enhance the water resources in the planning area.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County General Plan, Agricultural Element Goal 1	Preservation of Important Farmland.	Imperial County Planning/Building Department	Sections 5.11.5.3, 5.11.4.1, 5.11.2.3
Imperial County General Plan, Agricultural Element Goal 3	Limit the introduction of conflicting uses into farming areas, including residential development of existing parcels, which may create the potential for conflict with continued agricultural use of adjacent property.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County General Plan, Geothermal/Transmission Element, Goal 1	The County of Imperial supports and encourages the full, orderly, and efficient development of geothermal resources while at the same time preserving and enhancing where possible agricultural, biological, human, and recreational resources.	Imperial County Planning/Building Department	Section 5.11.5.3, 5.11.4.1, 5.11.2.3
Imperial County General Plan, Geothermal/Transmission Element, Goal 2	The County will minimize all impacts to agricultural lands and biological resources that could potentially result from the development of geothermal resources.	Imperial County Planning/Building Department	Section 5.11.5.3

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Imperial County General Plan, Agriculture and Soils, Goal 5	When planning and designing gen-tie lines, the County will consider impacts to agricultural lands, wildlife, and the natural desert landscape.	Imperial County Planning/Building Department	Section 5.11.5.3
Imperial County Air Pollution Control District Regulation VIII, Rules 800 through 806 - Requirements for Control of Fine Particulate Matter (PM10)	Regulation VII limits fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and man-made activities contributing to wind erosion.	Imperial County Air Pollution Control District	Sections 5.11.5.3, 5.11.5.1 (Air Quality)

5.11.5.1 Federal LORS

5.11.5.1.1 Federal Clean Water Act Pollution Control Act of 1972; Clean Water Act of 1977 (including its 1987 amendments).

The CWA establishes requirements for discharges of stormwater or wastewater from any point source that would affect the beneficial uses of waters of the United States. Section 402 of the CWA effectively prohibits discharges of stormwater from construction sites unless the discharge is in compliance with an NPDES permit. These authorities establish requirements for any facility or activity that has or that will discharge wastes (including sediment because of accelerated erosion) that may interfere with the beneficial uses of receiving waters.

The administering agency is the RWQCB, Colorado River Basin, Region 7 under the direction of the SWRCB, which regulate stormwater discharges associated with construction activity (SWRCB 2012) for projects resulting in one or more acres of soil disturbance. BRGP would result in a disturbance of more than one acre of soil. Therefore, the Project would need to be covered under the General Construction Permit (SWRCB 2012) and the applicant will develop and implement a site-specific SWPPP to meet permit requirements. Project requirements are described in greater detail in Section 5.11.4.

5.11.5.1.2 U.S. Department of Agriculture, Soil Conservation Service, National Engineering Handbook (1983), Sections 2 and 3.

The USDA prescribes standards of technical excellence for the planning, design, and construction of soil conservation practices. The administering agency for the above authority is the NRCS.

Sections 2 and 3 of the USDA NRCS National Engineering Handbook (NRCS 1983) provide standards for soil conservation during planning, design, and construction activities. The Applicant will adhere to the appropriate standards associated with the planning, design, and construction of soil conservation practices.

5.11.5.2 State LORS

5.11.5.2.1 California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code, Division 7) is the State law governing water quality of all state waters, including both surface waters and groundwater. Under the Porter-Cologne Water Quality Control Act, SWRCB has the ultimate authority over water quality policy on a state-wide level, and nine RWQCBs establish and implement water quality standards specific for each respective region. The Colorado River RWQCB regulates water quality in the BRGP area. The Project is required to meet water quality standards that are identified in the Water Quality Control Plan for this region.

Because the Project will disturb greater than one acre of land, it will require an NPDES California General Construction Activity Storm Water Permit before discharging any storm water (also see Section 5.15, Water Resources). Among other things, this permit requires the management of erosion and soil movement. In addition, industrial facilities in California with the potential to impact storm water discharges during operations are required to obtain an NPDES Permit Industrial Storm Water General Permit (SWRCB Order 97-03 DWQ) to ensure proper management and reduction of potential pollutants in runoff resulting from those operations. However, because power plants are exempt from coverage under the General NPDES storm water permit during operation (SWRCB 1993), and because all runoff at the Project site will be contained on site, no operation phase NPDES permit will be required.

5.11.5.2.2 Warren-Alquist Act, PRC, Section 25000 et seq.

The CEC has a one-stop permitting process for all thermal power plants rated 50 MW or more under the Warren-Alquist Act (Pub. Resources Code § 25500 et seq.). Under the act, the Energy Commission's certificate is "in lieu of" other state, local, and regional permits (ibid.).

CEC's in-lieu permitting authority for state and local permits also applies to non-federal Waste Discharge Requirements adopted by the California RWQCB.

Commission staff coordinates the environmental review of Project applications and amendment petitions with the RWQCB and other state and local agencies and incorporates into its analysis all non-federal Waste Discharge Requirements and other non-federal requirements that might otherwise be adopted by the RWQCB and other non-federal agencies.

5.11.5.2.3 California Environmental Quality Act, California Public Resources Code §21000 *et. seq*.; Guidelines for Implementation of the California Environmental Quality Act of 1970, 14 CCR §15000 - 15387, Appendix G.

The CEQA guidelines specify that: "A project will normally have a significant effect on the environment if it will … Cause substantial flooding, erosion or siltation; …Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural lands."

The administering agency for the above authority is the CEC.

5.11.5.2.4 California Land Conservation Act (Williamson Act). Cal. Government Code Title 5, Part 1, Chapter 7 Section §§51200-51295.

The Williamson Act provides for lowered property taxes for lands maintained in agricultural and certain open space uses. The landowner enters into a contract with the county or city to restrict land uses to those compatible with agriculture, wildlife habitat, scenic corridors, recreational use, or open space. In return, the local authorities calculate the property tax assessment based on the actual use of the land instead of its potential value assuming full commercial development. To be eligible, the land must be designated by a city or county as an agricultural preserve, scenic highway corridor, or wildlife habitat area; or it must be actively used for the three years immediately preceding the beginning of the contract as a salt pond, managed wetland, recreational or open space area.

The administering agency for the above authority is the Department of Conservation, Office of Land Conservation.

The BRGP does not include land requiring cancellation of any Williamson Act contracts.

5.11.5.2.5 Surface Mining and Reclamation Act of 1975, PRC, Division 2, Chapter 9, Section 2710 et seq.

The SMARA of 1975 (PRC, Sections 2710-2796) provides a comprehensive surface mining and reclamation policy for the regulation of surface mining operations to assure that adverse environmental impacts are minimized and mined lands are reclaimed to a usable condition. SMARA also encourages the production, conservation, and protection of the state's mineral resources. PRC Section 2207 provides annual reporting requirements for all mines in the state, under which the SMGB is also granted authority and obligations.

The County enacts ordinances to implement SMARA at the local level and to act as lead agency for the issuance of permits, development of reclamation plans, and is the holder of reclamation financial assurances.

5.11.5.2.6 Title 14, CCR, Division 2, Chapter 8, Subchapter 1, State Mining and Geology Board Reclamation Regulations, Section 3500 et seq.

SMARA Chapter 9, Division 2 of the PRC, requires the SMGB to adopt State policy for the reclamation of mined lands and the conservation of mineral resources. These policies are prepared in accordance with the Administrative Procedures Act, (Government Code) and are found in California Code of Regulations, Title 14, Division 2, Chapter 8, Subchapter 1.

The administering agency for the above authority is the Imperial County Planning/Building Department.

5.11.5.3 Local LORS

5.11.5.3.1 Imperial County Land Use Code, Title 9, Division 3, Chapter 1, Sections 90301.02, 90301.03; Chapter 2, Section 90302.13

This County ordinance establishes development standards including dust control measures for implementation during construction and grading activities. It requires submittal of a Plot Plan to the Imperial County Planning/Building Department for approval before obtaining a grading permit. The Plot Plan must include a map showing graded topography. Upon approval of the Plot Plan, a Grading Plan must be submitted that includes a topographic map showing sloped areas. This ordinance also establishes that a Soils Report may be required, which includes soil infiltration, soil texture test, cation exchange capacity, and soil fertility test.

The administering agency is the Imperial County Planning/Building Department.

5.11.5.3.2 Imperial County Land Use Code, Title 9, Division 10, Chapter 10.

Imperial County's grading ordinance incorporates regulations pertaining to excavation, grading, and construction. This section of the ordinance also identifies procedures and requirements for applying for a construction permit.

No person, firm, association, corporation or organization except public entities and their officers, employees or contractors who are performing work within publicly owned ROWs, shall, within the unincorporated territories of the County of Imperial, do any grading, excavation or earthwork construction without having first obtained a permit from the County Engineer.

Application for a permit must include drainage systems, protective devices, and existing and proposed elevations. Permit Conditions establish that 1) proposed grading, excavation, or earthwork will not cause the land to be unfit for agricultural use; 2) the depth of grading, excavation, or earthwork will not preclude the use of drain tile in irrigated lands; and 3) the grading, excavation, or earthwork construction cannot extend below the water table of the immediate area.

The administering agency is the Imperial County Planning/Building Department.

5.11.5.3.3 Imperial County Land Use Code, Title 9, Division 17, Chapter 1, Section 91701.01; Chapter 2, Section 91702.00 -91702.02

This chapter establishes regulations to facilitate the beneficial use of the geothermal resource for the general welfare of the people of Imperial County and California; to protect the resource from wasteful or detrimental uses and to protect people, property, and the environment from detriments that might result from the improper use of the resource. Item "M" of Section 91701.01 requires that a geotechnical investigation of soil characteristics affecting a project shall be performed, as determined by the Planning Director. Item "R" of Section 91701.01 establishes that geothermal projects shall provide for the minimum feasible surface land usage of the Project, preserve farmland and wildlife habitat according to the General Plan, and be compatible with the existing uses wherever possible.

Chapter 2, Section 91702.00 Specific Standards requires that all drilling sites, test facilities, and ponds be as small as possible and in no case larger than five acres on farmable land. Every site shall be designed to retain the maximum amount of usable agricultural land and the site shall not interfere with the irrigation and drainage pattern, and shall comply with requirements and regulations of the IID.

The administering agencies for the above authority are the Imperial County Planning/Building Department.

5.11.5.3.4 Imperial County General Plan

Open Space and Conservation Element

Conservation of Environmental Resources for Future Generations

Goal 1: Environmental resources shall be conserved for future generations by minimizing environmental impacts in all land use decisions.

Preservation of Agricultural Lands

Goal 4: The County will actively conserve and maintain contiguous farmlands and prime soil areas to maintain economic vitality and the unique lifestyle of the Imperial Valley.

Objective 4.2 - Control and prevent soil erosion when possible.

Preservation of Water Resources

Goal 8: The County will conserve, protect, and enhance the water resources in the planning area.

Biological Resource Conservation Preservation

Policy 2 – Landscaping should be required in all developments to prevent erosion on graded sites, and if the area is contiguous with undisturbed wildlife habitat, the plan should include revegetation with native plant species.

Agricultural Element

Preservation of Important Farmland

Goal 1: All Important Farmland, including the categories of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance, as defined by Federal and State agencies, should be reserved for agricultural uses.

Goal 3: Limit the introduction of conflicting uses into farming areas, including residential development of existing parcels, which may create the potential for conflict with continued agricultural use of adjacent property.

Geothermal/Transmission Element

Goal 1: The County of Imperial supports and encourages the full, orderly, and efficient development of geothermal resources while at the same time preserving and enhancing where possible agricultural, biological, human, and recreational resources

Goal 2: The County will minimize all impacts to agricultural lands and biological resources that could potentially result from the development of geothermal resources.

Goal 5: When planning and designing gen-tie lines, the County will consider impacts to agricultural lands, wildlife, and the natural desert landscape.

5.11.5.3.5 Imperial County Air Pollution Control District Regulation VIII, Rules 800 through 806 - Requirements for Control of Fine Particulate Matter (PM10)

The purpose of this regulation is to reduce the amount of fine Particulate Matter (PM10) entrained in the ambient air as a result of emissions generated from anthropogenic (man-made) Fugitive Dust (PM10) sources generated from within Imperial County by requiring actions to prevent, reduce, or mitigate PM10 emissions. The Rules contained within this Regulation have been developed pursuant to EPA guidance for Serious PM10 Non-Attainment Areas.

5.11.6 Agencies and Agency Contacts

Applicable permits and agency contacts for soils are shown in Table 5.11-4.

Table 5.11-4. Permits and Agency Contacts for Soils

Permit or Approval	Agency Contact	Applicability
NPDES Permitting; Notice of Intent (NOI), NPDES General Construction Storm Water Permit Waste Management Unit Permit (brine pond) Waste Discharge Requirements	John Carmona Water Quality Control Board Colorado River Basin Region 73-720 Fred Waring Drive, Suite 100 Palm Desert, CA 92260 JCarmona@waterboards.ca.gov 760-340-4521	NPDES Permit governing Storm Water Discharges Associated with Construction Activity for any disturbance of greater than one acre
Permit Imperial County Grading and Stormwater s	John Gay Director of Public Works johngay@co.imperial.ca.us	Grading and Drainage Construction
Imperial County Building Permit	Sergio Rubio Building Division Manager sertgiorubio@co.imperial.ca.us	Building Permit
Air Quality Permits	Brad Poiriez Air Pollution Control Officer Imperial County Air Pollution Control District 150 S. 9th Street El Centro, CA 92243 bradpoiriez@imperialcounty.net (760) 482-4606	IPAPCD Regulation VIII Compliance. The Applicant will comply with the Regulation by implementing BMPs to minimize wind erosion, as described in the preliminary DESCP.

Note:

DESCP = Drainage, Erosion, and Sediment Control Plan

5.11.7 Permits and Permit Schedule

It is expected that all the required ministerial permits for grading, building, and development can be secured as long as completed applications are provided to the appropriate agency prior to construction. The grading and building permits would be started after receiving approval from the planning department for the Project. Other permits that relate to soils, such as the NPDES, UIC Permit, Waste Discharge Requirements, and SMARA are evaluated in other sections (refer to Section 5.15, Water Resources and Section 5.4 Geological Hazards).

5.11.1 References

California Energy Commission. 2010. *Black Rock 1, 2, and 3 Geothermal Power Project – Major Amendment.*

California Energy Commission. 2009. *Amended Salton Sea Unit 6 Project*.

California Energy Commission. 2003. *Decision approving the Salton Sea Geothermal Unit 6 (now Black Rock 1, 2, 3) Power Plant Application for Certification*, Docket No. 02-AFC-2, Imperial County, published on December 19, 2003.

CH2M Hill. 2002. *IID Water Conservation and Transfer Project/ Draft Habitat Conservation Plan*, Draft EIR/EIS, January 2002.

Imperial County. January 2015. *Draft Programmatic Environmental Impact Report Renewable Energy & Transmission Element Update*.

Imperial County. July 2015. *Final Programmatic Environmental Impact Report Renewable Energy & Transmission Element Update*.

Imperial County. October 2015. *Imperial County Final Renewable Energy and Transmission Element*.

Imperial County. 2022. *Code of Ordinances, Title 9, Division 17, Final Renewable Energy Resources Ordinance*.

Landmark Consultants, Inc., 2022. *Proposed Black Rock Geothermal Power Plant Geotechnical Report*.

Signorotti, Vince. 2002. CalEnergy. Personal Communication. May 24, 2002.

United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS). *Web Soil Survey*. Available online: http://websoilsurvey.nrcs.usda.gov/. Accessed September 3, 2022.

United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS). *Official Soil Series Descriptions*. Available online: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/home/?cid=nrcs142p2_053587. Accessed September 3, 2022.

U.S. Department of Agriculture National Resources Conservation Service (USDA NRCS). *Soils Index Map* (1:24,000 scale). Accessed September 2022.

U.S. Department of Agriculture National Resources Conservation Service (USDA NRCS). *Important Farmland Maps* (1:24,000 scale). Accessed September 2022.

5.12 Traffic and Transportation

This section addresses the potential effects of the Black Rock Geothermal Project (BRGP or Project) on traffic and transportation. Section 5.12.1 describes the affected environment of the local and regional traffic and transportation routes surrounding the Project site. Section 5.12.2 presents the environmental analysis of the Project's effects on local traffic volumes and patterns. Section 5.12.3 evaluates potential cumulative effects on traffic and transportation because of other, simultaneous projects. Section 5.12.4 describes mitigation measures for the Project. Section 5.12.5 describes applicable laws, ordinances, regulations, and standards (LORS). Section 5.12.6 lists the applicable regulatory agencies and contacts. Section 5.12-7 discusses traffic and transportation permits required. Section 5.12.8 lists the references used to prepare this section.

5.12.1 Affected Environment

The proposed site is located adjacent to the Salton Sea and within the Salton Sea Known Geothermal Resource Area. The BRGP will provide approximately 77 megawatts net output. The Project will be located on approximately 55 acres of a 160-acre parcel within the unincorporated area of Imperial County, California, and is bounded by McKendry Road to the north, Severe Road to the west, and Boyle Road to the east. The town of Niland is approximately eight miles to the northeast, and the town of Calipatria is approximately six miles southeast of the Project site. The surrounding area consists of actively farmed fields as well as other geothermal plants located throughout the area, (including the Vulcan Power Plant and the Hoch (Del Ranch) Power Plant, both located to the southeast of the site). The Project consists of the geothermal power plant and associated infrastructure, including seven new well pads and associated production and injection wells. In addition, the Project includes up to 15 potential construction crew camps, laydown and parking areas located throughout the region, and up to four borrow pits. Most of the laydown and parking areas for BRGP will be located adjacent to the site immediately south and east. However, all 15 sites may be used and will be shared between three proposed projects: BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project. BRGP construction and commissioning activities are expected to take approximately 29 months, beginning in the second quarter of 2024. Preoperational testing of the power plant is expected to begin in approximately the second quarter of 2026, and full-scale commercial operation is expected to begin by June 2026.

5.12.1.1 Existing Regional and Local Transportation Facilities

The surrounding regional and local roadway networks are shown on Figures 5.12-1 and 5.12-2. The roadway network that serves Imperial County within the vicinity of the site is essentially a grid system of north-south and east-west roads. The majority of the roadways surrounding the Project site, including the direct access roadway and bordering roadways, are unpaved roads. Regional access to the site is provided from State Route 111 (SR 111) and SR 78.

The site is located southwest of the intersection of McKendry Road and Boyle Road. Primary access to the site is from SR 78 and SR 111. From SR 78, access to the site is via Lack Road, Gentry Road, and McKendry Road. From SR 111, access to the site is via Sinclair Road and Boyle Road. During construction and operations/maintenance, vehicles traveling to the site may use the roadways described in the following sections.

5.12.1.1.1 State Route 111

SR 111 is a north-south highway that roughly parallels the eastern side of the Salton Sea. Access from SR 111 to the site is provided via Sinclair Road. North and south of the city of Calipatria, SR 111 is one travel lane per direction. As SR 111 approaches the center of Calipatria at Main Street or SR 115, it widens to two travel lanes per direction with a left-turn lane at the intersections. According to traffic counts conducted in October 2022 (with adjustments to account for the change of travel caused by the COVID-19 pandemic), the average daily traffic volume on SR 111 south of the Sinclair Road intersection is 3,500 vehicles/day. Trucks are approximately 18% of all traffic based on data published by the California Department of Transportation (Caltrans) in 2019.

5.12.1.1.2 State Route 78 and State Route 86

SR 86 and SR 78 combine as an east-west highway that roughly parallels the southwest side of the Salton Sea in the vicinity of the Project site. SR 78/SR 86 has two travel lanes per direction, with turn lanes at crossing minor streets. Access from SR 78/SR 86 to the site is provided via Lack Road near the City of Westmorland. According to the traffic counts published by Caltrans in 2019, the average daily traffic volume on SR 78 ranges from 13,000 to 19,000 vehicles per day. Trucks are approximately 30% of all traffic.

5.12.1.1.3 Sinclair Road

Sinclair Road is a two-lane minor collector roadway. It has an east-west alignment. Sinclair Road connects to the Project site via Boyle Road to SR 111.

5.12.1.1.4 Boyle Road

Boyle Road is an unpaved two-lane minor collector roadway. It has a north-south alignment and borders the west portion of the Project site. Boyle Road connects to the Project site via Sinclair Road to SR 111 and via Gentry Road to SR 78/SR 86.

5.12.1.1.5 McKendry Road

McKendry Road is an unpaved two-lane minor collector roadway. It has an east-west alignment and borders the north portion of the Project side. McKendry Road connects to the Project site via Sinclair Road to SR 111 and via Gentry Road to SR 78/SR 86.

5.12.1.1.6 Gentry Road

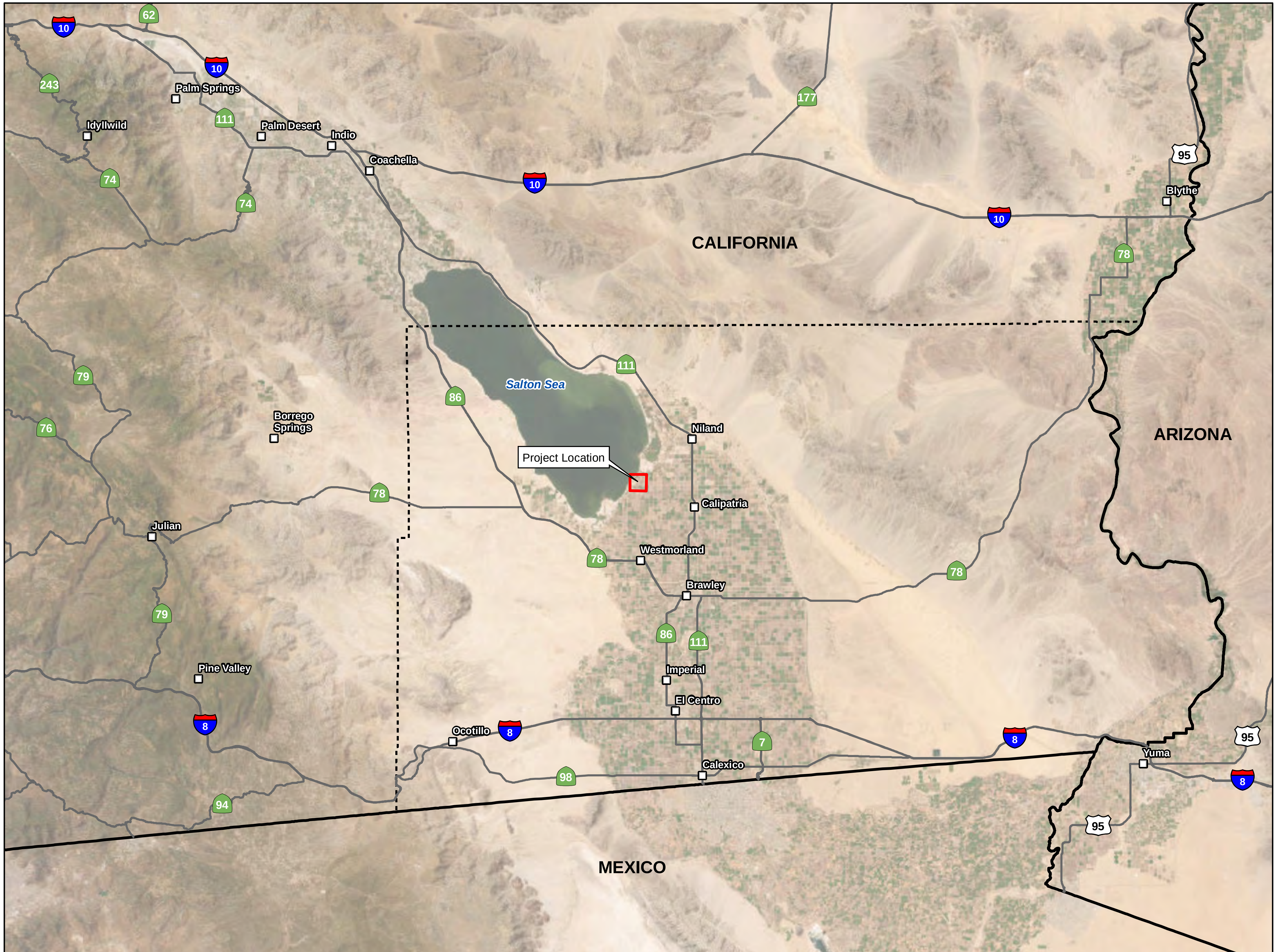
Gentry Road is a two-lane minor collector roadway. It has a north-south alignment. Gentry Road connects to the Project site via Forrester Road to SR 78/SR 86.

5.12.1.1.7 Brandt Road

Brandt Road is classified as a two-lane minor collector. It has a north-south alignment. Brandt Road connects the Project site to SR 78 and SR 111.

5.12.1.2 Existing Traffic Conditions and Level of Service Analysis

The traffic analysis for BRGP was conducted according to the methodologies and procedures outlined in the *Highway Capacity Manual* (HCM), 6th Edition (Transportation Research Board 2016), and applicable provisions from the California Environmental Quality Act (CEQA). The HCM 6th Edition assesses the performance of street and highway systems and the capacity of roadways and intersections by measuring the flow of traffic. Level of Service (LOS) is a qualitative assessment of the quantitative effects of such factors as traffic volume, roadway geometrics, speed, delay, and maneuverability on roadway and intersection operations. LOS is measured by six operating categories, LOS A to LOS F, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst.



Legend

- City or Town
- Major Road
- Imperial County Boundary
- State or National Boundary

N

0 5 10 20
Miles

Figure 5.12-1
Regional Roadway Network
Black Rock Geothermal Project
Imperial County, California

Jacobs

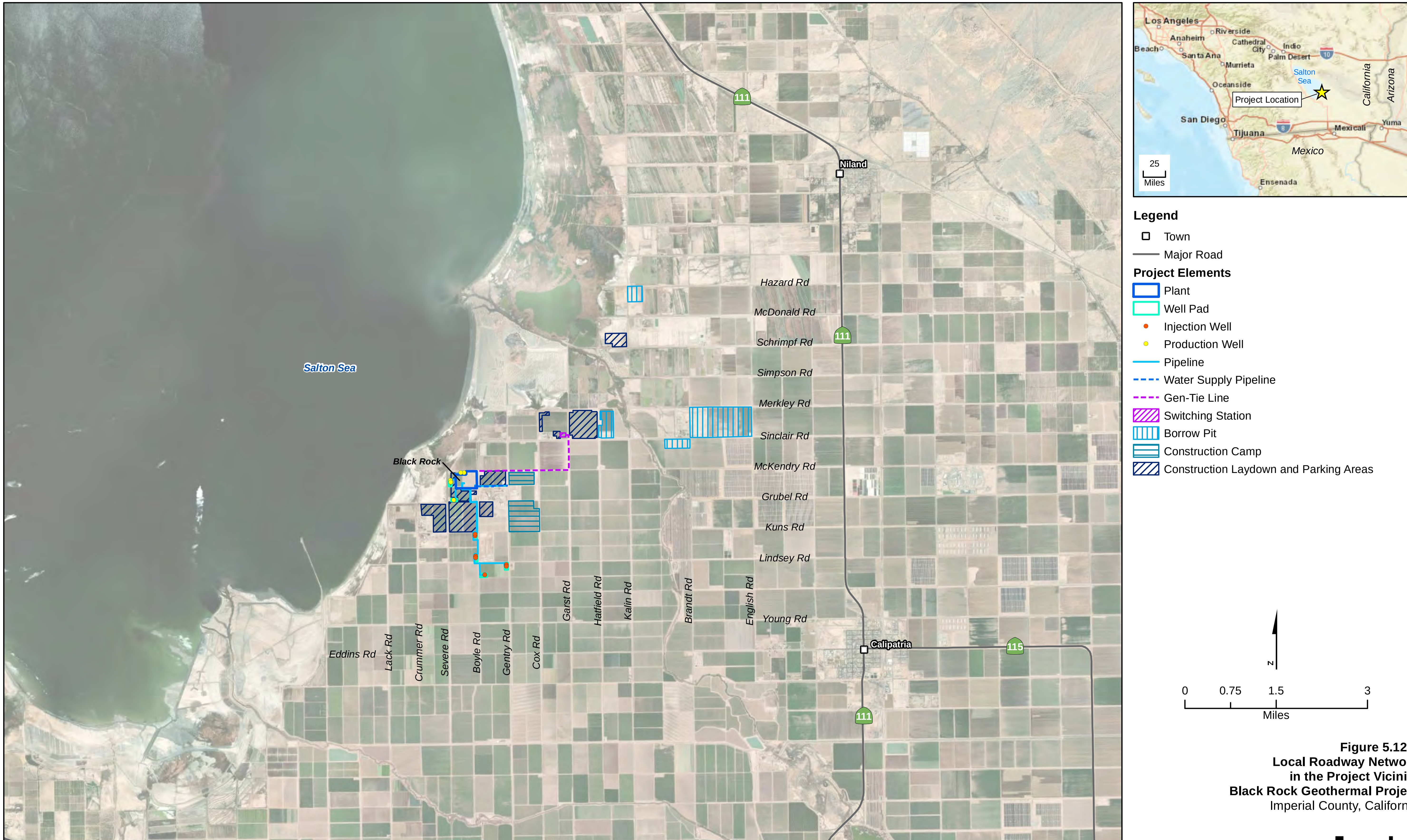


Figure 5.12-2
Local Roadway Network
in the Project Vicinity
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Transportation\BR\Figure_5.12-2_230206.mxd

The LOS requirements in the Circulation and Scenic Highways Element of the *Imperial County General Plan* (Imperial County 2008) specify LOS C as the minimum operating criteria on all roadway segments and intersections. Caltrans has identified a target LOS at the transition between LOS C and LOS D on state highway facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. For this analysis, mitigation measures should be considered when traffic conditions are forecasted at LOS D or worse on state highway facilities.

Table 5.12-1 is a summary of roadway capacities by roadway classification as defined by *the Imperial County General Plan* Circulation and Scenic Highways Element (Imperial County 2008). The volume/capacity (V/C) ratio is an indicator of traffic conditions, and the resulting V/C determines if the roadway is operating under capacity or over capacity. For this analysis, per Imperial County LOS requirement, LOS C capacity is used for the roadway segment analysis.

Table 5.12-1. Road Lanes and Capacity

Roadway Type	Number of Lanes/ X-Section (feet)	LOS C Daily Capacity	LOS D Daily Capacity	LOS E Daily Capacity
Minor Arterial	4 lanes/82/102	29,600	33,400	37,000
Minor Collector	2 lanes/40/70	7,100	10,900	16,200

Source: Imperial County 2008

Table 5.12-2 is a summary of traffic flow characteristics for LOS at unsignalized intersections based on the HCM 6th Edition method (Transportation Research Board 2016). The HCM 6th Edition defines six LOS, ranging from LOS A to LOS F, for each service measure to combination of service measures.

Table 5.12-2. LOS Criteria for Signalized and Unsignalized Intersection Operations

LOS	Average Control Delay (Signalized) (seconds per vehicle)	Average Control Delay (Unsignalized) (seconds per vehicle)
A	≤ 10.0	≤ 10.0
B	10.0 to 20.0	10.1 to 15.0
C	20.1 – 35.0	15.1 to 25.0
D	35.1 – 50.0	25.1 to 35.0
E	50.1 – 80.0	35.1 to 50.0
F	> 80.1	> 50.1

Source: Transportation Research Board 2016

5.12.1.2.1 Existing Roadway Conditions

Existing roadway conditions were evaluated for the following roadways:

- SR 111
- Sinclair Road
- Gentry Road
- Brandt Road
- SR 78/SR 86

Traffic volumes were obtained from traffic counts published by Caltrans in 2019 and field counts conducted in October 2022. Field traffic counts were collected for 2 days during the weekday. Table 5.12-3 is a summary of the daily traffic volumes and V/C ratios for existing conditions. All study roadway segments operate below the LOS C capacity.

Table 5.12-3. Existing Roadway Segment LOS Analysis Summary

Roadway	Segment Between	And	Number of Lanes	LOS C Capacity	ADT	V/C
SR 111	Niland Avenue	McDonald Road	2	7,100	4,000	0.56
	McDonald Road	Sinclair Road	2	7,100	4,000	0.56
	Sinclair Road	Hoober Road	2	7,100	4,000	0.56
Sinclair Road	SR 111	English Road	2	7,100	600	0.08
	English Road	Brandt Road	2	7,100	800	0.11
	Brandt Road	Garst Road	2	7,100	800	0.11
	Garst Road	Gentry Road	2	7,100	800	0.11
Gentry Road	Sinclair Road	McKendry Road	2	7,100	1,000	0.14
	McKendry Road	Lindsey Road	2	7,100	1,000	0.14
	Lindsey Road	Young Road	2	7,100	1,000	0.14
Brandt Road	Sinclair Road	Hoober Road	2	7,100	300	0.04
SR 78/SR 86	SR 78/SR 86 Junction	Forrester Road	4	29,600	20,800	0.70

Sources: Caltrans 2019a

ADT = average daily traffic

5.12.1.2.2 Existing Intersection Conditions

The LOS information was reviewed to assess the general operating conditions in the study area. LOS was obtained for the following intersections:

- SR 111 and Sinclair Road
- SR 111 and Main Street

Traffic volumes at the intersections were collected in October 2022. Traffic counts were collected for 2 days during the weekday morning period of 5:00 a.m. to 8:00 a.m. and afternoon period of 4:00 p.m. to 8:00 p.m. The existing intersection LOS is summarized in Table 5.12-4. The study intersections operate at LOS C or better during both peak hours.

Table 5.12-4. Existing (2015) Intersection LOS Summary

	AM Peak Hour		PM Peak Hour	
Intersection	Delay	LOS	Delay	LOS
SR 111 and Sinclair Road	11	B	10	B
SR 111 and Main Street	18	C	13	B

5.12.1.3 Truck Routes—Weight and Load Limitations

Within Imperial County, transportation permits for operating any oversize or overweight vehicles are required. Oversize or overweight is defined as any vehicle or combination of vehicles or special mobile equipment that exceeds the size or weight specified in Sections 35000 through 35796 of the California Vehicle Code (CVC). The maximum gross weight for a vehicle is 80,000 pounds. The maximum axle weight for a single axle is 20,000 pounds. A permit from Imperial County would allow vehicles to use the streets approved in the permit application. Specific truck routes within the County are not identified.

5.12.1.4 Future Roadway Plans and Projects

No major roadway projects are scheduled within the vicinity of the BRGP site.

5.12.1.5 Pedestrian and Bicycle Facilities

The Imperial County Transportation Commission (ICTC) *Regional Active Transportation Plan* proposes countywide Class I, II, and III bicycle routes. In the Project vicinity, Class II bicycle lanes are planned along SR 111, Sinclair Road, and Gentry Road. A Class II bicycle lane is marked by pavement markings or barriers. Vehicle parking, crossing, and turning movements are permitted within the Class II bicycle route. There are no bicycle pavement barriers or markings on SR 111, Sinclair Road, and Gentry Road at present.

Currently, there are no roadways with sidewalks within the vicinity of the Project site. The *Imperial County Pedestrian Master Plan* proposes to create an integrated network of pedestrian facilities, focusing on six unincorporated communities of the County (Herber, Niland, Ocotillo, Salton Sea City, Seeley, and Winterhaven). The Project site is not within the six unincorporated communities, so there are no future plans for sidewalks within the vicinity of the Project site.

5.12.1.6 Public Transportation

Imperial Valley Transit (IVT) is the public transit service serving Imperial County. Bus services provided by IVT include fixed routes, deviated fixed routes, and remote zone routes. IVT serves all of the cities in the County as well as the communities of Bombay Beach, Niland, Seeley, and Herber. As of 2021, IVT services include 14 total routes throughout the County, 15 transit stops in the Imperial County Census Designated Places, and 128 transit stops in the seven cities.

The Project site is not within the Fixed Route Transportation System, so it would not receive regular bus services to the Project site or within the vicinity of the Project site. The nearest IVT bus stop is on SR 111 and Main Street in Niland and SR 111 and Main Street in Calipatria.

5.12.1.7 Rail Traffic

The Southern Pacific Railroad mainline traverses Imperial County in a northwesterly direction from the Arizona border near Winterhaven toward Riverside County to the north. The closest railroad alignment to the Project site is the southerly branch of the Southern Pacific line originating from the mainline in Niland and traveling to Calipatria. These tracks run parallel to SR 111 approximately 7 miles east of the site.

5.12.2 Environmental Analysis

This subsection assesses the traffic and transportation effects associated with the BRGP. This analysis examines effects on roadway and intersection LOS expected during the construction and operation of the Project.

Construction of the Project will result in temporary increases in traffic associated with the movement of construction vehicles, equipment, and personnel on transportation facilities serving the Project area. Construction is expected to start in the second quarter of 2024 and last 29 months. Facility operations will begin shortly after than in the third quarter of 2026 while commissioning activities continue.

During the peak construction period, construction will require a maximum of up to 426 workers and 13 delivery/haul trucks per day. During operations, the Project is expected to require 61 staff and a total of 63 trucks per day to support daily operations and maintenance of the facility.

5.12.2.1 Significance Criteria

The significance criteria have been developed using guidance provided in CEQA Appendix G (Title 14, California Code of Regulations [CCR], Section 15000 et seq.) and relevant local policies. Effects of the proposed Project on transportation and circulation will be considered significant if the following criteria are met:

Threshold (a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

Threshold (b) Conflict or be inconsistent with CEQA guidelines Section 15064.3, Subdivision (b).

Threshold (c) Substantially increase hazards due to a geometric design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment).

Threshold (d) Result in inadequate emergency access.

Threshold question (a): Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?

The County of Imperial does not have published significance criteria for circulation. However, the *Imperial County General Plan* does state that the LOS goal for intersections and roadway segments is to operate at LOS C or better. Therefore, if an intersection or segment degrades from LOS C or better to LOS D or worse with the addition of Project traffic, the impact is considered significant.

Table 5.12-5 is a list of specific policies contained in the *Imperial County General Plan* associated with transportation and traffic.

Table 5.12-5. Imperial County General Plan Policies

Circulation and Scenic Highway Element	Consistency	Notes
Safe, Convenient, and Efficient Transportation System		
Goal 1 – The County will provide and require an integrated transportation system for the safe and efficient movement of people and goods within and through the County of Imperial with minimum disruption to the environment.	Consistent	A traffic analysis was conducted for the Project. The analysis examined the effects of the Project during construction and operation on the surrounding transportation system. Based on the analysis, the surrounding roadways and intersections with the addition of Project traffic are expected to operate at LOS C. The Project would apply for a transportation permit to operate any oversize or overweight vehicles during construction and operation of the Project. In addition, the Project would comply with applicable requirements in transporting hazardous materials. Therefore, the Project is consistent with this objective.
Objective 1.1 – Maintain and improve the existing road and highway network, while providing for future expansion and improvement based on travel demand and the development of alternative travel modes.	Consistent	A traffic analysis was conducted for the Project. The analysis examined the effects of the Project during construction and operation on the surrounding transportation system. Based on the analysis, the surrounding roadways and intersections with the addition of Project traffic are expected to operate at LOS C. The resulting LOS maintains the existing road and highway network surrounding the Project site. Therefore, the Project is consistent with this objective.

Circulation and Scenic Highway Element	Consistency	Notes
Objective 1.2 – Require a traffic analysis for any new development which may have a significant impact on County roads. A traffic analysis may not be necessary in every situation, such as when the size or location of the project will not have a significant impact upon and generate only a small amount of traffic. Also, certain types of projects, due to the trip generation characteristics, may add virtually no traffic during peak periods. These types of projects may be exempt from the traffic analysis requirements. Whether a particular project qualifies for any exemption will be determined by the Department of Public Works Road Commissioner.	Consistent	A traffic analysis was conducted for the Project. The analysis examined the effects of the Project during construction and operation on the surrounding transportation system. Therefore, the Project is consistent with this objective.

5.12.2.1.1 Construction Traffic

Construction Traffic Generation

An estimate of peak construction traffic during the 29-month construction period was developed based on the size of the workforce and construction activities. The construction trip estimates are presented in Table 5.12-6.

Table 5.12-6. Construction Trip Generation

		AM Peak Hour			PM Peak Hour		
Trip Type	ADT	In	Out	Total	In	Out	Total
Delivery/Haul Trucks	26	3	5	8	0	8	8
Delivery/Haul Trucks PCE (1.5)	39	5	8	13	0	13	13
Workers (two passengers/car)	426	213	0	213	0	213	213
Total Construction Traffic in PCE	465	230	8	238	0	238	238

Note:

Assumed each truck = 1.5 passenger car equivalents (PCEs).

During construction, up to 426 workers would access the Project site each working day. Because it is assumed that construction employees would be recruited locally and would stay in hotels and RV campsites in nearby cities, workers would carpool (ride with others), resulting in 426 daily trips. It is assumed that majority of the worker trips will arrive during the AM peak hour and depart the site during the PM peak hour. The remaining worker trips will occur throughout the day.

During the peak construction month, there will be a total of 13 trucks that would access the Project site each working day resulting in 26 delivery/haul truck trips per day. Of these, it is assumed that eight truck trips will arrive and depart the site during the peak hours. The remaining truck trips will occur throughout the day. For purposes of this analysis, the truck trips were converted to PCE trips at a ratio of 1.5 passenger cars for each truck, consistent with HCM guidelines.

Construction Traffic Distribution

It is assumed that all workers commuting daily would come from within Imperial County. Workers currently residing locally within the County would be expected to commute from their residences while many temporary workers from outside the County would be housed temporarily in hotels/rentals/trailer parks/campgrounds during the work week. The following assumptions were for construction workforce origins when accessing the Project construction laydown and parking areas as shown on Figure 5.12-2:

- 15% of the Project workforce would originate from Niland and areas to the north (Indio and nearby communities)
- 45% of the Project workforce would originate from the Calipatria and Westmorland areas
- 40% of the Project workforce would originate from farther south, including Brawley, El Centro, and Imperial

During the AM peak hour, workers accessing the Project site from the north would travel southbound on SR 111 to Sinclair Road to the Project construction laydown and parking areas. Workers accessing the Project site from the south and from the Calipatria and Westmorland area would either travel on SR 111 to Sinclair Road to the Project construction laydown and parking areas or use Gentry Road and Brandt Road to reach the Project construction laydown and parking areas.

Regional sources of construction materials would use designated heavy haul routes to deliver the materials to the Project site. Local haul routes include SR 111, SR 78/SR 86, Sinclair Road, and Gentry Road.

Roadway LOS with Construction Traffic

The daily traffic volumes generated during the BRGP peak construction period were added to the existing traffic volumes on each roadway segment and the V/C ratio was calculated. The roadway segment analysis with the Project traffic is summarized in Table 5.12-7. Based on the analysis, the roadway segments are forecast to operate acceptably (LOS C or better) with the addition of construction traffic.

Table 5.12-7. Construction Condition Roadway Segment LOS Analysis Summary

Roadway	Segment Between	And	LOS C Capacity	Existing ADT	Const. Traffic Added	Const. Condition ADT	V/C	LOS C or Better?
SR 111	Niland Avenue	McDonald Road	7,100	4,000	90	4,090	0.58	Yes
	McDonald Road	Sinclair Road	7,100	4,000	90	4,090	0.58	Yes
	Sinclair Road	Hoober Road	7,100	4,000	110	4,110	0.58	Yes
Sinclair Road	SR 111	English Road	7,100	600	200	800	0.11	Yes
	English Road	Brandt Road	7,100	800	200	1,000	0.14	Yes
	Brandt Road	Garst Road	7,100	800	310	1,110	0.16	Yes
	Garst Road	Gentry Road	7,100	800	310	1,110	0.16	Yes
Gentry Road	Sinclair Road	McKendry Road	7,100	1,000	310	1,310	0.18	Yes
	McKendry Road	Lindsey Road	7,100	1,000	200	1,200	0.17	Yes
	Lindsey Road	Young Road	7,100	1,000	200	1,200	0.17	Yes

Roadway	Segment Between	And	LOS C Capacity	Existing ADT	Const. Traffic Added	Const. Condition ADT	V/C	LOS C or Better?
Brandt Road	Sinclair Road	Hoober Road	7,100	300	110	410	0.06	Yes
SR 78/ SR 86	SR 78/ SR 86	Forrester Road	29,600	20,800	200	21,000	0.71	Yes

Const. = construction

Intersection LOS with Construction Traffic

The AM and PM peak-hour traffic generated during the construction period was added to the existing turning movement counts at the study intersections. The results of the existing and construction condition AM and PM peak-hour LOS analyses for all study intersections are summarized in Table 5.12-8. The two study area intersections would continue to operate at an acceptable LOS (LOS C or better) in the AM and PM peak hours with the addition of the Project construction traffic.

Table 5.12-8. Construction Condition Intersection LOS Summary

	AM Peak Hour		PM Peak Hour	
Intersection	Delay	LOS	Delay	LOS
SR 111 and Sinclair Road	11	B	10	B
SR 111 and Main Street	18	C	13	B

5.12.2.1.2 Operations and Maintenance Traffic

An estimate of operations and maintenance traffic was developed based on the Project site's typical day operations. The operations and maintenance trip estimates are presented in Table 5.12-9.

Table 5.12-9. Operations and Maintenance Trip Generation

		AM Peak Hour			PM Peak Hour		
Trip Type	ADT	In	Out	Total	In	Out	Total
Delivery/Haul/Maintenance Trucks	126	0	0	0	0	0	0
Delivery/Haul/Maintenance Trucks PCE (1.5)	189	0	0	0	0	0	0
Workers	122	40	21	61	21	40	61
Total Operations and Maintenance Traffic in PCE	311	40	21	61	21	40	61

Note:

Assumed each truck = 1.5 PCEs.

During operations and maintenance, it is estimated that 61 workers would access the Project site each working day, resulting in 122 daily operational workforce trips (61 trips twice per day) with two-thirds of the trips occurring during the day shift and one-third occurring during the night shift will be required onsite during operations of the Project for each working day. The facility will be capable of operation seven days per week, 24 hours per day. As a conservative assumption, it is assumed that all day shift staff will arrive and night shift staff will leave during the AM peak hour and the reverse would occur during the PM peak hour.

It is estimated that a total of approximately 63 trucks will access the Project site each working day, resulting in 126 delivery/haul/maintenance truck trips per day to support daily operations and maintenance of the facility. It is assumed that truck trips will occur throughout the day during off-peak hours to the Project site and to the Desert Valley Company Monofill landfill site. For purposes of this analysis, the truck trips were converted to PCE trips at a ratio of 1.5 passenger cars for each truck, consistent with HCM guidelines.

The operations and maintenance vehicle trip estimates are lower than those for peak construction traffic, so the traffic effects would be correspondingly lower.

Therefore, the proposed Project, during operation, maintenance, and construction, would not cause a substantial increase in traffic affecting the efficiency of the circulation system, including transit, roadway, bicycle, and pedestrian facilities and this impact is considered less than significant.

Threshold question (b): Conflict or be inconsistent with CEQA Guidelines Section 15064.3(b)?

Section 15064.3(b) of the CEQA Guidelines provides guidance on determining significance of transportation impacts and focuses on vehicle miles traveled (VMT). Pursuant to Senate Bill 743 (Steinberg 2013), the focus in evaluating transportation impacts under CEQA has shifted from traffic delays (i.e., LOS) to total VMT. The intent of SB 743 is to align transportation impacts under CEQA with the state's overall goals of increasing long-term sustainability by encouraging infill development, increasing reliance on mass transit, and reducing greenhouse gas emissions. The VMT analysis focuses on automobile and light-duty truck trips and excludes heavy truck trips.

5.12.2.1.3 Significance Threshold

Imperial County has not yet adopted its own threshold for VMT. The County is relying on the guidance provided in the Technical Advisory published by the Governor's Office of Planning and Research (OPR) in December 2018 (OPR Guidance) for the purpose of evaluating the potential VMT impacts of development projects. The OPR Guidance for VMT states that depending on the type of project, different thresholds of significance are applicable. The "Recommended Numeric Thresholds for Residential, Office, and Retail Project" section of the OPR Guidance includes a section on "Other Project Types," which applies to the Project:

> Of land use projects, residential, office, and retail projects tend to have the greatest influence on VMT. For that reason, OPR recommends the quantified thresholds described [in the Residential, Office, and Retail Project section] for purposes of analysis and mitigation. Lead agencies, using more location-specific information, may develop their own more specific thresholds, which may include other land use types.

For the purpose of evaluating the Project's potential VMT impact, the impact determination establishes if the VMT per employee is greater than the average VMT per capita for Imperial County. U.S. Census data (https://www.census.gov/) for Imperial County indicate that average commute distance is 21.8 miles. These data were used to estimate VMT per employee, as shown in Table 5.12-10. The average commute distance (or VMT per employee) was calculated using the average travel time to work for cities surrounding the Project site and Imperial County along with the average typical roadway and highway speeds. Based on the rural nature of Imperial County, assumed speeds on roadways and highways would range between 55 miles per hour (mph) to 65 mph.

Table 5.12-10. Calculation of VMT Significance Threshold

Location	Mean Travel Time to Work (minutes)	Imperial County Average VMT/Employee		
		55 mph	60 mph	65 mph
Indio City	22.9	21	22.9	24.8
Imperial City	19.5	17.9	19.5	21.1
Coachella City	22.9	21	22.9	24.8
Brawley City	21.6	19.8	21.6	23.4
Imperial County	22.0	20.2	22.0	23.8
Average	21.8	21.8		

5.12.2.1.4 Construction VMT Impacts

Although the proposed Project would increase VMT during the construction phase because of trips made by construction workers and transportation of construction material and equipment, these increases are temporary in nature and localized. Project construction is not anticipated to result in long-term, permanent changes to the surrounding vehicle transportation system.

5.12.2.1.5 Operations and Maintenance VMT Impacts

It is assumed that many workers would be recruited locally and come from cities within a 60-mile (commute travel time of approximately 60 minutes) radius from the Project site. This distance is primarily within Imperial County and a portion of Riverside County. The following assumptions were for the operations and maintenance workforce origins when accessing the Project site:

- 10% of the Project workforce would originate from Niland and areas to the north (Indio and nearby communities)
- 25% of the Project workforce would originate from the Calipatria and Westmorland areas
- 65% of the Project workforce would originate from farther south, including Brawley, El Centro, and Imperial

Table 5.12-11 is the calculation of VMT per employee during operations and maintenance. The average commute distance for workers during operations and maintenance of the Project is 20.8 vehicle miles per employee, which falls below the threshold of 21.8 VMT per employee.

Table 5.12-11. Calculation of VMT per Employee during Operations and Maintenance

Worker Residential Location		Commute Distance (miles)	Percent of Workers (%)	Vehicles per Worker	Calculation of Average VMT/ Employee
North Areas	Niland	9	5	1	0.45
	Coachella/Indio	60	5	1	3.0
Nearby	Calipatria	9	10	1	0.9
	Westmorland	14	15	1	2.1
South Areas	Brawley	19	45	1	8.55
	Imperial	25	10	1	2.5
	El Centro	33	10	1	3.3
			100		20.8

Therefore, the proposed Project would not conflict or be inconsistent with Section 15064.3(b) of the CEQA Guidance during the construction phase and this impact is considered less than significant.

Threshold question (c): Substantially increase hazards due to geometric design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The Project does not include changes to existing roadways during construction, operations, and maintenance. Based on the high volume and weight of these truck trips, and other heavy vehicle trips associated with the Project, some permanent degradation in roadway condition would be possible and may result in an increase in roadway hazards. With the implementation of a Transportation Management Plan (TMP), degradation in roadway condition caused by Project construction traffic would be restored based on the procedures established in the TMP. The construction contractor would work with Imperial County and Caltrans to prepare a schedule and mitigation plan for the roadways along the construction routes in accordance with the procedures established by the TMP.

Truck trips, including delivery of hazardous materials and removal of wastes, pose potential hazards for the public. However, the transporter will be required to obtain a Hazardous Material Transportation

License in accordance with CVC Section 32105 and will be required to follow appropriate safety procedures when transporting and handling such materials.

Therefore, with the implementation of a TMP and adhering to appropriate safety requirements, the proposed Project would not result in a substantial increase in roadway hazards. This impact is considered less than significant.

Threshold question (d): Result in inadequate emergency access?

During construction, emergency vehicles would have right-of-way over construction vehicles. Construction or operations and maintenance activities would not prevent or impede emergency access. Additional traffic associated with construction trips during the AM and PM peak hours may potentially delay emergency response vehicles. However, this delay would be minimal as all vehicles would yield to emergency response vehicles.

Therefore, the proposed Project would not result in inadequate emergency access. This impact is considered less than significant.

5.12.3 Transport of Hazardous Materials

A variety of hazardous chemicals would be stored and used during construction of the Project, including unleaded gasoline, diesel fuel, oils and lubricants (e.g., motor oil, transmission fluid, and hydraulic fluid), solvents, adhesives, and paint materials. There are no feasible alternatives to these materials for construction or operation of construction vehicles and equipment, or for painting buildings and equipment. In addition to those hazardous materials necessary for construction, maintenance lube oils, chemicals, paints, brine pond solids (if testing reveals them to be hazardous), scale from the walls of piping and geothermal fluids handling equipment, used oil, oil adsorbents, cleaning solutions and solvents, empty containers, fluorescent lamps, used batteries, and other hazardous materials would be generated periodically during operations.

Hazardous and universal wastes entering or exiting the Project site during construction or operation would be transported by a licensed transporter using a Uniform Hazardous Waste Manifest and disposed of or recycled at an appropriate Treatment, Storage or Disposal Facility. Copies of manifests, reports, waste analysis, exception reports, land disposal restrictions, and other related documents would be maintained onsite as required. Transport route arrangements would be required with Caltrans officials for permitting and escort, as applicable. The recommended routes for transport of hazardous materials, subject to Caltrans approval, is via SR 111 and SR 78/SR 86.

Section 5.5 (Hazardous Materials Handling) describes in detail the types and quantities of hazardous materials that will be used at the site. Section 5.14 (Waste Management) describes the frequency of disposal.

5.12.4 Cumulative Effects

A cumulative impact refers to a proposed Project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed Project (Public Resources Code Section 21083; Title 14 CCR, Sections 15064[h], 15065[c], 15130, and 15355).

5.12.4.1 Cumulative Construction Effects

During construction, the Project will have a less-than-significant effect on the transportation system in the immediate vicinity of the Project site. The Project will include a Construction and Demolition TMP to address the movement of workers, vehicles, and materials, including arrival and departure schedules and designated workforce and delivery routes. The Project Owner will consult with all applicable local jurisdictions, including Caltrans and Imperial County, in the preparation and implementation of the TMP.

As part of the TMP, the Project will be required to coordinate traffic flows with other major projects through the study intersections. Projects that could result in a significant cumulative effect also would be required to comply with applicable federal, state, and local LORS, and it is reasonable to assume that they also would include mitigation measures to reduce any significant cumulative traffic effects to a less-than-significant level. Although it is unlikely that the peak construction period for the Project, as well as the construction of multiple projects, would coincide with the Project's travel through the area roadways and intersections, it is possible that the construction traffic could overlap. However, a definitive construction schedule for other possible projects in the area is unknown.

Cumulative traffic impacts would be reduced with the implementation of the Project's TMP strategies. The proposed Project is unlikely, therefore, to result in cumulative impacts on traffic in combination with other closely related past, present, and reasonably foreseeable future projects.

5.12.4.2 Cumulative Operations and Maintenance Effects

A roadway segment analysis was conducted to determine the cumulative effects of the Project. Potential cumulative Project traffic increases were determined based on available information from published documents on the Imperial County planning website.

Cumulative traffic conditions on roadway segments during operations and maintenance of the Project and addition of cumulative projects are summarized in Table 5.12-12. Based on the analysis, the roadway segments are forecast to operate acceptably (LOS C or better) with the addition of cumulative Project traffic.

Table 5.12-12. Cumulative Condition Roadway Segment LOS Analysis Summary

Roadway	Segment Between	Segment And	LOS C Capacity	Existing ADT	Cumulative Projects Added	Cumulative Condition ADT	V/C	LOS C or Better?
SR 111	Niland Avenue	McDonald Road	7,100	4,000	936	4,936	0.70	Yes
	McDonald Road	Sinclair Road	7,100	4,000	766	4,766	0.67	Yes
	Sinclair Road	Hoober Road	7,100	4,000	936	4,936	0.70	Yes
Sinclair Road	SR 111	English Road	7,100	600	470	1,070	0.15	Yes
	English Road	Brandt Road	7,100	800	480	1,280	0.18	Yes
	Brandt Road	Garst Road	7,100	800	510	1,310	0.18	Yes
	Garst Road	Gentry Road	7,100	800	530	1,330	0.19	Yes
Gentry Road	Sinclair Road	McKendry Road	7,100	1,000	530	1,530	0.22	Yes
	McKendry Road	Lindsey Road	7,100	1,000	430	1,430	0.20	Yes
	Lindsey Road	Young Road	7,100	1,000	430	1,430	0.20	Yes
Brandt Road	Sinclair Road	Hoober Road	7,100	300	90	390	0.05	Yes
SR 78/ SR 86	SR 78/ SR 86	Forrester Road	29,600	20,800	986	21,786	0.74	Yes

Therefore, the proposed Project, during operation, maintenance, and construction, would not cause a substantial increase in traffic affecting the efficiency of the circulation system and this impact is considered less than significant. However, implementation of a TMP is recommended to ensure that the Project's contribution to cumulative impacts would remain less than significant.

5.12.5 Mitigation Measures

To address the potentially significant impact on roadway hazards and to ensure that the Project's contribution to cumulative effects would remain less than significant on the transportation system, the construction contractor would be required to prepare a TMP, also known as a construction traffic control plan and construction management plan. The TMP would address traffic control, construction traffic scheduling, carpooling, heavy equipment and materials delivery, street or lane closures, signage, and lighting.

The TMP also would include procedures to restore damages to roadway conditions caused by Project construction traffic. The construction contractor would work with Imperial County and Caltrans to prepare a schedule and mitigation plan for the roadways along the construction routes in accordance with the procedures established by the TMP.

With implementation of the TMP, the Project's impacts and cumulative effects on the transportation system would be less than significant.

5.12.6 Laws, Ordinances, Regulations, and Standards

LORS related to traffic and transportation are summarized in the following subsections. Table 5.12-13 summarizes all applicable federal, state, and local LORS and administering agencies, and describes how the applicant will comply with all LORS pertaining to traffic and transportation impacts.

Table 5.12-13. Laws, Ordinances, Regulations, and Standards for Traffic and Transportation

LORS	Requirements/Applicability	Administering Agency	AFC Sections Explaining Conformance
Title 49 CFR, Sections 171–177 and 350–399	Requires proper handling and storage of hazardous materials during transportation.	U.S. Department of Transportation and Caltrans	Project and transportation will comply with all standards for the transportation of hazardous materials (Sections 5.12.2.7 and 5.12.5.1).
Title 14 CFR, Section 77.13(2)(i), 77.17, 77.21, 77.23, and 77.25	Requires an applicant to notify the FAA of the construction or alterations of structures within a certain distance from an airport in order to avoid air navigation conflicts.	U.S. Department of Transportation and FAA	No airports are within 20,000 feet of the Project site; therefore, this requirement is not applicable (Section 5.12.5.1).
CVC Sections 13369, 15275, and 15278	Addresses the licensing of drivers and classifications of licenses required for the operation of particular types of vehicles. In addition, certificates permitting the operation of vehicles transporting hazardous materials are required.	Caltrans	The Project will conform to these sections in the CVC (Section 5.12.5.2).
CVC Section 25160 et seq.	Addresses the safe transport of hazardous materials.	Caltrans	The Project will conform to these sections in the CVC (Section 5.12.5.2).
CVC Sections 2500–2505	Authorizes the issuance of licenses by the Commissioner of the CHP for the transportation of hazardous materials including explosives.	Caltrans	The Project will conform to these sections in the CVC (Section 5.12.5.2).
CVC Section 31300 et seq.	Requires transporters to meet proper storage and handling standards for transporting hazardous materials on public roads.	Caltrans	Transporters will comply with standards for transportation of hazardous materials on state highways during construction and operations. SERC will conform to CVC Section 31303 by requiring that shippers of hazardous materials use the shortest route possible to and from the site (Section 5.12.5.2).
CVC Sections 31600–31620	Regulates the transportation of explosive materials.	Caltrans	The Project will conform to CVC §31600 – 31620 (Section 5.12.5.2).
CVC Sections 32000–32053	Regulates the licensing of carriers of hazardous materials and includes noticing requirements.	Caltrans	The Project will conform to CVC §31600 – 31620 (Section 5.12.5.2).
CVC Sections 32100–32109 and 32105	Establishes special requirements for the transportation of substances presenting inhalation hazards and poisonous gases. Requires that shippers of inhalation or explosive materials contact the CHP and apply for a Hazardous Material Transportation License.	Caltrans	The Project will conform by requiring shippers of inhalation or explosive materials to contact the CHP and obtain a Hazardous Materials Transportation License (Section 5.12.2.7 and Section 5.12.5.2).
CVC Sections 34000–34121	Establishes special requirements for the transportation of flammable and combustible fluids over public roads and highways.	Caltrans	The Project will conform to CVC §§34000 – 34121 (Section 5.12.2.7 and Section 5.12.5.2).

LORS	Requirements/Applicability	Administering Agency	AFC Sections Explaining Conformance
CVC Sections 34500, 34501, 34501.2, 34501.3, 34501.4, 34501.10, 34505.5–7, 34506, 34507.5 and 34510–11	Regulates the safe operation of vehicles, including those used to transport hazardous materials.	Caltrans	The Project will conform to these sections in the CVC (Section 5.12.2.7 and Section 5.12.5.2).
S&HC Sections 660, 670, 1450, 1460 et seq., 1470, and 1480	Regulates right-of-way encroachment and the granting of permits for encroachments on State and County roads.	Caltrans	The Project will conform to these sections in the S&HC (Section 5.12.5.2).
S&HC Sections 117, 660–711	Requires permits from Caltrans for any roadway encroachment during truck transportation and delivery.	Caltrans	Encroachment permits will be obtained by transporters, as required (Section 5.12.6).
CVC Sections 35780; S&HC Sections 660–711	Requires permits for any load that exceeds Caltrans weight, length, or width standards for public roadways.	Caltrans	Transportation permits will be obtained by transporters for all overloads, as required (Section 5.12.7).
CVC Sections 35550–35559	Regulates weight and load limitations.	Caltrans	The Project will conform to these sections in the CVC (Section 5.12.6).
California State Planning Law, Government Code Section 65302	Project must conform to the General Plan.	Imperial County	The Project will comply with the *Imperial County General Plan*. (Section 5.12.5.3).
Imperial County Municipal Code 10.12	Regulates and permits vehicle weight and load limitations.	Imperial County	The Project will comply with these section of Imperial County Municipal Code (Section 5.12.5.3).
Circulation Element of the Imperial County General Plan	Specifies long-term planning goals and procedures for transportation infrastructure system quality within Imperial County.	Imperial County	The Project will have no significant impact on the city's traffic and transportation infrastructure (Section 5.12.5.3).

Notes:

CFR = Code of Federal Regulations

CHP = California Highway Patrol

FAA = Federal Aviation Administration

S&HC = California Streets and Highways Code

SERC = State Emergency Response Commission

5.12.6.1 Federal LORS

- Title 49 CFR 171–177 governs the transportation of hazardous materials, the types of materials defined as hazardous, and the marking of the transportation vehicles.
- Title 49 CFR 350-399 and Appendices A-G, Federal Motor Carrier Safety Regulations, address safety considerations for the transport of goods, materials, and substances over public highways.
- Title 49 CFR 397.9, the Hazardous Materials Transportation Act of 1974, directs the U.S. Department of Transportation to establish criteria and regulations for the safe transportation of hazardous materials.

5.12.6.2 State LORS

- CVC Sections 13369, 15275, and 15278 address the licensing of drivers and classifications of licenses required to operate particular types of vehicles. In addition, certificates permitting the operation of vehicles transporting hazardous materials are addressed.
- CVC Sections 25160 et seq. address the safe transport of hazardous materials.
- CVC Sections 2500–2505 authorize the issuance of licenses by the Commissioner of the CHP to transport hazardous materials, including explosives.
- CVC Sections 31300 et seq. regulate the highway transportation of hazardous materials, routes used, and restrictions. CVC Section 31303 requires hazardous materials to be transported on state or interstate highways that offer the shortest overall transit time possible.
- CVC Sections 31600–31620 regulate the transportation of explosive materials.
- CVC Sections 32000–32053 regulate the licensing of carriers of hazardous materials and include noticing requirements.
- CVC Sections 32100–32109 establish special requirements for the transportation of substances presenting inhalation hazards and poisonous gases. CVC Section 32105 requires shippers of inhalation hazards or explosive materials to contact the CHP and apply for a Hazardous Material Transportation License. Upon receiving this license, the shipper will obtain a handbook specifying approved routes.
- CVC Sections 34000–34121 establish special requirements for transporting flammable and combustible fluids over public roads and highways.
- CVC Sections 34500, 34501, 34501.2, 34501.3, 34501.4, 34501.10, 34505.5–7, 34506, 34507.5, and 34510–11 regulate the safe operation of vehicles, including those used to transport hazardous materials.
- California S&HC, Sections 660, 670, 1450, 1460 et seq. 1470, and 1480 regulate right-of-way encroachment and granting of permits for encroachments on State and County roads.
- S&HC Sections 117 and 660–711 and CVC Sections 35780 et seq. require permits to transport oversized loads on County roads. S&HC Sections 117 and 660 to 711 require permits for any construction, maintenance, or repair involving encroachment on state highway rights-of-way. CVC Section 35780 requires approval for a permit to transport oversized or excessive loads over state highways.

- Caltrans weight and load limitations for state highways apply to all state and local roadways. The weight and load limitations are specified in CVC Sections 35550 to 35559. The following provisions from the CVC apply to all roadways and are therefore applicable to SERC:
  - **General Provisions**
    - The gross weight imposed upon the highway by the wheels on any axle of a vehicle shall not exceed 20,000 pounds; and the gross weight upon any one wheel, or wheels, supporting one end of an axle, and resting upon the roadway, shall not exceed 10,500 pounds.
    - The maximum wheel load is the lesser of the load limit established by the tire manufacturer, or a load of 620 pounds per lateral inch of tire width, as determined by the manufacturer's rated tire width.
  - Vehicles with Trailers or Semi-trailers
    - The gross weight imposed upon the highway by the wheels on any one axle of a vehicle shall not exceed 18,000 pounds; and the gross weight upon any one wheel, or wheels, supporting one end of an axle and resting upon the roadway, shall not exceed 9,500 pounds, except that the gross weight imposed upon the highway by the wheels on any front steering axle of a motor vehicle shall not exceed 12,500 pounds.
- California State Planning Law, Government Code Section 65302, requires each city and county to adopt a General Plan, consisting of seven mandatory elements, to guide its physical development. Section 65302(b) requires that a circulation element be one of the mandatory elements.
- All construction in the public right-of-way will need to comply with the "Manual on Uniform Traffic Control Devices" (Caltrans 2014; Federal Highway Administration [FHWA] 2009).

5.12.6.3 Local LORS

This section reviews compliance with all relevant local LORS without regard to their applicability as a matter of law. These LORS include the following:

- The Imperial County Circulation Element, which is part of the Imperial County General Plan, sets LOS C as the minimum acceptable LOS on County roadways and intersections.
- Imperial County Municipal Code Chapter 10.12 requires a permit from the County Road Commissioner for the movement and operation of vehicles with overweight or oversize loads as determined by the CVC. The Project will comply with all permit requirements before operating any overweight or oversized loads on County roads.
- Imperial County Municipal Code Chapter 12.12 requires an encroachment permit from the County Road Commissioner for any construction within the County right-of-way. The Project will comply with all permit requirements before constructing within any county right-of-way.

5.12.7 Agencies and Agency Contacts

Table 5.12-14 lists the agency contacts related to traffic and transportation.

Table 5.12-14. Agency Contacts for Traffic and Transportation

Issue	Agency	Contact
Transportation Permit for Oversized Loads	Caltrans	Caltrans Transportation Permits Issuance Branch 1120 N Street Sacramento, CA 95814 (916) 322-1297 Oversize.Overweight.Permits@dot.ca.gov
Transportation Permit for Oversized or Overweight Loads	Imperial County	Imperial County Public Works 155 South 11th Street, El Centro, CA 92243-2853 John Gay 442-265-1818
Encroachment Permit for Construction near roadways	Imperial County	Imperial County Public Works 155 South 11th Street, El Centro, CA 92243-2853 John Gay 442-265-1818
Hazardous Material Transportation License	CHP	Hazardous Material Licensing P.O. Box 942898 Sacramento, CA 942898-0001 (916) 843-3400 Email form available at: http://www.chp.ca.gov/prog/email.cgi
Safety Permits	Federal Motor Carrier Safety Administration	California Office 1325 J Street, Suite 1540 Sacramento, CA 95814 (916) 930-2760 Fax: (916) 930-2770 Email contact depends on the nature of the hazardous material hauled.

5.12.8 Permits and Permit Schedule

Table 5.12-15 lists the permits related to traffic and transportation and the permit schedule. The vehicles used to transport heavy equipment and construction materials will require transportation permits when they exceed the size, weight, width, or length thresholds set forth in Section 35780 of the CVC, Sections 117 and 660-711 of the California State Highway Code, and Sections 1411.1 to 1411.6 of the CCR. Affected vehicles will be required to obtain transportation permits from Caltrans and Imperial County, or from any other affected agency.

Transport route arrangements would be required with Caltrans and CHP officials for permitting and escort, as applicable. Transportation of hazardous materials to and from SERC will be conducted in accordance with CVC Section 31303.

Table 5.12-15. Permits and Permit Schedule for Traffic and Transportation

Permit	Agency Contact	Schedule
Single/annual-trip transportation permit for oversized loads and oversized vehicles	Caltrans Transportation Permits Issuance Branch (916) 322-1297 Oversize.Overweight.Permits@dot.ca.gov	Obtain when necessary, 2-hour processing time (single trip) to 2 weeks (annual trip).
Hazardous materials transportation license	CHP Hazardous Material Licensing Program (916) 843-3400	Obtain when necessary, approximately 2-week processing time.
Transportation permit for moving any extra-legal load that is overweight or oversized	Imperial County Public Works 442-265-1818	Obtain when necessary, issuance within 1 to 2 days.
Encroachment Permit for Imperial County	Imperial County Public Works 442-265-1818	Obtain when necessary, issuance within 7 business days if engineering plan approval is conducted concurrently or engineering plan approval is not required. Otherwise, permit Department processing time can take several weeks.

5.12.9 References

California Department of Transportation. (Caltrans). 2019a. Traffic Data Branch. 2019 Traffic Volumes on the California State Highway System. http://traffic-counts.dot.ca.gov.

California Department of Transportation (Caltrans). 2019b. Traffic Data Branch. 2019 Annual Average Daily Truck Traffic on the California State Highway System. http://traffic-counts.dot.ca.gov.

Imperial County. 2008. *Imperial County General Plan*. January 2008. https://www.icpds.com/planning/land-use-documents/general-plan.

Imperial County. 2021. *Imperial County Pedestrian Master Plan*. https://publicworks.imperialcounty.org/wp-content/uploads/2021/06/ICPMP_Final.web_.pdf.

Imperial County. 2022. *Imperial County Transportation Commission Regional Active Transportation Plan*. https://www.imperialctc.org/assets/documents/transportation-plans-and-studies/ICTC-ATP_Final-Document_2022.02.28_Reduced-Size.pdf.

Imperial Valley Transit. 2022. Transit Schedule. http://schedule.ivtransit.com.

Transportation Research Board. 2016. *Highway Capacity Manual.* 6th Edition.

5.13 Visual Resources

5.13.1 Introduction

This section describes existing conditions and potential aesthetic or visual impacts of the proposed Black Rock Geothermal Project (Project or BRGP). Although no federal, state, or local laws specifically protect visual resources, the importance of maintaining visual character is encouraged in the California Environmental Quality Act (CEQA) and the other federal guidance documents. The California Energy Commission (CEC) does not have its own guidance on assessing visual effects. CEC reviewed the available visual impact assessment guidance from the Federal Highway Administration (FHWA), U.S. Bureau of Land Management, U.S. Forest Service, National Research Council, and California Department of Transportation. FHWA was found to be most applicable. Although this Project is not related to highways, FHWA's guidance does assess buildings and presents an analysis framework that is transferrable to other types of actions, has been in practice since the 1980s, and has become a widely accepted standard for analysis of visual impacts. Therefore, CEC's analysis applies concepts from FHWA as well as relevant CEQA guidance.

Visual resources consist of the natural and built features of the landscape that can be seen and that contribute to the public's experience and appreciation of the environment. Natural landscape features include landform, water, and vegetation patterns, whereas built features such as buildings, roads, and other structures reflect human or cultural modifications. Visual resource impacts are generally defined in terms of a project's physical characteristics and potential visibility and the extent to which its presence would alter the perceived visual character and quality of the environment.

In accordance with CEC Guidelines for preparing Application for Certification (AFC) visual impact assessments, this section documents existing visual conditions in the area of the Project and evaluates the potential of the Project to cause significant adverse impacts with respect to existing visual resources. In addition, this section includes a discussion of the Project's relationship to federal, state, and local regulations and policies pertaining to the protection of visual quality in the Project vicinity.

Section 5.13.2 documents the visual conditions that currently exist in the Project area. Section 5.13.3 includes a description of the methods used to prepare this analysis, as well as potential environmental effects as they relate to visual resources. Section 5.13.4 discusses the potential cumulative impacts of this and other projects in the area. Section 5.13.5 summarizes the mitigation measures proposed to reduce Project impacts on visual resources. Section 5.13.6 describes the applicable laws, ordinances, regulations, and standards (LORS) relevant to visual resources. Section 5.13.7 lists agencies involved and agency contacts, and Section 5.13.8 discusses permits. Section 5.13.9 lists the references used in preparation of this section.

Figure 1-1 provides a map showing the general Project location within a regional landscape context, and Figure 1-4 is an oblique aerial view of the Project site and surrounding landscape. Figure 5.13-1 shows the locations of the photograph viewpoints referenced in this section, and their relationship to the Project site. Three locations have been selected as key observation points (KOPs) from sensitive viewing areas. These views were used for more detailed analysis, including preparation of visual simulations and are shown on Figures 5.13-2a through 5.13-2f. Three additional representative photographs, shown on Figures 5.13-3a through 5.13-3c, are included to provide additional context of the surrounding landscape of the Project's visual setting.

5.13.2 Affected Environment

5.13.2.1 Regional Setting

Figure 1-1 shows the Project location within the regional landscape and Figure 1-4 is an oblique aerial view of the Project site and surrounding rural landscape. The Project is located within unincorporated Imperial County, near the southeastern shore of the Salton Sea, and is approximately 90 miles northeast of the City of San Diego.

In terms of the regional landscape, the southeastern shore of the Salton Sea lies within the Imperial Valley, a trough which extends from the Coachella Valley in the north to the Gulf of California in the south (Britannica 2023). Terrain within the Imperial Valley is generally comprised of flat or gently sloping agricultural land. Much of the Imperial Valley is below sea level and is surrounded by mountain ranges. The Chocolate Mountains to the east and northeast reach elevations exceeding 2,000 feet above mean sea level, while the Santa Rosa Mountains to the west and northwest are approximately 4,500 feet above mean sea level. Located approximately 60 miles west and rising to elevations of approximately 6,515 feet, the Cuyamaca Mountains may be seen in the backdrop on clear days from places within the Project vicinity. Obsidian Butte is a barren rocky mound located approximately 0.5 mile west of the Project.

5.13.2.2 Local Setting

The local landscape is dominated by agricultural operations. The Salton Sea area is one of only 19 designated Known Geothermal Resource Areas in California (CEC 2020). As described in Section 2.4.2.1, there are 12 existing geothermal power plants operating within the Salton Sea area. Within approximately 10 square miles of the Project, there are 10 existing geothermal power plants, including 28 production wells and 41 injection wells (State Lands Commission, 2015). Each existing geothermal power plant utilizes approximately 50 acres for operations. Beyond a 10-mile radius, projects are less likely to result in significant impacts unless it is located in or can be seen from a particularly sensitive site, or the project is located in an area that might be considered a regional focal point (National Academy of Sciences 2007).

Rural two-lane roadways, at times paralleled by electrical distribution lines and poles, are common sights along the flat terrain. Tall vegetation, including rows of trees, can be found interspersed throughout the local area.

The Sonny Bono Salton Sea National Wildlife Refuge includes temporary lodging for employees and is located approximately 0.65 mile northeast of the Project. Similarly, the Red Hill Marina County Park includes temporary camping facilities located approximately 2.3 miles northeast of the Project. The nearest permanent residence to the plant site is located approximately 2.5 miles to the southeast.

Nighttime lighting in the area is generally limited to operational lighting for the various existing geothermal power plants, located northeast, southeast, and southwest of the Project. Electrical distribution and/or transmission structures, telecommunication structures, and traffic lights are prevalent vertical features throughout the region.

5.13.2.3 Plant Site

Figure 1-4 is an annotated aerial photograph showing the Project, referred to as the plant site, which is situated on approximately 55-acre portion of a larger 160-acre parcel. The plant site is located at the southwest corner of McKendry Road and Boyle Road approximately eight miles southwest of the town of Niland and approximately six miles northwest of the town of Calipatria. The shape of the plant site is rectangular with approximately 1,400 feet of street frontage along Boyle Road on the east side and approximately 1,800 feet of street frontage on McKendry Road on the north side.

As described in Section 5.4.1.1, the plant site is located in an active agricultural field currently in Bermuda grass crop. The plant site is bounded on the east by a concrete-lined irrigation water delivery canal and Boyle Road and on the north by McKendry Road. Agricultural fields are located to the north, east, south, and west of the site. Existing geothermal power plants are located across Boyle Road, southeast of the plant site, and approximately 0.7 mile southwest of the plant site. The Salton Sea is located northwest of the plant site and an approximately eight-foot-tall earthen embankment (levee) separates the waterbody from the plant site.

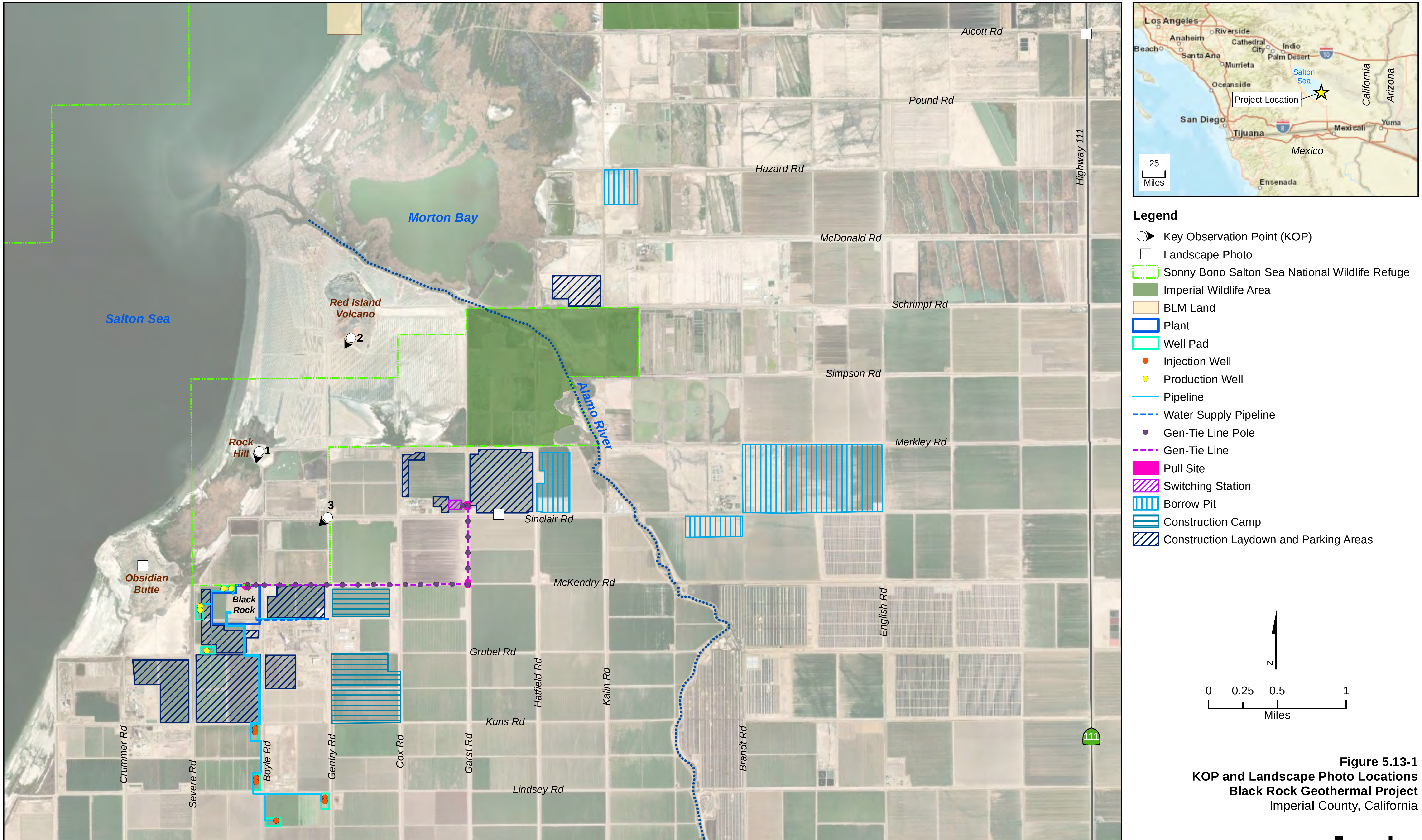


Figure 5.13-1
KOP and Landscape Photo Locations
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Visual\BR\Figure_5.13-1_230315.mxd

View Looking South

Figure 5.13-2a
Existing Conditions Photo from Rock Hill (KOP1)
Black Rock Geothermal Project
Imperial County, California

Jacobs

View Looking South

Figure 5.13-2b
Visual Simulation from Rock Hill (KOP1)
Black Rock Geothermal Project
Imperial County, California

Jacobs

View Looking South

Figure 5.13-2c
Existing Conditions Photo from Red Hill (KOP2)
Black Rock Geothermal Project
Imperial County, California

Jacobs

View Looking South

Figure 5.13-2d
Visual Simulation from Red Hill (KOP2)
Black Rock Geothermal Project
Imperial County, California

Jacobs

View Looking Southwest

Figure 5.13-2e
Existing Conditions Photo from Sonny Bono Salton Sea National Wildlife Refuge (KOP3)
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\SACFPP01\Proj\BHER\Draft AFC\Figures\Black Rock\Figure_5.13-2e.pdf

View Looking Southwest

Figure 5.13-2f
Visual Simulation from Sonny Bono Salton Sea National Wildlife Refuge (KOP3)
Black Rock Geothermal Project
Imperial County, California

Jacobs

View Looking Southeast

Figure 5.13-3a
Landscape Photo from Obsidian Butte
Black Rock Geothermal Project
Imperial County, California

Jacobs

View Looking West

Figure 5.13-3b
Landscape Photo from West Sinclair Road
Black Rock Geothermal Project
Imperial County, California

Jacobs

View Looking Southwest

Figure 5.13-3c
Landscape Photo from Highway 111
Black Rock Geothermal Project
Imperial County, California

Jacobs

5.13.2.4 Ancillary Facilities

Ancillary facilities, including well sites, pipelines, gen-tie lines, freshwater supply lines, and temporary construction laydown yards, parking areas, borrow pits, and construction camps would be primarily located on separate, relatively flat plowed agricultural land, vacant property, or equipment staging areas, or industrial (geothermal power plant) areas. As of December 2022, crops grown at agricultural properties in the area are predominately green grasses. Accessory agricultural structures, such as sheds or barns, are not present at the ancillary facility sites but are common throughout the local area. Table 5.13-1 summarizes the existing setting at each of the ancillary facility sites.

Table 5.13-1. Existing Setting and Land Uses at Ancillary Facility Sites

Facility	Existing Character
Well Sites	Flat agricultural fields with active crops or plowed soil.
Pipelines	Flat agricultural fields with active crops or plowed soil; Abandoned structures (north side of West Lindsey Road)
Gen-tie Structures	Flat agricultural fields with active crops or plowed soil; Roadway shoulders
Freshwater Supply Lines	Equipment staging; Geothermal power plant
Construction Laydown Yard and Parking Area, and/or Borrow Pit #1	Flat agricultural fields with active crops or plowed soil;
Construction Laydown Yard and Parking Area #2	Flat agricultural fields with active crops or plowed soil; Hunting
Construction Laydown Yard and Parking Area #3	Flat agricultural fields with active crops or plowed soil;
Construction Laydown Yard and Parking Area #4	Flat agricultural fields with active crops or plowed soil;
Construction Laydown Yard and Parking Area #5	Flat agricultural fields with active crops or plowed soil;
Construction Laydown Yard and Parking Area #6	Flat agricultural fields with active crops or plowed soil;
Construction Laydown Yard and Parking Area #7	Flat agricultural fields with active crops or plowed soil;
Construction Laydown Yard and Parking Area #8	Flat agricultural fields with active crops or plowed soil;
Construction Laydown Yard and Parking Area #9	Flat agricultural fields with active crops or plowed soil;
Construction Laydown Yard and Parking Area #10	Flat agricultural fields with active crops or plowed soil;
Construction Camp #1	Flat agricultural fields with active crops or plowed soil;
Construction Camp #2	Flat agricultural fields with active crops or plowed soil;
Borrow Pit #2	Flat agricultural fields with active crops or plowed soil;
Borrow Pit #3	Flat agricultural fields with active crops or plowed soil;
Borrow Pit #4	Flat agricultural fields with active crops or plowed soil;
Borrow Pit #5	Flat agricultural fields with active crops or plowed soil;

Source: Google Earth 2023

5.13.2.5 Viewer Sensitivity

Accepted visual assessment methods, including those adopted by the FHWA and other federal agencies, establish sensitivity levels as a measure of public concern for changes to visual character and quality. Viewer sensitivity is among the criteria used for evaluating visual impact significance and is generally divided into high, moderate, and low categories. The factors considered in assigning a sensitivity level include viewer activity, view duration, proximity, number of viewers, attention, focus, and special management or planning designation (FHWA 2015).

In general, and depending on the extent and type of visual change, the degree of visual impact tends to be more substantial where the sensitivity of affected viewers is highest. Within the Project area, motorists, workers, and recreationalists are the primary affected viewer groups; however, there are also a limited number of residences or neighbors. These groups may at times overlap, but for the purposes of this discussion they are described separately:

- Motorists on local streets, in particular Gentry Road and West Sinclair Road, both two-lane local roadways, comprise the largest viewer group. Local roadways in the Project area exist in a rural setting, do not connect major urban centers, and support a relatively low volume of traffic. Motorists may consist of various local and regional roadway travelers who are familiar with the visual setting, as well as travelers who use the roadway on a less regular basis, and include roadway travelers who are commuters, private vehicle drivers, and commercial truck or emergency vehicle drivers. There is no posted speed limit on Gentry Road and West Sinclair Road near the Project. The maximum speed limit for most two-lane undivided highways in California is 55 miles per hour (LADPW 2023). View duration for motorists traveling along local streets would typically be relatively brief. The nearest scenic highways are SR-111 (eligible) near Bombay Beach, located approximately 15 miles northwest, and SR-78 (eligible), located approximately 14 miles southeast. Viewer sensitivity of motorists is considered low due to the limited number of motorists on local roadways, the relatively short duration of views by passing motorists, and the presence of existing geothermal power plants.
- A limited number of residential viewers (neighbors) could be affected by the Project. As described in Section 5.13.2.2, the Sonny Bono Salton Sea National Wildlife Refuge includes temporary lodging for employees and is located approximately 0.65 mile northeast of the Project. Similarly, the Red Hill Marina County Park includes temporary camping facilities located approximately 2.3 miles northeast of the Project. The nearest permanent residence to the plant site is located approximately 2.5 miles to the southeast. Because views from residential areas are long in duration, sensitivity of this group is generally considered moderate to high. However, because few residences exist within view of the site, overall sensitivity is considered low to moderate.
- Workers at nearby agricultural properties and geothermal power plants are a third viewing group. This includes local business owners and employees. Due to the rural nature of agricultural land and sparse industrial facilities, the quantity of workers within the Project area is relatively low. Agricultural and/or industrial worker facilities surround the Project site. Workers' view duration could be moderate to brief when working outdoors and not focused on a specific location. Due to the low quantity of viewers and relatively short viewing duration, viewer sensitivity of this group is considered low to moderate.
- Another group is recreationalists hiking in the Project vicinity. This includes people using the Sonny Bono Salton Sea National Wildlife Refuge, which is approximately 0.65 mile north of the Project site, and trails at Red Hill Marina County Park, located approximately two miles north of the Project site. With their slower travel speed, hiker's view duration is generally longer than for motorists, and, thus, individuals in this group are likely to notice more detail, with respect to visual change in the environment. Further, the Sonny Bono Salton Sea National Wildlife Refuge is a federally protected site. With this in mind, viewer sensitivity of pedestrians is considered moderate.

An important factor for all the viewers described above is that they already experience the presence of existing electrical utility structures and power generating facilities, which are established elements within the Project's visual setting. The incremental change in local views imposed by the proposed Project is therefore relatively small.

5.13.2.5.1 Project Viewshed and Site Visibility

The Project viewshed is defined as the general area from which the Project would be visible. For purposes of describing a project's visual setting and assessing potential visual impacts, the viewshed can be divided into distance zones of foreground, middle ground, and background views. Distance zones are based on the position of the viewer in relationship to the landscape. They are measured from one static point, such as the location of a key view. As individual viewers move, so does the point from which the foreground, middle ground, and background are measured. In general, the closer a resource is to the viewer, the more dominant it is and the greater its importance to the viewer. Distance zones are defined, as follows (FHWA 2015).

- Foreground: 0.25-0.5 mile from the viewer

- Middle ground: Extends from the foreground zone to three to five miles from the viewer
- Background: Extends from the middle ground zone to the limit of visibility.

Foreground views from the Project site generally depict rural agricultural and industrial geothermal power plant operations, as well as views of Obsidian Butte and tall vegetation. Obsidian Butte is an elevated topographical feature, void of vegetation, but can be prominent due to the flat surroundings and proximity to the Project site of approximately 0.5-mile northwest. Middle ground views from the Project site include Rock Hill and tall vegetation. Similar to Obsidian Butte, Rock hill is an elevated topographical feature, void of vegetation, but not as prominent as Obsidian Butte due to small size of the feature and distance from the Project of approximately one mile north. Long distance views from the Project site generally depict surrounding mountains including the Chocolate Mountain and Santa Rosa Mountain ranges. These mountain ranges are prominent in the background but do not attract attention as focal points due to distances of 25 to 50 miles away from the Project site, lack of unique characteristics and detail, and unity along the horizontal expanses.

Public views of the Project site are generally limited to nearby roadways, the Sonny Bono Salton Sea National Wildlife Refuge, and elevated topography such as Rock Hill, Red Hill, and surrounding hills and mountains.

5.13.2.6 Key Observation Points

Field reconnaissance was conducted August 2022 to observe existing visual conditions at the Project site and surrounding area. The visual fieldwork included taking representative photography including documentation of KOPs. High-resolution digital photographs were taken using a single lens reflex (SLR) camera with a 50-millimeter (mm) equivalent lens, which represents a horizontal view angle of 40 degrees. Systematic documentation of photograph viewpoint locations included Global Positioning System (GPS) recording and photograph log sheet and base map annotation.

In consultation with CEC representatives, three KOPs were selected for visual simulation. Taken together, the set of KOP views represent locations where Project-related change would be most noticeable to the public. Figure 5.13-1 depicts the location of each KOP and additional representative photograph viewpoints on an annotated aerial photograph of the Project site and surrounding area.

The following discussion includes description of the existing visual conditions and character found within the Project area. A set of KOPs, presented on Figures 5.13-2a through 5.13-2f, provides a framework and baseline for the evaluation of the Project's potential visual effects contained in Section 5.13.3. The KOP locations were determined, in conjunction with the CEC, due to public accessibility, existing land uses, and the potential for impacts on sensitive visual resources. Additional representative photographs, Photographs A through C (shown on Figures 5.13-3a through 5.13-3c), provide more extensive documentation of existing visual landscape conditions in the Project vicinity.

5.13.2.6.1 Views from Rock Hill (KOP 1)

KOP 1 represents the existing view from Rock Hill, a volcanic outcropping, facing south toward the Project site, which is approximately one mile away. The view represents what viewers on Rock Hill Trail, which is within the Sonny Bono Salton Sea National Wildlife Refuge, would see while looking toward the Project site. The foreground consists of elevated angular berms with roadways on the top side, horizontal expanses of brown soil and green and brown vegetation, and vertical lines of utility structures which are partially visually absorbed into the brown earthen background. The green vegetation is relatively low growing and bushy, while the brown vegetation is grassy. The middle ground consists of horizontal rows of rounded trees with varying green colors dividing agricultural property. The primary unpaved roadway (Boyle Road) narrows at distance on the left side of the photo. Additional vertical lines formed by utility structures are partially visually absorbed into the brown earthen agricultural fields. The existing geothermal power plants add a modest amount of visual interest, on the left and right sides of the photo, dominate the view as human-made structures, including cooling towers expelling visible plumes that protrudes into the skyline. In the background, horizontal expanses of green and brown agricultural fields, as well as horizontal rows of rounded trees, can be seen in the distance. Refer to Figure 5.13-2a.

5.13.2.6.2 Views from Red Hill (KOP 2)

KOP 2 represents the existing view from Red Hill, approximately two miles northeast of the Project site, facing southwest. The view represents what viewers within the Red Hill Marina County Park campground area would see while looking toward the Project site. The foreground consists of a horizontal expanse of dry, grainy, and plowed light brown agricultural soil which dominates the view. In the middle ground, a horizontal line of green agricultural fields and clusters of green rounded trees can be seen. A horizontal sliver of reflective water from a service water pond is partially visible in the center of the photo. The barren Rock Hill is visible on the right side of the photo along with the similarly barren Obsidian Butte. Both Rock Hill and Obsidian Butte are mildly prominent topographical features with rounded forms and rocky, dark brown soil color due to the lack of vegetation. Several geothermal power plants are visible as human-made structures and visible plumes protrudes into the skyline in the center and left sides of the photo. In the background, the dry foothills of the Peninsular Mountain Ranges southwest of the Project site are inconspicuous but appear as a narrow, light brown, horizontal band with rounded form across the horizon. Clusters of dark trees or structures are partially visible. Refer to Figure 5.13-2c.

5.13.2.6.3 Views from the Sonny Bono Salton Sea National Wildlife Refuge (KOP 3)

KOP 3 represents the existing view from the entrance road of the Sonny Bono Salton Sea National Wildlife Refuge, approximately 0.65 mile northeast of the Project site, facing southwest. The view represents what visitors of the facility would see while looking toward the Project site. The foreground consists of a concrete irrigation canal and associated white gate structure. Low lying, dry, brown, bushy ruderal vegetation is growing amongst rocky soil on the side of an unpaved roadway and parking area. The roadway travels over the canal and wraps around vertical metallic white signage and grey utility structures. A large, green, rounded tree is located at the end of the parking area on the right side of the photo. Electrical distribution lines parallel the unpaved roadway as a series of thin horizontal black lines. A horizontal expanse of dry, brown, low growing grass interspersed with small green bushes can be seen within an agricultural field across the middle of the photo. In the middle ground, a horizontal row of green rounded trees can be seen. Obsidian Butte is partially visible through gaps in the row of trees on the right side of the photo. Electrical utility poles appear as vertical lines and protrude the skyline. Agriculture and industrial geothermal energy production structures, along with associated visible plumes are partially seen through gaps in the row of trees and protrude into the skyline and offer a minor degree of visual interest. In the background, structures are partially visible in the distance. Refer to Figure 5.13-2e.

5.13.2.7 Landscape Photos

Landscape photos were taken from three locations: Obsidian Butte, West Sinclair Road, and SR-111. The landscape photo from Obsidian Butte (Figure 5.13.3a) is looking southeast, toward the Project site, and shows the jagged rocky terrain of Obsidian Butte in the foreground. Also in the foreground are patches of brown colored dry brush at the base of Obsidian Butte. An unpaved roadway leads away from view while green riparian vegetation is shown as a horizontal expanse. The middle ground consists of agricultural fields, both green and brown, geothermal energy production facilities including visible plumes being expelled from cooling towers protruding the skyline in the center of the photo, and electrical distribution poles seen as vertical lines. The background consists of rows of rounded trees in the distance. As viewed from Obsidian Butte, the overall existing visual character is rural agricultural with elements of industrial features from the geothermal power plants.

The landscape photo from West Sinclair Road (Figure 5.13.3b) is taken from the westbound shoulder of the roadway and shows pavement leading away from view, reddish soil along the side of the roadway, and green/brown agricultural fields in the foreground. Also in the foreground, electrical distribution lines and poles protrude into the skyline and lead the viewer from the foreground to the background creating a focal point. A dark colored above ground pipeline parallels the roadway on the north. The middle ground includes the existing Elmore geothermal generating facility, including cooling towers and visible plumes protruding the skyline, which offers a moderate degree of visual interest. Additional electrical distribution poles and lines can be seen protruding the skyline in a north-south orientation. In the background, Red Hill and Obsidian Butte can be seen as brown, rounded, and barren earthen features on the right side of the photo. As viewed from West Sinclair Road, the overall existing visual character is rural agricultural with elements of industrial features from the geothermal power plants and electrical distribution structures.

The landscape photo from SR-111 (Figure 5.13.3c) is taken from the southbound shoulder facing southwest. In the foreground, green and orange bushes line the roadway, and a green street sign dominates the photo. Green and brown agricultural fields show as vast horizontal expanses in the middle ground. Rounded, green trees are seen in rows as well as spontaneous occurrences protruding the skyline. Electrical distribution poles are shown as vertical lines protruding the skyline. In the background, geothermal energy production sites, including cooling towers and visible plumes protrude the skyline, which offer a minor degree of visual interest. As viewed from SR-111, the overall existing visual character is rural agricultural.

5.13.2.8 Visual Quality

The generally agricultural and industrial setting of the Project site and surrounding areas contains fairly common features such as agricultural fields, agricultural structures, bands of trees and other vegetation, two-lane roadways, utility infrastructure, agricultural, and industrial structures. Memorability and distinctiveness of the particular Project site is reduced based on the commonality of the setting. There are occasional views of generally natural landscapes, particularly, the elevated topography of Obsidian Butte, Rock Hill, and Red Hill, the waterbody as seen from KOP 2, tree lines, and distant mountain ranges. However, the local area includes existing electrical distribution lines and structures, agricultural and geothermal production facilities, roadways, and fences which are common in the Project area. The visual order in the landscape is not free from encroachment and the integrity of visual order is reduced.

The area surrounding the Project site contains open expanses of agricultural land generating patterns of brown and green fields. The vegetation generally has rounded shape and a consistently varied texture. Existing agricultural and geothermal production facilities join the agricultural land to form a somewhat disjointed visual pattern. Utility infrastructure, sporadic agricultural and industrial structures, roadways, and residences serve to break up the uniformity.

5.13.3 Environmental Analysis

5.13.3.1 Analysis Procedure and Methodology

This analysis of visual effects associated with the proposed Project is based on review of the following information: Project drawings and technical data; aerial and ground level photographs of the Project area; and computer-generated visual simulations, as well as GIS data and public policies pertaining to visual quality, as outlined in Section 5.13.6 Laws, Ordinances, Regulations, and Standards.

An initial step in the study process was the review of planning documents and GIS data applicable to the general Project area to develop a sense of the type of existing and planned land uses, and the public policy guidelines for the protection or preservation of visual resources. This initial desktop assessment considered foreground and middle ground viewing distances and was verified through field observations. Section 5.13.2.6 includes descriptions with references to photo-documentation of existing visual conditions.

The set of KOP visual simulations presented on Figure 5.13-2b, Figure 5.13-2d, and Figure 5.13-2f provide a depiction of the location, scale, and visual appearance of the proposed Project including new structures, equipment, and landscaping. The computer-generated simulations are the result of an objective analytical and computer modeling process described briefly below.

Three–dimensional (3-D) computer modeling for the proposed Project was developed from Project data and drawings including site and equipment general arrangement plans, and scaled elevation/section drawings. The digital Project modeling was combined with existing conditions data such as GIS topographic data and digital aerial photographs of the site and surrounding area to produce digital modeling for simulation of the Project.

For the simulation viewpoints (KOPs), photograph locations were incorporated into the 3-D modeling based on GPS field data and base map, using five feet as the assumed eye level. Computer “wireframe” perspective plots were overlaid on the photographs to verify scale and viewpoint locations. Digital visual simulation images were then produced using the 3-D modeling combined with digital photographs from each viewpoint. The visual simulations portray the Project site with landscaping at approximately five years of maturity. The final “hardcopy” existing view and visual simulation images contained in this AFC document were printed from the digital image files and produced in color on 8.5×11-inch sheets.

The assessment of visual impacts was based on evaluation of the changes to the existing visual resources that would result from construction and operation of the Project. In part, the changes were assessed by comparing the set of computer-generated visual simulations to the existing visual conditions. The assessment of visual changes and potential impacts is based on consideration of several factors:

- The specific changes in the affected visual environment’s composition and character;
- The affected environment’s visual character;
- The extent to which the affected environment includes designated visual features or resources and the degree to which the change is consistent with public policies pertaining to visual quality; and
- The sensitivity of the viewers.

5.13.3.2 Impact Evaluation Criteria

With respect to determining the significance of the anticipated changes under the CEQA, the anticipated changes were evaluated in terms of the criteria provided by the CEQA guidelines. Appendixes G and I of the guidelines indicate that a project will have a significant effect on the environment if it will (ACEC 2019):

- Have a substantial, adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.
- Substantially degrade the existing visual character or quality of public views of the site and its surroundings. FHWA guidelines were used as a supplement to evaluate visual character in order to conduct a more thorough analysis of compatibility at the project site and sensitivity of nearby viewers. Visual character is generally defined as the project site’s and the surrounding area’s visual features and physical attributes. The scale, form, and materials of the project is described to understand the aesthetic and visual setting, as follows (FHWA, 2015).
  - Scale – relates to height, width, and depth of the buildings.
  - Form – relates to shape or configuration of the buildings.
  - Materials – relates to color, texture, and other artistic attributes of the buildings.

Aesthetic and visual impacts can be defined as “changes to the environment (measured by the compatibility of the impact) or to viewers (measured by sensitivity to the impacts). When measured together, the “compatibility of the impact and the sensitivity of the impact yield the degree of the impact” to overall visual character (FWHA 2015).

  - Compatibility of the Impact – the ability of environment to absorb the project and the compatibility of the visual characteristics of the environment and project. Compatibility is assessed by evaluating changes to scale, form, and materials and resulting impact to existing visual character.

  - Sensitivity of the Impact – the ability of viewers to see and care about the project's impacts. The sensitivity to impact is based on changes in the character of aesthetic and visual resources. Viewer sensitivity considers factors such as:
    - Distance of the viewer.
    - Viewer exposure, which includes proximity to the impact, number of viewers affected, and duration of view.
    - Viewer awareness, which includes attention (or degree of routineness or uniqueness), focal points, and protection (such as scenic designations).
  - Degree of the Impact – a no/negligible, minor/moderate, or significant change to visual character. The project may benefit visual character by either enhancing aesthetic and visual resources or by creating better views of those resources and improving the experience of visual character by viewers. Similarly, they may negatively affect aesthetic and visual character by degrading visual resources or obstructing or altering desired views.
- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

5.13.3.3 Project Appearance

The Project facilities are described in detail in **Section 2**, Project Description. **Figure 2-1** shows the general arrangement and layout of the proposed Project features on the site, and **Figures 2-4a, 4b, and 4c** provides typical elevation views.

5.13.3.3.1 Plant Site

The plant site includes atmosphere flash tanks (AFT), turbine generators, cooling towers, a switchyard, control building, emergency generators, power distribution center, a service water pond, transformers, a brine pond, condensate storage tanks, and storage.

- Scale: The two AFT structures would be supported by individual reinforced concrete or structural steel structures and would reach heights of approximately 95 feet. The majority of plant site structures, including turbine generators, cooling towers, switchyard, control building, and tanks, would be less than 60 feet in height. The chain-linked fence would reach a height of six feet. The general building mass, excluding the pond components, would be approximately 1,200 feet in length and 1,000 feet in width.
- Form: The two AFT structures have dominant vertical forms that draw the view towards the skyline. Major yard tanks would be cylindrically shaped with convex roofing. The control and storage buildings would be rectangular with flat roofing. The earthen berm would appear as a horizontal line. Generally, the plant site would appear as a horizontal mass of structures with varying shapes.
- Materials: The majority of structures would be constructed from steel and placed on reinforced concrete slabs, on grade. The power distribution center would be a pre-engineered, single story metal building. Most metallic surfaces would be treated with corrosive resistant material and beige in color. The perimeter chain link fence would be grey and semi-transparent when viewed from a perpendicular angle. The earthen berm would be brown in color. The varying depths, shapes, and orientation of structures would appear as a highly textured with surface relief.

5.13.3.3.2 Well Sites

A total of 12 new wells, installed on seven new well pads, would be required for full plant operation.

- Scale: Each well would reach a height of approximately 12 feet. Piping for the wells would be 12 inches in diameter.
- Form: Wells would be constructed using pumps, piping, and valve components. Each well would appear as vertical line structures extending from the well pad.

- Materials: Wells would be metallic and neutral grey/tan in color. The varying depths, shapes, and orientation of well components would appear as a slightly textured mechanical object.

5.13.3.3.3 Pipelines

Project-related ancillary facilities include a network of above-ground production and injection pipelines.

- Scale: Both production and injection pipelines would be installed above-ground at a height of approximately three to five feet above grade. The majority of the pipelines would consist of 36-inch piping along with 12-inch well warmup piping. The total length of the production pipeline is approximately 1.4 linear mile. The total length of the injection pipeline is approximately 5.1 linear miles.
- Form: Pipelines would be cylindrical and appear as horizontal lines.
- Materials: The pipelines would be supported on drilled pier cast-in-place foundations and constructed of appropriate corrosion-resistant alloys or functionally equivalent. Pipelines would generally appear as beige in color, smooth in texture, and metallic.

5.13.3.3.4 Gen-Tie Line Route

A total of 23 tubular steel poles (TSP) would be required for full operation.

- Scale: Each TSP would have a width of approximately two feet and reach a height of approximately 130 feet. The minimum conductor distance from the ground would be 30 feet, which is consistent with GO-95 standards of 30 feet minimum at 60 degrees Fahrenheit and 27 feet minimum at the maximum operating temperature.
- Form: Each TSP structure would appear as vertical line structures extending from the surface. Conduit strung from each structure would appear as a series of thin, horizontal lines.
- Materials: TSP structures would be constructed from steel and coated with corrosion and glare resistant material. The structures would be dull gray in color.

5.13.3.3.5 Freshwater Supply

The freshwater supply line would be buried underground and would not be visible.

5.13.3.3.6 Temporary Construction Laydown Yards, Parking Areas, Borrow Pits, and/or Construction Camps

- Scale: Temporary chain-linked security fencing would reach a height of six feet. Visible equipment and materials would vary in size.
- Form: The chain-linked fence would be a horizontal line while visible equipment and materials would vary in shape and configuration.
- Materials: The chain-linked fence would be metallic, grey, and slightly textured.

5.13.3.3.7 Lighting

Nighttime construction is not anticipated unless certain short-term construction procedures are required that cannot be interrupted because of safety or other logistical considerations. If circumstances require nighttime construction activity, any necessary temporary lighting would be focused and directed on work areas and away from surrounding properties.

Operational lighting on the Project site would be limited to areas required for safety, would be directed on site to avoid backscatter, and would be shielded from public view to the extent practical. Lighting that is not required to be on during nighttime hours would be controlled with sensors or switches operated such that the lighting would be on only when needed.

Lighting would be provided in the following areas:

- Building interior, office, control, and maintenance areas
- Building exterior entrances
- Outdoor equipment platforms and walkways
- Transformer areas
- Power island perimeter roads
- Parking areas
- Plant entrance

Emergency lighting from battery packs would be provided in areas of normal personnel traffic to permit egress from the area in case of failure of the normal lighting system. In major control equipment areas and electrical distribution equipment areas, emergency lighting permits equipment operation to allow auxiliary power to be reestablished.

5.13.3.3.8 Structural Dimensions, Materials, and Aesthetic Treatment

Materials and aesthetic treatment of Project structures are provided Table 5.13-2, below.

Table 5.13-2. Structural Dimensions, Materials, and Aesthetic Treatment

Feature	Length (feet)	Width (feet)	Height (feet)	Diameter (feet)	Color	Materials	Finish
Well Heads	12	12	15	—	Pearl Light Grey (RAL 9022) or Similar	Inconel 625	Gloss
Well Pads	600	300	1		N/A	Aggregate/Gravel	
Production Pipelines and Supports	6893	5	5	—	Beige (RAL 1001) or similar	Alloy 2507	Semi-Gloss
Reinjection Pipelines and Supports	13829	5	5	—	Beige (RAL 1001) or similar	Alloy 2205	Semi-Gloss
High Pressure Separator	64	-	28	12	Beige (RAL 1001) or similar	Carbon Steel with Inconel 625 Cladding	Semi-Gloss
Standard Pressure Crystallizer	-	-	60	17	Beige (RAL 1001) or similar	Carbon Steel with SS2205 CR Liner	Semi-Gloss
Low Pressure Crystallizer	-	-	60	21	Beige (RAL 1001) or similar	Carbon Steel with SS2205 CR Liner	Semi-Gloss
Atmosphere Flash Tank (AFT)	-	-	90	22	No Paint	Carbon Steel with SS2205 CR Liner	
HP Demister	-	-	28	8.33	Beige (RAL 1001) or similar	Carbon Steel	Semi-Gloss
SP Demister	-	-	26	7.5	Beige (RAL 1001) or similar	Carbon Steel	Semi-Gloss
LP Demister	-	-	40	10.5	Beige (RAL 1001) or similar	Carbon Steel	Semi-Gloss

Feature	Length (feet)	Width (feet)	Height (feet)	Diameter (feet)	Color	Materials	Finish
HP Scrubber	-	-	24	4	Beige (RAL 1001) or similar	Carbon Steel	Semi-Gloss
SP Scrubber	-	-	22	3.66	Beige (RAL 1001) or similar	Carbon Steel	Semi-Gloss
LP Scrubber	-	-	38	7	Beige (RAL 1001) or similar	Carbon Steel	Semi-Gloss
NCG Extraction System	93	57	30	—	Pearl Dark Grey (RAL9023) or similar	SS316/304	Semi-Gloss
Steam Turbine with Generator	60	24	40	—	Manufacturer Standard	Packaged Unit	
Condenser	40	30	30	—	No Paint	Carbon Steel, SS316/304, Duplex 2003	
Primary Clarifier	-	-	53	125	Beige (RAL 1001) or similar	Carbon Steel with partial 2205 Liner	Semi-Gloss
Secondary Clarifier	-	-	51	115	Beige (RAL 1001) or similar	Carbon Steel with partial 2205 Liner	Semi-Gloss
Thickener	-	-	51	60	Beige (RAL 1001) or similar	Carbon Steel with partial 2205 Liner	Semi-Gloss
Bulk Chemical Storage for Process	80	50	20	-	No Paint		
Horizontal Belt Filter	225	95	30	-	Beige (RAL 1001) or similar	Packaged Unit	Semi-Gloss
Water Treatment - RO Unit	45	45	25	—	Manufacturer Standard		
Cooling Tower	337	58	42.5	—	Beige (RAL 1001) or similar	Fiberglass Reinforced Plastic	Semi-Gloss
Oxidization Box	40	20	20		Beige (RAL 1001) or similar		Semi-Gloss
Bulk Chemical Storage for Cooling Tower	80	20	15	-	No Paint	Plastic	
Emergency Vent Stack/ Rock Muffler			45	30	No Paint	Carbon Steel / Concrete	
Injection Pumping System	50	45	8	—	Manufacturer Standard for Pumps/Beige (RAL 1001) or similar for Piping	Duplex Stainless Steel	Semi-Gloss

Feature	Length (feet)	Width (feet)	Height (feet)	Diameter (feet)	Color	Materials	Finish
Control/Electrical Package - Power Distribution Center (PDC)	80	28	16	—	Beige (RAL 1001) or similar	Engineered Metal Building	Semi-Gloss
Purge Water System - Condensate Storage	35	35	20	-	No Paint	TBD	
Water Storage - Service Water Pond	845	137	10		N/A	Lined Concrete	
Surface Impoundment	760	68			N/A	Lined Concrete	
AFT for Surface Impoundment			60	22	No Paint		
Hydro blast Pad	88	70			No Paint/Concrete	Concrete	
Transformers – Switchyard	200	160	27	—	Manufacturer Standard	Electrical Equipment	
Main Circuit Breaker				—	Manufacturer Standard	Electrical Equipment	
Emergency Generator (4160 V)	25	12	12	—	Beige (RAL 1001) or similar	Packaged Unit	Semi-Gloss
Emergency Generator (480 V)	25	24	12		Beige (RAL 1001) or similar	Packaged Unit	Semi-Gloss
Firewater Pump Engine	37.5	7.3	12	—	Manufacturer Standard	Packaged Unit	
Steam Turbine Generator Control/Lube Oil Skid				—	Manufacturer Standard	Stainless Steel / Carbon Steel	
Filter cake trailer staging	215	60	12		N/A	Concrete	
Temporary outage geothermal fluid tanks			12	180	N/A	Lined Carbon Steel	
Temporary outage geothermal fluid tanks			12	120	N/A	Lined Carbon Steel	
Temporary Hazardous Waste Bins	215	60	12		N/A		
Control Building	200	100	20	—	Beige (RAL 1001) or similar		Semi-Gloss
Maintenance/Warehouse Building	150	100	30	—	Beige (RAL 1001) or similar	Prefabricated Steel Building	Semi-Gloss
Transformer Wall	37	38	20	—	N/A	Concrete	

5.13.3.3.9 Conceptual Landscape Plan

No aesthetic landscaping is proposed.

5.13.3.3.10 Construction Laydown Area

Construction of the project would take approximately 29 months total. Temporary construction facilities would include construction laydown and parking areas, borrow pits, and construction camps. During the construction period, construction materials, large equipment, trucks, construction camps, and parked vehicles, including recreational vehicles, could be visible in this area; Temporary facilities would be partially screened by perimeter fencing.

5.13.3.3.11 Water Vapor Plumes

Visible plumes from power plants (and other sources) form when the mass of water in an exhaust plume exceeds the saturation point of the exhaust gases. The saturation point of air is directly related to its temperature with warm air having a higher saturation point (being able to carry more water in a vapor state) than cold air. When the saturation point is reached, water would condense out of vapor state to a liquid state, forming fine water droplets. These water droplets are visible in an exhaust plume.

Based on previous experience with cooling towers and atmospheric flash tanks that would be installed at the Project site, formation of visible plumes from the Project are expected to occur frequently. These plumes are consistent with other visible plumes in the Project area and create visual interest.

5.13.3.4 Assessment of Visual Effects

5.13.3.4.1 KOP 1—View from Rock Hill

Figure 5.13-2a and Figure 5.13-2b show a before and after view looking southeast from Rock Hill, a location approximately 0.5 mile northwest of the site. This KOP represents long duration views experienced by viewers walking near the summit of the Rock Hill Trail. Refer to Section 5.13.2.6.1 for a description of the existing views from KOP 1.

The Figure 5.13-2b visual simulation shows a view of the Project including the entire northern profile of the facility. Views in the foreground are unaffected by the Project. The Project is located in the middle ground in this visual simulation. The plant site, which is the most prominent feature of the Project, would appear as a new irregularly shaped horizontal form of grey or tan color interrupting an expanse of agricultural land in the middle ground. The different structures at the plant site provide for relief and a textured appearance. The cluster of structures at the plant site generally repeat in form, texture, and color to the existing geothermal energy production facilities nearby. Near the center of this view, two metallic, vertical AFT structures provide a minor focal point as they vertically protrude the skyline while expelling visible plumes. These new AFT structures generally repeat the scale, form, and materials of existing cooling towers at existing geothermal production facilities seen nearby on the right and left sides of the photo. Stretching to the east (right side of photo) from the PGF, a gen-tie structures appear as a new row of black vertical lines, connected by several circuits of conduit appearing as black horizontal lines protruding into the skyline. Although significantly larger is size, the new gen-tie line would repeat in form, and materials to the existing utility poles within view. The new perimeter fence is completely visually absorbed by the larger, more prominent facility structures. The aboveground production pipelines are partially seen as horizontal black lines extending west (left side of photo) from the plant site. Although the Project facilities appear as slightly larger than nearby geothermal production facilities, the proposed building massing has a similar aesthetic treatment, and its character is not out-of-context with the style of nearby industrial. Element contrasts would be moderate as the plant site structures, gen-tie structures, and aboveground pipelines would be seen but would not attract attention due to the presence of similar features within the view.

The Project would be generally compatible with the existing landscape due to the similar scale, form, and materials with existing nearby geothermal power plants. Viewer sensitivity from KOP 1, primarily made up of recreationalists hiking at Rock Hill, is considered moderate due to the longer duration of views by this group (refer to Section 5.13.2.5). The general compatibility of the Project within the existing setting, combined with the moderate sensitivity of the viewers, result in a moderate long-term change to overall visual character.

5.13.3.4.2 KOP 2— View from Red Hill

Figure 5.13-2c and Figure 5.13-2d show a before and after view looking southwest from the trails at Red Hill, a location approximately two miles northeast of the plant site. This viewpoint represents long duration views experienced by viewers at Red Hill as they walk near the summit. Refer to Section 5.13.2.6.2 for a description of the existing views from KOP 2.

The Figure 5.13-2d visual simulation shows a view of the Project including the northern profile of the plant site. Views in the foreground are unaffected by the Project. The Project is located in the middle ground in this visual simulation. The plant site, which is the most prominent feature of the Project, would appear as a new irregularly shaped horizontal form of grey or tan color interrupting an expanse of agricultural land and existing agricultural and geothermal energy production facilities. The different structures at the plant site provide for relief and a textured appearance. Although closer to the foreground to the viewer, the cluster of proposed structures at the plant site generally repeat the form, texture, and color to the existing agricultural and geothermal energy production facilities nearby. Near the center of this view, two metallic, vertical AFT structures provide a minor distinctive focal point as they vertically protrude the skyline while expelling visible plumes. These new AFT structures generally repeat the scale, form, and materials of existing cooling towers at existing geothermal production facilities seen nearby. Stretching to the east from the PGF, a gen-tie structures appear as a new row of black vertical lines, connected by several circuits of conduit appearing as black horizontal lines. Although significantly larger is size, the new gen-tie structures would repeat in form, and materials to the existing utility poles within view. The new perimeter fence is completely visually absorbed by the larger, more prominent facility structures. The aboveground production pipelines are partially seen as horizontal black lines extending west from the plant site. Although the Project facilities appear as closer and slightly larger than nearby geothermal production facilities, the proposed building massing has a similar aesthetic treatment, and its character is not out-of-context with the style of nearby industrial facilities. Element contrasts would be moderate as the plant Site structures, gen-tie structures, and aboveground pipelines would be seen but would not attract attention due to the presence of similar features within the view.

The Project would be generally compatible with the existing landscape due to the similar scale, form, and materials with existing nearby geothermal power plants. Viewer sensitivity from KOP 2, primarily made up of recreationalists hiking or camping at Red Hill Marina County Park, is considered moderate due to the longer duration of views by this group (refer to Section 5.13.2.5). The general compatibility of the Project within the existing setting, combined with the moderate sensitivity of the viewers, result in a moderate long-term change to overall visual character.

5.13.3.4.3 KOP 3— View from the Sonny Bono Salton Sea National Wildlife Refuge

Figure 5.13-2e and **Figure 5.13-2f** show a before and after view looking southwest from the Sonny Bono Salton Sea National Wildlife Refuge Visitor Center entrance, a location approximately 0.75 mile northeast of the plant site. This viewpoint represents short duration views experienced by visitors of the refuge as they drive into the parking area for the visitor center. Refer to Section 5.13.2.6.3 for a description of the existing views from KOP 3.

The Figure 5.13-2f visual simulation shows a view of the Project including the northern and eastern sides of the site. Views in the foreground are unaffected by the Project. The Project is located in the middle ground in this visual simulation. The plant site, which is the most prominent feature of the Project, would appear as a new irregularly shaped horizontal form of grey or tan color interrupting an expanse of agricultural land and a horizontal row of rounded green trees. The different structures at the plant site provide for relief and a textured appearance. Although closer to the foreground to the viewer, the cluster of proposed structures at the plant site generally repeat the form, texture, and color to the existing agricultural and geothermal energy production facilities nearby. Near the center of this view, two metallic, vertical AFT structures provide a minor distinctive focal point as they vertically protrude the skyline while expelling visible plumes. These new AFT structures generally repeat the scale, form, and materials of existing cooling towers at existing geothermal production facilities seen nearby. Stretching to the east from the PGF, gen-tie structures appear as a new row of black vertical lines, connected by several circuits of conduit appearing as black horizontal lines. Although significantly larger is size, the new gen-tie structures would repeat in form and materials to the existing utility poles within view. The new perimeter fence is completely visually absorbed by the larger, more prominent facility structures. The aboveground production pipelines are partially seen as horizontal black lines extending west from the plant site. Although the Project facilities appear as closer and slightly larger than nearby geothermal production facilities, the proposed building massing has a similar aesthetic treatment, and its character is not out-of-context with the style of nearby industrial. Element contrasts would be moderate as the plant site structures, gen-tie structures, and aboveground pipelines would be seen but would not attract attention due to the presence of similar features within the view.

The Project would be generally compatible with the existing landscape due to the similar scale, form, and materials with existing nearby geothermal power plants. Viewer sensitivity from KOP 3, primarily made up of recreationalists and motorists entering the Sonny Bono Salton Sea National Wildlife Refuge, is considered moderate due to the longer duration of views by this group (refer to Section 5.13.2.5). The general compatibility of the Project within the existing setting, combined with the moderate sensitivity of the viewers, result in a moderate long-term change to overall visual character.

5.13.3.5 Impact Significance

The following discussion addresses questions regarding whether the visual effects associated with the Project would be significant pursuant to CEQA criteria. The assessment of potential visual impacts is structured according to the criteria set forth in Appendix G of the CEQA Guidelines. The CEQA Guidelines define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the Project, including objects of historic or aesthetic significance (14 CCR 15382)." Additionally, FHWA guidelines were used as a supplement to evaluate visual character in order to conduct a more thorough analysis of compatibility at the Project site and sensitivity of nearby viewers. The four questions related to aesthetics that are posed for lead agencies and the answers to them follow.

1. Would the Project have a substantial adverse effect on a scenic vista?

   For purposes of this evaluation, a scenic vista is defined as a distant public view along or through an opening or corridor that is recognized and valued for its visual quality. There are no Imperial County or State designated scenic vistas within view of the Project. The Sonny Bono Salton Sea National Wildlife Refuge provides scenic views to the public, including from an elevated observation deck near the visitor center. The Project would be visible from the refuge, including from the observation deck. The Project would encroach on views of agricultural land, as viewed from the wildlife refuge and shown on KOP 3. As shown in KOP 3, and discussed in Section 5.13.3.4.3, the Project would be similar in scale, form, and materials to existing geothermal power plants located south and southwest of the scenic views offered at the wildlife refuge. Therefore, the Project would be generally compatible with the visual character of the setting.

   Viewer sensitivity at the refuge is considered moderate due to the longer duration of views by viewers entering the Sonny Bono Salton Sea National Wildlife Refuge. Due to the general compatibility of the Project with the existing visual character of the setting, and the moderate viewer sensitivity, the Project would result in a moderate long-term impact on visual character. As no designated scenic vistas would be impacted, the Project would result in less than significant impacts to the scenic resources of the Sonny Bono Salton Sea National Wildlife Refuge.

2. Would the Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

As described in Section 5.13.6.2 (LORS), there are no state scenic highways within view of the Project. The two closest highways in the Scenic Highway Program, both eligible, are between 13 and 15 miles across the Salton Sea from the Project. The eligible portion of State Route (SR-) 111 begins near Bombay Beach, about 14.5 miles north-northwest of the plant, and the eligible portion of SR-78 begins at the U.S. Border Patrol checkpoint, about 13.5 miles west-southwest of the plant. The Project would not be visible from either of these roadways; therefore, it would not affect scenic resources from these roadways.

3. Would the Project substantially degrade the existing visual character or quality of the site and its surroundings?

The Project would not substantially degrade the existing visual character of the site and its surroundings. The Project would introduce temporary construction sites and a new permanent industrial facility into a local area with existing similar industrial facilities.

Construction

Temporary construction facilities include construction laydown and parking areas, borrow pits, and construction camps located within five miles of the plant site. Although temporary activity associated with construction such as presence of large equipment, trucks, construction camps, and workers could be visible in the immediate area for approximately 29 months, existing intervening development, vegetation and fencing would partially screen views toward the temporary construction areas from most nearby public vantage points. Typical construction equipment and materials would vary on a daily basis but would be generally incompatible with the existing scale, form, and materials viewed in the landscape.

Potential visibility of construction phase activities would be primarily viewed in short durations from motorists traveling on rural local roadways. Viewer sensitivity of motorists is considered low due to the close proximity but shorter duration of views. Viewers within the SBSS NWR and workers, considered to have moderate viewer sensitivity due to longer viewing duration, would also view the construction sites. The nearest permanent residence is located approximately 2.5 miles southeast of the plant site. Although viewer sensitivity for residents is considered moderate to high, because few residences exist within view of the sites, overall sensitivity is considered low.

Due to the temporary nature of construction and moderate viewer sensitivity, the Project would result in less than significant short-term impacts on visual character and quality from construction.

Operation

As discussed in detail in Section 5.13.3.4, the Project would generally be seen within the context of a visual setting in which existing geothermal power plants, including cooling towers emitting visible plumes, tanks, gen-tie structures and aboveground pipelines, control buildings, and general industrial development, are present. The photographs and simulations presented on Figure 5.13-2a through Figure 5.13-2f demonstrate that, as seen from many nearby public locations in the vicinity, the built Project is similar in scale, form, and materials with existing geothermal power plants located in the local area and would be generally compatible with the existing visual character.

The built Project would be primarily viewed by motorists on local roadways as they travel in close proximity while passing the site, hence views of the Project would primarily be brief in duration. The Project would be seen by a smaller number of viewers on nearby trails, including Rock Hill Trail and the trails at Red Hill Marina County Park, as well as by a limited number of stationary viewers, which may include nearby agricultural and industrial workers and residents. Overall viewer sensitivity of the Project would be moderate.

Due to the general compatibility of the Project with the existing visual character, and the moderate visual sensitivity of viewers, the built Project would result in less than significant long-term impacts on visual character and quality.

4. Would the Project create a new source of substantial light and glare that would adversely affect day or nighttime views in the area?

   Nighttime construction is anticipated. This temporary lighting would be focused and directed on work areas. Given the rural agricultural setting, lack of residences within one mile of the Project, and presence of nearby geothermal energy production facilities, it is anticipated that any short-term construction-related sources of nighttime lighting would generally not be noticeable, and thus, the impact would be less than significant.

   As described in Section 5.13.3.3.7, operational lighting on the Project site would be limited to areas required for safety, would be directed on site to avoid backscatter, and would be shielded from public view to the extent practical. Lighting that is not required to be on during nighttime hours would be controlled with sensors or switches operated such that the lighting would be on only when needed.

   As described in Section 5.13.3.3.8, structure surfaces would be treated with non-reflective coatings, where feasible, which would reduce potential impacts from glare to a less than significant level. Additionally, lighting will be directed on site to avoid backscatter and will be shielded from public view to the extent practical. To further reduce visual impacts from glare and lighting, proposed Mitigation Measures VIS-1 and VIS-2 would require agency coordination for surface treatment of exterior equipment and lighting prior to final design.

   Given the limited level of lighting proposed for the Project and the measures that would be taken to minimize offsite effects, as well as the presence of existing nighttime lighting in the Project vicinity, night lighting and glare impacts from the Project would be less than significant.

5.13.4 Cumulative Effects

The CEQA Guidelines (Section 15355) define cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." As detailed in Section 5.6 Land Use, all of the identified projects, including renewable energy developments which been approved within Imperial County, are located at least one mile or more from the Project site.

Within approximately 10 square miles of the Project, there are 10 existing geothermal power plants, including 28 production wells and 41 injection wells (State Lands Commission, 2015). In particular, there is an existing geothermal power plant adjacent to the southeast of the plant site and approximately 0.75 mile southwest of the plant site. Due to the relatively sparse development of geothermal power plants within 10 miles, the general compatibility of the Project with the visual character, and because viewer sensitivity is considered moderate, the Project would result in less than significant cumulative visual impacts. Therefore, the Project does not contribute to a cumulatively considerable effect.

5.13.5 Mitigation Measures

VIS-1: The applicant shall coordinate with the California Energy Commission and/or Imperial County on the utilization of appropriate glare-minimizing surface treatment and materials on exterior equipment surfaces, as feasible, prior to final design. Surface treatment of exterior equipment shall comply with Imperial County Municipal Code Section 91702.02(E), as feasible.

VIS-2: The applicant shall coordinate with the California Energy Commission and/or Imperial County on appropriate night lighting design and materials prior to final design. Lighting shall comply with Imperial County Municipal Code Section 91702.02(L), as feasible.

5.13.6 Laws, Ordinances, Regulations, and Standards

As described in Section 5.6 Land Use, the Project is located along the eastern side of the Salton Sea, northwest of the City of Calipatria and southwest of the community of Niland in unincorporated Imperial

County. Applicable LORS were reviewed to support the evaluation of the Project's visual effects. The discussion below identifies (1) plans and policies relevant to visual quality that are potentially applicable to the Project, and (2) any potential conflicts with these policies.

At its closest point, the Project's auxiliary areas would be about 3.5 miles northwest of Calipatria, and the plant would be approximately 6.0 miles away from the city limits. The Project's auxiliary areas would be about 2.7 miles southwest of Niland, and the plant would be about 6.8 miles away from the community. Neither Calipatria's *2035 General Plan* nor the *Niland Urban Area Plan* identify any visual resources or properties with sensitive views toward the Project site. Therefore, these plans are not discussed further in this AFC. Federal visual resource LORS for the SBSS NWR and for BLM-administered land in the Project vicinity are discussed in Sections 5.13.6.1 and 5.13.6.2.

Table 5.13-3 lists the plans and ordinances that are pertinent to the Project. The specific provisions of each plan or ordinance that have potential relevance to the Project are identified below.

Table 5.13-3. LORS for Visual Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Sonny Bono Salton Sea National Wildlife Refuge Complex Final Comprehensive Conservation Plan	Plan provides long-term guidance for management decisions via goals, objectives, and strategies to accomplish refuge purposes and identify future need	U.S. Fish and Wildlife Service	Section 5.13.6.1
Visual Resource Management System	The results of BLM's visual resource inventory are applicable to BLM land in the Project vicinity	Bureau of Land Management Desert District (El Centro Field Office)	Section 5.13.6.2
California Scenic Highway Program	Plan to preserve and protect California state scenic highway corridors from change	California Department of Transportation	Section 5.13.6.3
Imperial County General Plan	Comprehensive long-range plan guides the physical development of Imperial County	Imperial County Planning and Development	Section 5.13.6.4

5.13.6.1 Sonny Bono Salton Sea National Wildlife Refuge Complex Final Comprehensive Conservation Plan

The National Wildlife Refuge (NWR) System was created to protect America's fish and wildlife by safeguarding the critical ecosystems on land and along waterways these species need to survive. NWRs also present opportunities for recreation, including activities where visual quality and aesthetics are critical, such as nature photography and wildlife viewing. The Sonny Bono Salton Sea NWR Complex includes the Sonny Bono Salton Sea NWR (SBSS NWR) and the Coachella Valley NWR. However, the Coachella Valley NWR is about 75 miles northwest of the Project, would not be affected by Project construction or operation, and, therefore, is not discussed further in this visual analysis. At its closest point, the Project, including the plant site, would be adjacent to Unit 2 of the SBSS NWR. Therefore, the SBSS NWR Comprehensive Conservation Plan (USFWS 2014) was reviewed for goal, policies, and objectives related to visual quality and aesthetics in and around the NWR. The BRGP is not located within the SBSS NWR and the goals, policies, and objectives are not applicable. However, the following assessment is provided for completeness.

The purpose of the Comprehensive Conservation Plan is to guide how the Refuges should be managed to best achieve the purposes for which they were established. The plan characterizes the Project area as generally having "little visible variation in elevation" except for the "most prominent features" of five rhyolite domes that comprise the Salton Buttes (USFWS 2014). Four of these landforms are clustered around Unit 2: Obsidian Butte, Red Island's two domes, and Rock Hill. The plan also notes that views from

Rock Hill of the Salton Sea and distant mountain ranges are "quite spectacular." While the rhyolite domes are west and north of Unit 2, the mountains encircle the Salton Sea and the Imperial Valley. Unit 2 currently has a trail to the top of Rock Hill to take advantage of these views.

Unit 2 visitor views to the west and north would be unimpeded while viewing the Salton Sea and Imperial Wildlife Area. The gen-tie line would encroach on views when looking to the east and southeast at the Chocolate Mountains. However, the new plant and gen-tie line would be noticeable to Unit 2 visitors and would be prominent in the views from Rock Hill and the Visitor's Center, even with the two existing geothermal plants already part of the view to the south. The intactness of views of the Chocolate Mountains, as viewed from Rock Hill and the Visitor's Center, is already disrupted by existing geothermal power plants, utility structures, and general development in the distance (refer to Figure 5.13-2b).

Views of prominent and unique features within the SBSS NWR would continue to be available to viewers of the SBSS NWR. Particularly, views from the visitor center, trails, and Rock Hill looking west towards the Salton Sea, would be unaffected by the Project.

5.13.6.2 BLM Visual Resource Management System

BLM's visual resource management system uses inventories of visual resources on BLM-administered lands to determine allowable visual changes to the characteristic landscape. The Project is not located on BLM-administered land. However, some of the Project elements may be visible from BLM parcels north of the Project. The northernmost auxiliary area, with less visible and temporary construction activities like staging and a borrow pit, would be about two miles south of the closest BLM parcels. More visible project elements, such as the gen-tie line and the plant, would be approximately four miles away. Therefore, some potential viewers could look across or from BLM land to the Project.

Because some potential viewers could view Project elements from or across BLM land, the most recent BLM guidance for the area was reviewed. The current plan for the Project area is *The California Desert Conservation Area Plan* (BLM 1999). BLM designated their parcels surrounding the Salton Sea for limited uses (Multiple-Use Class L) to protect scenic (and other) resource values via lower-intensity development. The plan indicates that a visual resources management program will be developed, but does not include specific policies, goals, or objectives related to visual resources on BLM-administered land in the Project vicinity.

The BLM national geographic information system (GIS) database was then reviewed to determine if BLM had more recent data for visual resources in the Project vicinity. As of February 2023, no areas of critical environmental concern, wilderness areas, or other special management areas are located within 10 miles of the Project. Additionally, the BLM database indicates a portion of one of the nearby parcels was part of a 2010 visual resources inventory. The inventory indicated visibility from this parcel is generally up to five miles but resulted in a low scenic quality rating. The inventory also indicated that maintenance of visual quality has low value, meaning the area is not visually sensitive. Overall, this nearby parcel was assigned visual resource inventory Class IV, which signifies areas with lesser visual value (BLM 2023).

Because of the lack of visually sensitive BLM resources, no analysis regarding BLM land with sensitive visual resources was conducted for this VIA. In addition, the Project can be considered to conform to the VRI Class IV designation for nearby BLM parcels in that construction and operation of the Project would not change the low scenic quality rating or visual sensitivity. The existing designations are already at the lowest end of the scenic quality and visual sensitivity scales.

5.13.6.3 California Scenic Highway Program

California's Scenic Highway Program was created by the Legislature in 1963. Its purpose is to preserve and protect scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to highways. The State Scenic Highway System includes highways that are either eligible for designation as scenic highways or have been designated as such.

The two closest highways in the Scenic Highway Program—both eligible—are between 13 and 15 miles across the Salton Sea from BRGP. The eligible portion of State Route (SR-) 111 begins near Bombay Beach, about 14.5 miles north-northwest of the plant, and the eligible portion of SR-78 begins at the U.S. Border Patrol checkpoint, about 13.5 miles west-southwest of the plant. The Project would not be visible from either of these roadways because of the distance and intervening structures; therefore, it conforms with the requirements of the state Scenic Highway Program.

5.13.6.4 Imperial County General Plan and Municipal Code

The Project is located in unincorporated Imperial County and is, therefore, subject to the provisions of the *Imperial County General Plan* (Imperial County 1993). The plan's Conservation and Open Space Element (COS), Circulation and Scenic Highways (CSH), Land Use (LU), and Renewable Energy and Transmission (RET) elements also include goals and objectives specific to the conservation of visual resources.

The plan identifies the Salton Sea as a "unique visual resource because of its size, its location in a desert area, and its value to wildlife." However, the Project would be located near two existing geothermal plants in the Salton Sea Known Geothermal Resource Area and in one of Imperial County's renewable energy/geothermal overlay zones. The RET element acknowledges that renewable energy facilities—like geothermal plants— can affect visual character and quality of visual resources like scenic vistas, the natural environmental, and existing landscapes. Such facilities can also result in "new sources of substantial light or glare." In accordance with the RET element, this chapter evaluates the degree to which the Project "location in relation to key observation areas would impact the existing aesthetics of the surrounding area." Sections 5.13.6.1 and 5.13.6.2 consider "recreational areas with scenic qualities such as the Salton Sea" and "compatibility with current visual resource ratings assigned to BLM-managed lands" (Imperial County 2015).

The geothermal overlay zone is intended to facilitate the development of renewable energy resources. Policies pertaining to visual resource that are applicable to the Project are summarized and evaluated in Table 5.13-4.

Table 5.13-4. Conformity with the Imperial County General Plan and Municipal Code

Provision	Conformity?
Imperial County Municipal Code Division 17 – Geothermal projects (considered to be the overriding guidance document to the various General Plan Elements).	Yes. The Project meets the appropriate land use and is within the Geothermal Overlay Zone. Visual impacts from potential geothermal power plants within this overlay have been previously analyzed by previous environmental impact studies associated with the adoption of Division 17 on October 24, 2017 (Section 7 of Ordinance No. 1521). The Project would be subject to Division 17 of the Imperial County Municipal Code (Section 91702.02(E)) which requires pipelines to be painted and/or landscaped to blend with the environment. Mitigation Measure VIS-1 requires agency coordination for surface treatment of exterior equipment. The gen-tie alignment was sited based on existing roads and available right-of-way to minimize the impacts from towers and lines on undeveloped or agricultural areas, as required by Division 17 of the Imperial County Municipal Code (Section 91702(G)). The wells and pipelines were sited to avoid the fragile ecological areas, as required by Division 17 of the Imperial County Municipal Code (Section 91702 (B)).

Provision	Conformity?
RET Environmental Implementation Standards: Consider potential direct and indirect impacts on aesthetics.	As described in this section (5.13 Visual Resources) impacts to visual quality and aesthetics have been evaluated.
RET Transmission Corridor Goal: To minimize, as much as practicable, the impact of transmission towers and lines upon our aesthetic environment by encouraging appropriate location and design features.	The gen-tie towers would noticeably exceed the height of existing transmission lines in the area. The gen-tie alignment was sited based on existing roads and available right-of-way to minimize the impacts from towers and lines on undeveloped or agricultural areas, as required by Division 17 of the Imperial County Municipal Code (Section 91702(G)).
COS Goal 1 (Conservation of Environmental Resources for Future Generations): Environmental resources shall be conserved for future generations by minimizing environmental impacts in all land use decisions and educating the public on their value. Objective 1.5: Provide opportunities for enjoyment of a quality natural experience to present and future generations.	The Project would be constructed on land currently used for agricultural near other existing geothermal facilities. Therefore, the Project would not degrade natural areas and would conform to COS Objective 1.5.
COS Goal 5 (Conservation of Visual Resources): The aesthetic character of the region shall be protected and enhanced to provide a pleasing environment for residential, commercial, recreational, and tourist activity. Objective 5.1: Encourage the conservation and enhancement of the natural beauty of the desert and mountain landscape.	The Project would be constructed on land currently used for agricultural near other existing geothermal facilities. Therefore, the Project would generally be compatible with the existing recreational and tourist environment.
COS Goal 8 (Protection of Opens Space and Recreational Opportunities): Open space shall be maintained to protect the aesthetic character of the region, protect natural resources, provide recreational opportunities, and minimize hazards to human activity. Objective 8.9: Conserve desert lands within the County's jurisdiction for wildlife protection, recreation, and aesthetic purposes.	The Project would be constructed on land currently used for agricultural near other existing geothermal facilities. Therefore, the Project would generally be compatible with the existing recreational environment.
COS Policy (Visual Resources Conservation): Develop planning programs to conserve and protect visual resources and scenic views from incompatible development and land uses. ▪ Program: Encourage designs that are compatible with the natural landscape and with recognized historical character and discourage designs that are clearly out of place within rural areas. ▪ Program: Encourage designs that emphasize native vegetation and conform grading to existing natural forms. Encourage abundant native landscaping that screens buildings and parking lots and blends development with the natural landscape. ▪ Program: Scenic protection standards for land use permits, including industrial and processing uses, and subdivisions should include visual assessments by qualified experts; visually effective setbacks near highways and roadways; siting in unobtrusive locations; and standards for height, architectural design, landscaping, lighting, and signs.	Although no landscaping is proposed, the Project would be subject to Division 17 of the Imperial County Municipal Code (Section 91702.02(E)) which requires pipelines to be painted and/or landscaped to blend with the environment. Mitigation Measure VIS-1 requires agency coordination for surface treatment of exterior equipment. The gen-tie alignment was sited based on existing roads and available right-of-way to minimize the impacts from towers and lines on undeveloped or agricultural areas, as required by Division 17 of the Imperial County Municipal Code (Section 91702(G)). The wells and pipelines were sited to avoid the fragile ecological areas, as required by Division 17 of the Imperial County Municipal Code (Section 91702 (B)).
COS Policy (Visual Resources Conservation): Develop a Scenic Highway program that identifies scenic highways for future state-designation and visual resource preservation. Program: Potential candidates considered eligible for designation include SR-78 and SR-111.	As described in Section 5.13.6.3, the Project would not be visible from the eligible portions of these state routes and thus would not affect their eligibility for scenic highway designation.

Provision	Conformity?
CSH Goal 4 (Scenic Highways): The County shall make every effort to develop a circulation system that highlights and preserves the environmental and scenic amenities of the area. Objective 4.3 Protect areas of outstanding scenic beauty along any scenic highways and protect the aesthetics of those areas.	As described in Section 5.13.6.3, the Project would not be visible from the eligible portions of these state routes and thus would not affect their eligibility for scenic highway designation.
LU Goal 3 (Regional Vision): Achieve balanced economic and residential growth while preserving the unique natural, scenic, and agricultural resources of Imperial County. Objective 3.4: Protect/improve the aesthetics of Imperial County and its communities.	The existing geothermal facilities have rendered portions of the Project area more industrial than agricultural.

Source: *Imperial County General Plan*. Adopted November 9, 1993. Cited elements updated January 29, 2008 (CSH), October 6, 2015 (LU and RETE), and March 8, 2016 (COS).

5.13.6.5 Summary of Project's Conformity with Applicable LORS

The Project would comply with Division 17 of the Imperial County Municipal Code, which is the overriding guidance document over Imperial County General Plan goals and policies. Therefore, the Project would conform to applicable LORS. Agencies and Agency Contacts

Agencies and contacts are provided in Table 5.13-5.

Table 5.13-5. Agency Contacts for Land Use

Issue	Agency	Contact
Imperial County permitting; Imperial County zoning and land use data; Imperial County engineering data	Imperial County Planning Division	Jim Minnick Planning and Development Services Director 801 Main Street El Centro, CA 92243 Phone: (442)-265-1736 jimminnick@co.imperial.ca.us
	Imperial County Building Division	Sergio Rubio Building Division Manager 801 Main Street El Centro, CA 92243 Phone: (442)-265-1736 sergiorubio@co.imperial.ca.us
	Imperial County Public Works/Engineering	John Gay Director of Public Works 155 South 11th Street El Centro, CA 92243 Phone: (442-265-1818 johngay@co.imperial.ca.us
Paleontological Resources Documentation and Specimen Repository	Anza Borrego Desert State Park Stout Research Center	Dr. Lyndon K. Murray District Paleontologist 200 Palm Canyon Drive Borrego Springs, CA 92004 Phone: (760) 767-4974 E-mail: lyndon.murray@parks.ca.gov

5.13.7 Permits and Permit Schedule

Because of the exclusive jurisdiction of the CEC, no other land use permits are required for the plant site. Conditional Use Permits from Imperial County may be required for ancillary facilities (well pads and pipelines). The Imperial County Planning Commission has authority to apply conditions which may further reduce potential impacts.

5.13.8 References

American Council of Engineering Companies (ACEC). 2019. *2019 California Environmental Quality Act & CEQA Guidelines.* 2019.

Britannica, The Editors of Encyclopaedia. "Imperial Valley". Encyclopedia Britannica, 3 March. 2023, https://www.britannica.com/place/Imperial-Valley. Accessed 7 March 2023.

BLM. 1999. *The California Desert Conservation Area Plan.* https://eplanning.blm.gov/public_projects/lup/66949/82080/96344/CDCA_Plan.pdf. Adopted 1980; reprinted and amended 1999.

____. 2023. BLM National Visual Resource Inventory Classes Polygons. https://gbp-blm-egis.hub.arcgis.com/datasets/BLM-EGIS::blm-natl-visual-resource-inventory-classes-polygons/explore?location=33.287761%2C-115.616513%2C13.00. Last update: February 8, 2023.

California Department of Transportation (Caltrans). 2018. California State Scenic Highway System Map. https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed February 23, 2023.

California Energy Commission (CEC). 2020. *Known Geothermal Resource Areas- California, 2020.* https://gis.data.ca.gov/documents/CAEnergy::known-geothermal-resource-areas/about. Accessed on March 31, 2023.

California State Lands Commission. 2015. The Geysers and Salton Sea Geothermal Fields. Updated June 2015. https://slc.ca.gov/wp-content/uploads/2018/10/07-TheGeysersandSaltonSeaFields.pdf. Accessed March 30, 2023.

City of Calipatria. 2013. *2035 General Plan.* http://www.calipatria.com/media/managed/calipatria-2035-general-plan-september-20131.pdf. Accessed February 23, 2023.

Imperial County Assessor's Office. 2020. *Assessor's GIS*. Available Online at: https://assessor.imperialcounty.org/. Accessed on February 27, 2023.

Imperial County Planning/Building Department. 1996. *Niland Urban Area Plan.* https://www.icpds.com/assets/planning/community-plans/niland-urban-area-plan.pdf. Accessed February 23, 2023.

Imperial County Planning and Development Services. 2015. *Renewable Energy and Transmission Element County of Imperial General Plan.* https://www.icpds.com/assets/planning/cec-alternative-energy-update/reports-and-documents/final-renewable-energy-and-transmission-element-10-6-15.pdf. Accessed March 10, 2023.

Imperial County Planning and Development Services. 2023. General Plan. https://www.icpds.com/planning/land-use-documents/general-plan. Adopted November 9, 1993. Accessed March 10, 2023.

Los Angeles Department of Public Works (LADPW). 2023. *Speed Limits.* Available online at: https://dpw.lacounty.gov/tnl/SpeedLimits.shtml#:~:text=The%20maximum%20speed%20limit%20on,and%20for%20vehicles%20towing%20trailers. Accessed on February 23, 2023.

National Academy of Sciences. 2007. *Environmental Impacts of Wind-Energy projects*. Washington, DC. 2007.

The Salton Sea Authority. 2023. Frequently Asked Questions. Available online at: https://saltonsea.com/about/faq/#:~:text=The%20total%20volume%20of%20water,approximately%207.5%20million%20acre%20feet.&text=As%20stated%20the%20Salton%20Sea,point%20in%20the%20northern%20half. Accessed on February 22, 2023.

U.S. Department of Transportation, Federal Highway Administration (FHWA). 2015. *Guidelines for the Visual Impact Assessment of Highway projects*. Available online at: https://www.environment.fhwa.dot.gov/env_topics/other_topics/VIA_Guidelines_for_Highway_projects.aspx#chap53. Accessed on February 27, 2023.

U.S. Fish and Wildlife Service (USFWS). 2023. *Sonny Bono Salton Sea National Wildlife Refuge – About Us*. Available online at: https://www.fws.gov/refuge/sonny-bono-salton-sea/about-us. Accessed on March 4, 2023.

U.S. Fish and Wildlife Service (USFWS). 2014. *Sonny Bono Salton Sea National Wildlife Refuge Complex Final Comprehensive Conservation Plan.* https://ecos.fws.gov/ServCat/Reference/Profile/108501. Accessed March 10, 2023.

5.14 Waste Management

This section discusses the potential effects on human health and the environment from nonhazardous and hazardous waste generated at the Black Rock Geothermal Project (BRGP or Project). Section 5.14.1 describes Project site investigations that have determined whether past activities have contaminated the site as well as the future waste streams that would be generated by the Project. Section 5.14.2 describes the Project's environmental analysis in terms of waste managed and waste disposal sites used. Section 5.14.3 discusses potential cumulative effects. Section 5.14.4 describes proposed mitigation measures. Section 5.14.5 presents laws, ordinances, regulations, and standards (LORS) that apply to the generated waste. Section 5.14.6 describes agencies that have jurisdiction over the generated waste and provides a list of agency contacts. Section 5.14.7 describes permits required for generated waste and a schedule for obtaining those permits. Section 5.14.8 provides the references used to prepare this section.

5.14.1 Affected Environment

This section discusses the condition of the approximately 55-acre Project site and the potential need to remove or otherwise treat contaminated soil or groundwater at the site. Additionally, this section identifies the various nonhazardous and hazardous waste streams for Project construction and operation.

The Project consists of the geothermal power plant as well as associated infrastructure, including seven new well pads and associated production and injection wells. In addition, the Project includes up to eleven potential construction crew camps, laydown and parking areas located throughout the region and up to four borrow pits. Most of the laydown and parking areas for BRGP will be located adjacent to the site immediately south and east. However, up to all fifteen sites may be used and will be shared between three proposed projects: BRGP, Elmore North Geothermal Project (ENGP), and Morton Bay Geothermal Project (MBGP).

5.14.1.1 Site Investigations

A Phase I environmental site assessment (ESA) was conducted in September 2022 by Jacobs for the Project site (Jacobs 2022) (Appendix 5.14A). The ESA was conducted in accordance with methods prescribed by the American Society for Testing and Materials document entitled "Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process (Designation: E 1527-21)."

The Phase I ESA report identified the following Recognized Environmental Condition (REC):

> The southeast corner of the Site is intersected by the property boundary for CalEnergy R2 Vulcan and Del Ranch Power Plants. The CalEnergy R2 Vulcan and Del Ranch Power Plants property is identified by the [State Water Resources Control Board] as an [land disposal site] based on operation of surface impoundments (brine ponds), which contain plant processes/effluent streams (CalEnergy 2021). Additionally, an land use covenant (LUC) is also in place for a portion of the CalEnergy R2 Vulcan and Del Ranch Power Plants. The LUC specifies that no excavation of contaminated soils can occur without regulatory agency review and approval (Cal Energy 2012). This environmental restriction is not applicable to the portion of the CalEnergy R2 Vulcan and Del Ranch Power Plants property that intersects the boundary of the Site.

Further, the Phase I ESA Report identified one environmental condition for the site:

> Historical aerial photograph records and the site reconnaissance indicate that the Site has been used for agricultural purposes from 1937 through present. Based on the historical agricultural activities, there is a potential for the soil or groundwater to harbor residual agricultural chemicals from past fertilizer, pesticide, or herbicide application.

Even with the identified REC and environmental condition, it was determined that impacts at the Project site is considered low since the environmental restrictions are not applicable at the Project site. In addition, no Controlled Recognized Environmental Conditions or Historic Recognized Environmental Conditions were identified at the Project site. Two discarded oil containers (one quart size and one 5-gallon container) were observed on the east side of the property along Boyle Road; however, no staining was observed in the area of the discarded oil containers. The potential for a small quantity of the oil to have been released from the containers is considered a *de minimis* condition.

5.14.1.2 Project Waste Generation

Wastewater, nonhazardous waste, and hazardous waste will be generated at the Project site during facility construction and operation.

5.14.1.2.1 Construction Phase

During construction, the primary waste generated will be nonhazardous waste. However, some hazardous waste will also be generated. All of the hazardous wastes will be generated at the Project site. The types of waste and their estimated quantities are described below. Typical wastes generated during construction are identified in Table 5.14-1.

Nonhazardous Solid Waste. The nonhazardous waste streams listed below could potentially be generated from construction of the Project:

- **<u>Paper, Wood, Glass, and Plastics: Per month over an estimated 29-month construction period, a</u>**pproximately 77 tons of paper, wood, glass, and plastics will be generated from packing materials, waste lumber, insulation, and empty nonhazardous chemical containers during Project construction. The waste will be placed in onsite dumpsters. These wastes will be recycled where practical. Waste that cannot be recycled will be disposed of periodically at a Class II or III landfill.
- **<u>Concrete:</u>** Approximately 200 tons of excess concrete will be generated during construction of the Project. Waste will be recycled where practical, and nonrecyclable waste will be deposited in a Class III landfill.
- **<u>Metal: Per month, a</u>**pproximately 33 tons of metal, including steel from welding/cutting operations, packing materials, and empty nonhazardous chemical containers, as well as aluminum waste from packing materials and electrical wiring, will be generated during construction. Waste will be recycled where practical, and nonrecyclable waste will be deposited in a Class III landfill.

Table 5.14-1. Potential Wastes Generated during Construction

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Scrap wood, glass, plastic, paper, calcium silicate insulation, mineral wool insulation	Construction	Normal refuse	77 tons per month	Nonhazardous	Recycle and/or dispose of at Class II or III landfill
Scrap metals	Construction	Parts, containers	33 tons per month	Nonhazardous	Recycle and/or dispose of at Class III landfill
Concrete	Construction	Solids	200 tons[a] during construction	Nonhazardous	Recycle and/or dispose of at Class III Landfill

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Empty hazardous material containers	Construction	Drums, containers, totes	840 containers[b] during construction	Nonhazardous	Dispose of containers <5 gallons as normal refuse; return containers >5 gallons to vendors for recycling or reconditioning
Spent welding materials	Construction	Solid	5 lbs per month	Nonhazardous or hazardous	Recycle with vendors if nonhazardous; offsite at Class I landfill if hazardous
Petroleum contaminated solids (>51%)	Oil filters, rags, absorbents material potentially small leaks and spills	Hydrocarbons	500 lbs per month	Hazardous	Recycled or disposed offsite at permitted TSDF
Solvents, paint, adhesives	Construction	Varies	10 lbs per month	Hazardous	Recycle at permitted TSDF
Steam turbine piping cleaning waste	Pipe cleaning and flushing	Varies	110 gallons during construction	Hazardous or nonhazardous fluid	Dispose at permitted TSDF

Notes:
[a] 30 cubic yards
[b] Containers include <5-gallon containers, 55-gallon drums, or totes
lbs = pounds
RCRA = Resource Conservation and Recovery Act
TSDF = treatment, storage, and disposal facility

Wastewater. Wastewater generated during construction will include sanitary waste, stormwater runoff, equipment washdown water, and water from excavation dewatering during construction (if dewatering is required). These wastewaters could be classified as hazardous or nonhazardous depending on their chemical quality. As discussed, wastewater would be sampled and disposed of if found hazardous. Methods for disposing of nonhazardous wastewaters are identified in Section 5.14.4.1.

Hazardous Waste. Most hazardous waste generated during construction will consist of fluids, including flushing and cleaning fluids, and solvents. Other hazardous waste, such as oil filters, oily debris, welding materials and dried paint, may also be generated during construction.

When pipes are cleaned and flushed, fluid waste will be generated. The volume of flushing and cleaning waste generated is estimated to be one to two times the internal volume of the pipes cleaned.
The quantity of welding, solvent, and paint waste is expected to be minimal. Methods for recycling and disposing of hazardous wastes during construction are described in Section 5.14.4.1.

5.14.1.2.2 Operation Phase

During Project operation, the primary waste generated will be nonhazardous waste. However, varying quantities of hazardous waste also will be generated periodically. The types of wastes and their estimated quantities are discussed below.

Nonhazardous Waste. *T*he Project will produce facility wastes typical of geothermal power generation operations and maintenance activities. These wastes consists primarily of filter cake, a dewatered slurry from the underflow of the clarification system. Other nonhazardous wastes may include broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other miscellaneous solid wastes. The quantity of all solid nonhazardous waste generated is estimated approximately 15,000 tons per year (tpy). Large metal parts will be recycled.

Nonhazardous Fluids. The primary discharge will consist of spent geothermal fluid from the secondary clarifiers that will be reinjected via the injection wells to replenish the geothermal resource. In upset conditions, this spent geothermal fluid would be directed to a Class II surface impoundment (brine pond), after which it would be injected into a dedicated aerated fluid injection well. This dedicated aerated fluid injection well would also receive fluid from the thickener, which collects filter press filtrate, and fluid from the plant conveyance system around the plant equipment. The brine pond will also receive fluid generated during emergency situations, maintenance operations, spills and water from hydro blasting, portable shower effluent, vehicle wash station effluent, and reject water from reverse osmosis system. Monitoring wells would be provided adjacent to the brine pond to comply with Regional Water Quality Control Board (RWQCB) ground water regulations. Fluid injection will take place in accordance with California Department of Conservation, Geologic Energy Management Division (CalGEM) and RWQCB requirements.

The brine pond will be located within the plant site and is a concrete surfaced basin that is sized to accommodate draining of the primary and secondary clarifier, plus two feet of freeboard. The triple-lined brine pond will include a Leachate Collection and Removal System to detect any leaks in the primary liner.

During upset conditions, spent geothermal fluid that overflows from the clarifiers and the thickener would be directed to the brine pond for temporary storage, after which this fluid will be pumped to the aerated fluid injection well. This fluid would be discharged into an injection well after startup is complete.

A secondary source of process water is blowdown from the cooling towers. This process water will be injected into the dedicated condensate injection well.

The sanitary drains will discharge to a septic tank. Waste from the septic tank will be pumped out periodically. The septic tank will outlet to the dispersal system, such as a leach field, evapotranspiration bed, or other approved disposal method based on site constraints. Equipment washwater will be contained within designated areas and transported to the brine pond. Storm drainage will be collected in the retention basin on the west side of the facility and either pumped to the brine pond or allowed to evaporate.

Hazardous Waste. Hazardous waste generated will include used lubricating oil, brine pond solids, geothermal scale, cooling tower debris and sludge, aerosol containers, solvents, paint, adhesives, laboratory analysis waste, and lead acid batteries. It may also include geothermal filter cake, when considered hazardous. Based on the proposed design of the facility, it is likely that over the life of the Project, the BRGP can achieve a goal of generating 95 percent of the filter cake that will be characterized as nonhazardous. Approximately five percent will likely be characterized as hazardous due to elevated concentrations of heavy metals. The brine pond temporarily stores solids that have either precipitated or settled out of the geothermal fluid during the power generation process, which may include constituents provided in Table 2-3.

Wastes potentially generated during operations at the facility are summarized in Table 5.14-2.

Table 5.14-2. Potential Wastes Generated during Project Operations

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Petroleum contaminated solids (>51%)	Oil filters, small leaks and spills from the turbine lubricating oil system	Hydrocarbons	50 tons per year	Hazardous	Recycled or disposed offsite at permitted TSDF
Oil, water, sludge	Turbine lube oil console units	Hydrocarbons	50 tons per year	Hazardous	Recycled or disposed offsite at permitted TSDF

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Used Oil	Turbine, valves, pumps, motor oil change out	Hydrocarbons	20 tons per year	Hazardous	Recycled by certified oil recycler
brine pond solids	Clarifier, well maintenance, plant conveyance, atmospheric flash tank, scrubber drains	Geothermal fluids solids	7,000 tons per year	Hazardous	Dispose offsite at permitted TSDF
Geothermal Scale	Hydroblasting scale debris from pipes, process valves and vessels	Varies	3,000 tons per year	Hazardous	Dispose offsite at permitted TSDF
Geothermal filter cake	Geothermal byproduct	Varies	~800 tons per year	Hazardous	Dispose offsite at permitted TSDF
Geothermal filter cake	Geothermal byproduct	Varies	~14,000 tons per year	Nonhazardous	DVC monofill
Cooling tower debris and sludge	Cooling tower fill material, sludge	Solid debris, sludge containing mud and spent chemicals	200 tons per year	Hazardous	Dispose offsite at permitted TSDF
Aerosol containers, solvents, paint, adhesives	Maintenance	Varies	800 lbs per year	Hazardous	Dispose offsite at permitted TSDF
Laboratory analysis waste	Process related	Waste reagents and laboratory chemicals	2,700 lbs per year	Hazardous	Dispose offsite at permitted TSDF
Lead acid batteries	Electrical room, equipment	Metals	80 lbs per year	Hazardous	Store <10 batteries (for up to one year) then recycle offsite
Alkaline batteries	Equipment	Metals	40 lbs per year	Universal waste solids	Recycle or dispose offsite at Universal Waste Destination Facility
Fluorescent tubes	Maintenance Area Lighting	Metals	180 lbs per year	Universal waste solids	Recycle or dispose offsite at Universal Waste Destination Facility
Scrap metal and electronic components	Distributed control system, plant computers, instruments, etc.	Metals	100 lbs per year	Universal Waste Solids	Recycle with an approved facility
Commercial Trash	Typical solid waste from commercial facilities such as paper, packaging, debris	Normal refuse	75 tons per year	Nonhazardous	Local landfill

Notes:

lbs = pounds

DVC = Desert Valley Company

5.14.2 Environmental Analysis

5.14.2.1 Significance Criteria

A project may have a significant effect on the environment in terms of waste management if it meets the following criteria (California Environmental Quality Act Guidelines Section 15002[g], Appendix G):

- Be located on a site that is included on a list of hazardous materials sites (Cortese List) compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment
- Have solid waste disposal needs beyond the capacity of appropriate landfills to accommodate them

The risks or hazards posed by the transportation of hazardous materials, including hazardous wastes, are described and analyzed in Section 5.5, Hazardous Materials Handling.

5.14.2.2 Cortese List

An examination of the California Department of Toxic Substances Control (DTSC) Hazardous Waste and Substances Site List (Cortese List) compiled pursuant to Government Code Section 65962.5 shows there are no sites currently on the list within 1,000 feet of the Project site (DTSC 2023a). The closest listed site is the Puregro Company site at 1025 River Drive in Brawley, California, which is approximately 12 miles from the proposed Project site. Thus, it is highly unlikely that any impacts will result from Cortese-listed properties, nor will the Project site present a significant hazard to the public or the environment.

5.14.2.3 Solid Waste Disposal

Nonhazardous waste (often referred to as municipal waste or garbage) will be recycled or deposited at a Class II or III landfill. Hazardous wastes will be delivered to a permitted offsite TSDF for treatment or recycling, or will be deposited at a permitted Class I landfill. The following sections describe the waste disposal sites feasible for disposal of Project wastes (Table 5.14-3).

5.14.2.3.1 Nonhazardous Waste

Approximately 3,400 total tons of nonhazardous waste will be generated during Project construction. An additional 14,000 total tons of nonhazardous waste will be generated during its operation on an annual basis. The nonhazardous wastes will be recycled to the extent possible, and what cannot be recycled will be disposed of at a permitted landfill as discussed below.

It is anticipated that all excavated soil will be used onsite for grading and leveling purposes. In the event that some excavated soil is not reused onsite, it will be classified for disposal on the basis of sampling completed once the soil is excavated and stockpiled. Soil determined to be nonhazardous may be suitable for reuse at a construction site or disposal at a regional disposal facility, depending on its characteristics.

The nonhazardous filter cake waste from the Project site will be transported to the Desert Valley Company's monofill for disposal. The monofill, located in Brawley, California, is an active Class II Solid Waste Management Facility used for the disposal of designated geothermal nonhazardous waste streams and byproducts. The monofill was recently permitted by Imperial County to add a fourth disposal cell (Cell 4). Cell 4 will be developed in two separate phases that will increase the disposal capacity of the monofill by 2.6 million cubic yards. Based on the expected waste disposal rates for the Project site, along with other planned geothermal power plants, the Applicant expects that the monofill will have an operational life extending to at least 2051 based on current disposal rates, but the final Environmental Impact Report (EIR) currently extends the closure date to 2080. No enforcement actions have been identified at the facility, no violations have been identified since 2004. A single area of concern (AOC) was identified during a routine inspection by the Local Enforcement Agency (LEA) inspector on January 20, 2022. During this inspection the LEA inspector noted that the Operator submitted their January 2022 tonnage report on

February 17, 2022[1]. The operator was reminded that monthly tonnage reports are due by the 15th day of the following month per permit requirements. Based on subsequent inspections, the concerns have been resolved (CalRecycle 2023a).

All other nonhazardous solid wastes will be collected by a commercial waste hauler and transported to Republic Services Allied Imperial Landfill (Republic Services), operated by Imperial Landfill, Inc. The 337-acre facility is located at 104 E Robinson Road, Imperial, California. Republic Services accepts mixed municipal, construction/demolition, and industrial waste. The active Class III landfill has a permitted capacity of 19.5 million cubic yards and a maximum throughput of 1,700 tons per day. No enforcement actions have been identified at the facility since 2006, no violations have been identified since 2021, and a single AOC was identified during the last inspection. On December 21, 2022, a routine inspection by the LEA inspector noted that the status impact report was due to California Department of Resources Recycling and Recovery (CalRecycle) by January 1, 2023. The AOC was resolved when the landfill submitted the report on January 17, 2023 (CalRecycle 2023a).

Republic Services owns Valley Environmental Services, a transfer/processing facility in Imperial County (El Centro), where waste is processed prior to disposal (Andrade 2023). Valley Environmental Services is located at 702 East Heil Avenue, El Centro, California, on five acres of land. The facility has a permit for mixed municipal waste at a capacity of 36,135 tons per year with a maximum throughput of 99 tons per day. No enforcement actions have been identified at the facility since 2008, and the last violation was identified during an inspection in 2022. On May 24, 2022, a routine inspection by the LEA inspector noted that the site would need to comply with 14 CCR 17409.5.7 and 14 CCR 17409.5.6 if organic waste is handled at the facility. Based on subsequent inspections, the concern has been resolved (CalRecycle 2023a).

Two additional landfills that provide nonhazardous waste services to Imperial County area include Imperial Solid Waste Site and the Salton City Solid Waste Site (Andrade 2023). The Imperial Solid Waste Landfill is located at 1705 W. Worthington Road in Imperial, California. The active solid waste landfill, operated by the Imperial County Department of Public Works, accepts mixed municipal and agricultural waste. The facility is comprised of one acre, with a maximum permitted capacity of 1,560 tons per year and a maximum permitted throughput of 15 tons per day. There have been no enforcement actions or AOCs identified (CalRecycle 2023a).

The Salton City Solid Waste Site is also located in Imperial County at 935 W. Highway 86 in Salton City, California on 320 acres owned by Imperial County. This Class III facility is operated by Burrtec Waste Industries, Inc. and accepts mixed municipal, industrial, and construction/demolition waste. It has a remaining capacity of 1,264,170 cubic yards with a maximum throughput of 6,000 tons per day.
No enforcement actions have been identified at the facility since 2008, and the last violation was identified during an inspection in 2022. On February 25, 2022, a routine inspection by the LEA inspector noted landfill daily cover and worker health and safety concerns during machine operation. Based on subsequent inspections, the concerns have been resolved (CalRecycle 2023a).

[1] Dates for AOC at monofill located online via by CalRecycle 2023a

Table 5.14-3. Solid Nonhazardous Waste Disposal Facilities in the Vicinity of the Project

Landfill/ Transfer Station	Location	Class	Permitted Capacity*	Remaining Capacity* (cubic yards)	Permitted Throughput* (tons per day)	Estimated Closure Date*	Violation of Minimum State Standards Noted*
DVC Monofill[c]	Brawley, CA	III	4,329,800 cubic yards[a]	3,540,156[a]	750	2051-2080[a,b]	None
Republic Services Allied Imperial Landfill	Imperial, CA	III	19,514,700 cubic yards	12,384,000	1,700	12/31/2040	Yes (10/06)
Valley Environmental Services	El Centro, CA	NA	36,135 tons per year	NA	99	NA	Yes (09/08)
Imperial Solid Waste Site	Imperial, CA	III	1,560 tons per year	NA	15	NA	None
Salton City Solid Waste Site	Salton City, CA	III	65,100,000	1,264,170	6,000	12/31/2038	Yes (06/08)

* Based on CalRecycle SWIS Database (CalRecycle 2023a)

[a] Information is from the latest permit approved by RWQCB to expand the facility via Cell 4.

[b] Estimated closure date based on current disposal rates in anticipated to be 2051. Final EIR identifies 2080 as closure date.

[c] DVC Monofill accepts only geothermal waste consisting of nonhazardous waste associated with geothermal energy facilities.

According to CalRecycle, the Republic Services Allied Imperial Landfill has a total capacity of more than 19.5 million cubic yards of refuse, and the estimated remaining capacity as of March 31, 2019, was more than 12.3 million cubic yards.

Adequate landfill capacity exists; therefore, disposal of nonhazardous waste will not be a constraint on the Project development. Impacts related to landfill capacity will be less than significant.

5.14.2.3.2 Hazardous Waste

Hazardous waste generated at the Project will be stored at the facility for less than 90 days. The waste will then be transported to a TSDF by a permitted hazardous waste transporter. These facilities vary considerably in what they can do with the hazardous waste they receive. Some can only store waste, some can treat the waste to recover usable products, and others can dispose of the waste by incineration, deep-well injection, or landfilling. Incineration and deep-well injection of these materials are not permitted in California.

According to DTSC, over 100 facilities in California can accept wastes such as batteries, used oil, solvents, or other hazardous waste for treatment, recycling, or disposal (DTSC 2023b). For ultimate disposal, the Project will use multiple facilities.

Clean Harbors Buttonwillow Landfill. This landfill is permitted at 13.25 million cubic yards and can accept 10,500 tons per day. The Class I landfill is permitted to accept waste until 2040 (CalRecycle 2023). Buttonwillow has been permitted to manage a wide range of hazardous wastes, including RCRA hazardous wastes, California hazardous waste, and nonhazardous waste for stabilization treatment, solidification, and landfill. The landfill can handle containers and bulk hazardous waste in liquid, solid, semi-solid, sludge and gas form. Typical waste streams include fluids, solids, semi-solids and sludge, inorganic and organic waste, listed hazardous waste, RCRA waste with heavy metals or organics, nonhazardous waste, oil and water mixtures, PCB disposal, radioactive waste (NORM/TENORM), transportation and logistics (Clean Harbors 2023).

Copper Mountain Landfill. This landfill operated by Republic Services, Inc. in Yuma, Arizona has a design capacity of approximately 61.4 million tons (ADEQ 2023). The facility is permitted to accept construction/demolition, municipal solid, and California hazardous wastes. With approval from the local County, the facility is also approved to receive other industrial wastes. There is currently no annual or daily capacity limits at this facility. Facility operations is estimated to last for through the next 121 years, until 2144 (Mullins 2023).

Kettleman Hills Facility. This landfill, operated by Chemical Waste Management Inc., accepts Class I waste. The B-18 landfill is permitted for and will accept all hazardous wastes except radioactive materials, compressed gases in cylinders, biological agents/infectious waste, and explosives. Currently, B-18 landfill Phases 1 and 2 are in operation with a permitted capacity of 18.4 million cubic yards, although most of that capacity has been expended. B-18 Phase 3 has been permitted with a capacity of approximately five million cubic yards and an anticipated closure date of 2033. After B-18 closes, a new B-20 hazardous waste landfill will be opened on currently undeveloped land at the site. B-20 has a permitted capacity of 15 million cubic yards and a life expectancy of 24 years. As a whole, Kettleman Hills Landfill will be accepting waste for the next 38 years, until 2054.

Alternative Treatment and Recycling Facilities*. In addition to hazardous waste landfills, there are numerous offsite commercial hazardous waste treatment and recycling facilities near the* Project *area. Some facilities that may be used include Safety Kleen or* Veolia Environmental Services in Southern California or US Ecology Beatty in Nevada.

5.14.2.4 Waste Disposal Summary

The Project will generate nonhazardous waste that will add to the total waste generated in Imperial County and in California. However, there is adequate recycling and landfill capacity in California to recycle and dispose of the waste generated by the Project. Between recycling and offsite transport, it is estimated that the Project will generate approximately 75 tpy from operations. Considering that 284,847 tons of solid waste went to landfill in Imperial County in 2020, the Project's contribution will likely represent approximately 0.03 percent of the total waste landfilled in the county (CalRecycle 2023b). Therefore, the impact of the Project on solid waste recycling and disposal capacity will not be significant.

Hazardous waste generated will consist of used oil, brine pond solids, geothermal scale, failed filter cake, cooling tower debris and sludge, aerosol containers, equipment maintenance fluids/solvents, paint, adhesives, laboratory analysis waste, and lead acid batteries. Hazardous waste treatment and disposal capacity at the designated facilities are more than adequate. Therefore, the effect of the Project on hazardous waste recycling, treatment, and disposal capacity will not be significant.

5.14.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code Section 21083; Title 14 California Code of Regulations, Title 14, Sections 15064[h], 15065[c], 15130, and 15355).

The quantities of nonhazardous wastes that would be generated during the Project construction and operation would be relatively low: approximately 3,400 tons (total) of solid waste during construction and approximately 14,000 tons per year (tpy) during operation. Recycling efforts would be prioritized wherever practical, and capacity is available in a variety of treatment and disposal facilities near the Project area.

An estimated 24,000 tpy on nonhazardous waste are anticipated to be generated at the proposed ENGP and MBGP during the operation of each project. Approximately 284,847 tons of solid waste were landfilled in Imperial County in 2020, and therefore the cumulative operational contribution will likely represent less than 22% of the total waste landfilled in the County (CalRecycle 2023b). Regarding hazardous waste, less than one ton will be generated during construction and approximately 15,000 tpy is estimated during operation. There is sufficient capacity at the designated TDSFs.

Additionally, there are six proposed projects within a six-mile radius of the site, which includes: Energy Source Mineral ALTiS, Hell's Kitchen Geothermal Exploration Project, Midway Solar Farm IV, Lindsey Solar Farm, Wilkinson Solar Farm, and Ormat Wister Solar. Existing and future projects proposed are subject to, and follow, federal, state, and local laws and ordinances for waste management; thus, cumulative effects are not significant. Further, adequate capacity exists at both nonhazardous waste and hazardous waste landfills. Therefore, the impact of the Project on solid waste recycling and disposal capacity will not be significant.

5.14.4 Mitigation and Waste Management Methods

The handling and management of waste generated by the Project will follow the hierarchical approach of source reduction, recycling, and disposal. The first priority will be to reduce the quantity of waste generated through pollution prevention methods (e.g., high efficiency cleaning methods). The next level of waste management will involve reusing or recycling wastes (e.g., used oil recycling). For wastes that cannot be recycled, offsite disposal will be used for residual wastes that cannot be reused or recycled,

The following sections present methods for managing nonhazardous and hazardous waste generated by the Project.

5.14.4.1 Construction Phase

Handling requirements and mitigation measures for handling wastes during construction are described in the following sections.

5.14.4.1.1 Nonhazardous Wastes

Nonhazardous solid waste generated during construction will be collected in onsite dumpsters and will be picked up periodically by Republic Services in Imperial, California. Waste materials that may be recycled will be taken to Valley Environmental Services, El Centro, California (Andrade 2023).

Wastewater generated during construction will include sanitary waste and could include excavation dewatering water, equipment washwater, and stormwater runoff. Sanitary waste will be collected in portable, self-contained toilets and disposed of by a contracted sanitary service. Excavation dewatering water and equipment washwater will be contained within designated areas, sampled, and if nonhazardous transported to the onsite retention basin. Stormwater runoff will be managed in accordance with a stormwater management permit, which will be obtained before construction starts. Storm drainage will be collected in the retention basin and allowed to evaporate. Nonhazardous wastewater generation will be minimized, where feasible, by water conservation and reuse measures, such as dust control and road watering.

5.14.4.1.2 Hazardous Wastes

Most hazardous waste generated during construction will consist of excavation dewatering water, flushing and cleaning fluids, and solvents. Some waste in the form of welding materials and dried paint may also be generated. Nonhazardous materials will be used whenever possible to minimize the quantity of hazardous waste generated. The construction contractor will be the generator of hazardous construction waste and will be responsible for proper handling in compliance with all applicable federal, state, and local laws and regulations, including licensing, training of personnel, accumulation limits and times, and reporting and recordkeeping. The hazardous waste will be collected in satellite accumulation containers near the points of generation. This waste will be moved to the contractor’s 90-day hazardous waste storage area, located at the plant construction laydown area. The waste will be delivered to an authorized hazardous waste management facility before expiration of the 90-day storage limit.

5.14.4.2 Operation Phase

Handling requirements and mitigation measures for the handling of wastes during operation are described in the following sections.

5.14.4.2.1 Nonhazardous Wastes

All aqueous discharges, with the exception of sanitary wastewater, will be reinjected into the injection wells to replenish the geothermal resource. In plant upset conditions, this spent geothermal fluid would be directed to the brine pond, after which it would be injected into a dedicated aerated fluid injection well. The brine pond will also receive fluid generated during emergency situations, maintenance operations, spills and water from hydro blasting, portable shower effluent, vehicle wash station effluent, and reject water from reverse osmosis system. Well injection will take place in accordance with CalGEM requirements.

The brine pond would also collect fluid from wells during flow-testing after drilling during introduction of fluid to the Resource Production Facility and Power Generation Facility. This fluid would be discharged to brine pond before discharged to an injection well.

A secondary source of wastewater is process water from the cooling towers. This process water will be injected into the dedicated condensate injection well.

Sanitary waste will flow to an onsite septic tank that will be pumped out regularly. Equipment washwater will be contained within designated areas and transported to the brine pond. Storm drainage will be collected in the retention basin and allowed to evaporate.

The nonhazardous filter cake will be transported to the Desert Valley Company's monofill for disposal. Other nonhazardous waste will be collected, processed for material recovery/recycling, and, if recycling is not feasible, deposited in a local landfill. Whenever practical, recycling will be implemented throughout the facility to minimize the quantity of nonhazardous waste that will be generated at the site.

5.14.4.2.2 Hazardous Wastes

To avoid the potential effects on human health and the environment from handling and disposing of hazardous wastes, procedures will be developed to ensure proper labeling, storage, packaging, recordkeeping, and disposal of all hazardous wastes. The following general procedures will be employed:

- The Project will be classified as a hazardous waste generator and will obtain a site-specific U.S. Environmental Protection Agency (EPA) identification number that will be used to manifest hazardous waste from the Project facility. Hazardous waste from the Project facility will be stored onsite for less than 90 days before offsite disposal, treatment, or recycling.
- Hazardous wastes will be accumulated at the generating facility according to the Title 22 California Code of Regulations requirements for satellite accumulation.
- Hazardous wastes will be stored in appropriately segregated storage areas surrounded by berms to contain leaks and spills. The bermed areas will be sized to hold the full contents of the largest single container and, if outdoors and not roofed, will be sized for an additional volume for the rainfall associated with a 25-year, 24-hour storm event. If indoors, the containment shall be sized for an additional volume equivalent to 20 minutes of the design flow of any fire protection water. These areas will be inspected daily.
- Hazardous wastes will be collected by a licensed hazardous waste hauler using a hazardous waste manifest. Wastes will be shipped only to authorized hazardous waste management facilities. Biannual hazardous waste generator reports will be prepared and submitted to DTSC. Copies of manifests, reports, waste analyses, and other documents will be kept onsite and will remain accessible for inspection for at least three years.
- Employees will be trained in hazardous waste procedures, spill contingencies, and waste minimization.

- Procedures will be developed to reduce the quantity of hazardous waste generated. Nonhazardous materials will be used instead of hazardous materials whenever practical, and wastes will be recycled whenever practical.

Specifically, hazardous waste handling will include the following practices; handling of hazardous wastes in this way will minimize the quantity of waste deposited to landfills:

- Used lubricating oil will be recovered and recycled by a used oil recycling contractor.
- Spent oil filters and oily rags will be recycled.

5.14.4.3 Facility Closure

When the Project is closed, both nonhazardous and hazardous wastes must be handled properly. Closure can be temporary or permanent. Temporary closure would be for a period greater than the time required for normal maintenance, including economic or mechanical replacements or overhaul. Causes for temporary closure could be flooding of the site, or damage to the plant from earthquake, fire, storm, or other natural causes. Permanent closure would consist of a cessation in operations with no intent to restart operations and could result from the age of the plant, damage to the plant beyond repair, economic conditions, or other unforeseen reasons. Handling of wastes for these two types of closure are discussed below.

5.14.4.3.1 Temporary Closure

For a temporary closure, where there is no release of hazardous materials, facility security will be maintained on a 24-hour basis, and the California Energy Commission Compliance Project Manager will be notified. Depending on the length of shutdown necessary, a contingency plan for the temporary cessation of operations will be implemented. This plan will be prepared as described in Section 2.3. The plan will be developed to ensure conformance with all applicable LORS and the protection of public health and safety and the environment. The plan, depending on the expected duration of the shutdown, could include draining all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. All wastes will be disposed of according to applicable LORS, as discussed in Section 5.14.5.

If the temporary closure **is** in response to facility damage, or where there is a release or threatened release of hazardous waste or materials into the environment, procedures will be followed as set forth in the applicable risk management, spill control, or emergency action plans. Procedures include methods to control releases, notification of applicable authorities and the public, emergency response, and training for generating facility personnel in responding to and controlling releases of hazardous materials and hazardous waste. Once the immediate problem of hazardous waste and materials release is contained and cleaned up, temporary closure will proceed as described for a closure where there is no release of hazardous materials or waste.

5.14.4.3.2 Permanent Closure

The planned life of the generation facility is 40 years, although operation could be longer. When the facility is permanently closed, the handling of nonhazardous and hazardous waste and hazardous materials will be part of a decommissioning plan that will be developed and submitted to the California Energy Commission for review at least 12 months prior to planned facility closure. The plan will comply with applicable LORS and will attempt to maximize the recycling of facility components. The facility will be cleaned and the facility components will be salvaged to the greatest extent possible. Cleaning will consist of removal of scale from piping and equipment walls (primarily fluid-handling piping and equipment) and the removal of sludge from the primary and secondary clarifiers, "clean close" the brine pond, and the cooling tower basin. Unused chemicals will be sold back to the suppliers or other purchasers or users. All solids will be tested. Those found to be hazardous will be transferred to a permitted Class I landfill. Nonhazardous wastes will be transferred to a permitted Class II or Class III landfill as appropriate for each waste. These solids will be managed and disposed of properly so as not to cause significant environmental or health and safety impacts.

Under permanent closure, the wells will be abandoned with proper certification using CalGEM procedures and the brine pond will be “clean closed” in accordance with the RWQCB waste discharge requirements.

The site will be secured 24 hours per day during the Project decommissioning activities.

5.14.4.3.3 Monitoring

Because the environmental impacts caused by construction and operation of the facility are expected to be minimal, extensive monitoring programs will not be required. Generated waste, both nonhazardous and hazardous, will be monitored during Project construction and operation in accordance with the monitoring and reporting requirements mandated by the regulatory permits to be obtained for construction and operation.

5.14.5 Laws, Ordinances, Regulations, and Standards

Nonhazardous and hazardous waste handling at the Project will be governed by federal, state, and local LORS. Applicable LORS address proper waste handling, storage, and disposal practices to protect the environment from contamination and to protect facility workers and the surrounding community from exposure to nonhazardous and hazardous waste. Table 5.14-4 presents a summary of the LORS applicable to waste handling at the Project.

Table 5.14-4. LORS for Waste Management

Laws, Ordinances, Regulations, and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
RCRA Subtitle D	Regulates design and operation of nonhazardous solid waste landfills. Project solid waste will be collected and disposed of by a collection company in conformance with Subtitle D.	CalRecycle	Sections 5.14.2.3, 5.14.2.4, 5.14.3, 5.14.5.1, 5.14.6
RCRA Subtitle C	Controls storage, treatment, and disposal of hazardous waste. Hazardous waste will be handled by contractors in conformance with Subtitle C.	DTSC	Sections 5.14.2.2, 5.14.2.3, 5.14.4.2, 5.14.5.1, 5.14.6, 5.14.7
Clean Water Act	Controls discharge of wastewater to the surface waters of the United States.	RWQCB	Sections 5.14.2.2, 5.14.2.3, 5.14.4.3, 5.14.5.1
State			
CIWMA	Controls solid waste collectors, recyclers, and depositors. Project solid waste will be collected and disposed of by a collection company in conformance with CIWMA.	CalRecycle	Sections 5.14.2.3, 5.14.2.4, 5.14.3, 5.14.5.2, 5.14.6
HWCL	Controls storage, treatment, and disposal of hazardous waste. Hazardous waste will be handled by contractors in conformance with the HWCL.	DTSC	Sections 5.14.2.2, 5.14.2.3, 5.14.4.2, 5.14.5.2, 5.14.6, 5.14.7
Porter-Cologne Water Quality Control Act	Controls discharge of wastewater to surface waters and ground waters of California.	RWQCB	Sections 5.14.2.2, 5.14.2.3, 5.14.4.3, 5.14.5.2

Laws, Ordinances, Regulations, and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
California Fire Code	Controls storage of hazardous materials and wastes and the use and storage of flammable/combustible fluids. Wastes will be accumulated and stored in accordance with Fire Code requirements. Permits for storage containers will be obtained, as needed, from the ICFPD.	ICFPD	Section 5.5.6
Assembly Bill 341 / State Bill 1018 – Mandatory Commercial Recycling	Requires commercial businesses generating four cubic yards per week or more of solid waste to adopt recycling practices.	CalRecycle	Sections 5.14.2.3, 5.14.2.4, 5.14.3, 5.14.5.2, 5.14.6
Local			
Hazardous Materials Program – CUPA various programs	The DTSC is the CUPA for Imperial County that regulates and conducts inspections of businesses that handle hazardous materials, hazardous wastes, and/or have underground storage tanks. The Project will comply with Hazardous Materials Business Plan requirements concerning storage and handling of hazardous materials and wastes, and will also cooperate with the agency on resolution of any environmental issues at the site.	DTSC	Sections 5.14.2.2, 5.14.2.3, 5.14.4.2, 5.14.5.3, 5.14.6, 5.14.7

Notes:

CIWMA= California Integrated Waste Management Act

CUPA = Certified Unified Program Agency

DTSC = Department of Toxic Substances Control

HWCL = Hazardous Waste Control Law

ICFPD = Imperial County Fire Prevention Department

RCRA = Resource Conservation and Recovery Act

5.14.5.1 Federal LORS

EPA regulates wastewater under the 1972 Amendments to the Federal Water Pollution Control Act, commonly known as the Clean Water Act. The federal statute that controls nonhazardous and hazardous waste is the Resource Conservation and Recovery Act (RCRA) 42 United States Code 6901, et seq. RCRA's implementing regulations are found in Title 40 Code of Federal Regulations, Parts 260 et seq. Subtitle D assigns responsibility for the regulation of nonhazardous waste to the states; federal involvement is limited to establishing minimum criteria that prescribe the best practicable controls and monitoring requirements for solid waste disposal facilities. Subtitle C controls the generation, transportation, treatment, storage, and disposal of hazardous waste through a comprehensive "cradle-to-grave" system of hazardous waste management techniques and requirements. It applies to all states and to all hazardous waste generators (above certain levels of waste produced). The Project will conform to this law in its generation, storage, transport, and disposal of any hazardous waste generated at the facility. EPA has delegated its authority for implementing the law to the State of California.

5.14.5.2 State LORS

Wastewater is regulated by the State Water Quality Control Board and RWQCB under the Porter-Cologne Water Quality Control Act. Nonhazardous waste is regulated by the CIWMA of 1989, found in Public Resources Code Sections 40000 et seq. This law provides an integrated statewide system of solid waste management by coordinating state and local efforts in source reduction, recycling, and land disposal safety. Counties are required to submit Integrated Waste Management Plans to the state. This law directly affects Imperial County and the solid waste hauler and disposer that will collect the Project solid waste. It also affects the Project to the extent that hazardous wastes are not to be disposed of along with solid waste.

RCRA allows states to develop their own programs to regulate hazardous waste. The programs must be at least as stringent as RCRA. California has developed its own program in HWCL (Health and Safety Code Sections 25100 et seq.). Because California has elected to develop its own program, HWCL performs essentially the same regulatory functions as RCRA and is the law that will regulate hazardous waste at the Project. However, HWCL includes hazardous wastes not classified as hazardous waste under RCRA. Because hazardous wastes will be generated at the Project facility during construction and operation, HWCL will require the Applicant to adhere to storage, recordkeeping, reporting, and training requirements for these wastes.

State law (Assembly Bill 341/Senate Bill 1018) requires businesses that generate four cubic yards or more of commercial solid waste per week to institute a recycling program. The Applicant will avail itself of opportunities provided by the franchised waste hauler and disposal companies to divert as much waste as possible from landfills and, instead, will recycle the materials.

5.14.5.3 Local LORS

For solid nonhazardous waste, the laws are administered and enforced primarily by the DTSC and RWQCB. The DTSC will serve as CUPA for the Project, and will advise on the health effects of leaks and spills of hazardous materials and hazardous waste.

Local agency requirements and LORS associated with the Project will be addressed before the construction and operation of the facility, and the facility will conform to all local requirements. These include the need to file a Hazardous Material Business Plan (HMBP) using the California Environmental Reporting System (CERS) submittal system, which will allow the storage of hazardous materials and wastes in accordance with state and local regulations. The HMBP will be updated annually in accordance with applicable regulations.

For emergency incidents, Calipatria Fire Department (CFD) is the nearest fire station to the Project and would provide the first response to a fire at the Project site (Nadarro 2023). Additional information on emergency response is provided in Section 5.5, Hazardous Materials, and Section 5.16, Worker Health and Safety.

All wastes generated by the Project will be managed in a manner consistent with applicable LORS.

5.14.5.4 Codes

The design, engineering, and construction of hazardous waste storage and handling systems will be in accordance with all applicable codes and standards, as follows:

- California Building Code
- California Fire Code
- Imperial County Code

5.14.6 Agencies and Agency Contacts

Several agencies, including EPA at the federal level and DTSC and the California Environmental Protection Agency – CalRecycle at the state level, regulate nonhazardous and hazardous waste and will be involved in the regulation of the waste generated by the Project. The regulations, however, are administered and enforced primarily through the DTSC, which is the designated CUPA for Imperial County, and the Imperial County Public Health Department, Environmental Health Services. The persons to contact for nonhazardous and hazardous waste management are listed in Table 5.14-5.

Table 5.14-5. Agency Contacts for Waste Management

Issue	Agency	Contact
Nonhazardous Waste		
Solid Waste and Recycling	County of Imperial Public Health Department, Environmental Health Services	Alphonso Andrade (for info on county landfills) 797 W Main St Ste B El Centro, CA 92243 (442) 265-1888
Hazardous Waste		
Hazardous Waste Compliance and Inspections	DTSC	Laura Florez DTSC Imperial CUPA 627 Wake Avenue El Centro, CA 92243 (760)352-0381

5.14.7 Permits and Permit Schedule

The temporary storage of hazardous wastes at the Project will be included in the HMBP submitted to the DTSC, as described in Section 5.5, Hazardous Materials. No additional permits are required.

5.14.8 References Cited

Andrade, Alphonso – County of Imperial, Public Health Department, Environmental Health Services. 2023. Personal communication with Lindsey Xayachack/Jacobs. February 22.

Arizona Department of Environmental Quality (ADEQ). 2023. Public Notice | Proposal to Issue Air Quality Class I Renewal Permit No. 66292 to Copper Mountain Landfill Inc. Available online: https://azdeq.gov/public-notice-proposal-issue-air-quality-class-i-renewal-permit-no-66292-copper-mountain-landfill. February 21.

California Department of Resources Recycling and Recovery (CalRecycle). 2023a. Solid Waste Information System (SWIS) Database, Imperial County. Available online: https://www2.calrecycle.ca.gov/SolidWaste/Site/Search. February 20.

California Department of Resources Recycling and Recovery (CalRecycle). 2023b. *2021 Landfill Summary Tonnage Report*. Available online: https://www2.calrecycle.ca.gov/LandfillTipFees/. February 19.

California Department of Toxic Substances Control (DTSC). 2023a. *DTSC's Hazardous Waste and Substances Site List (Cortese List)*, Imperial County. Available online: https://www.envirostor.dtsc.ca.gov/public/search?cmd=search&reporttype=CORTESE&site_type=CSITES,FUDS&status=ACT,BKLG,COM&reporttitle=HAZARDOUS+WASTE+AND+SUBSTANCES+SITE+LIST+%28CORTESE%29. February 20.

California Department of Toxic Substances Control (DTSC). 2023b. *California Commercial Offsite Hazardous Waste Permitted Facilities*. Available online: http://www.envirostor.dtsc.ca.gov/public/commercial_offsite.asp. February 17.

City of Calipatria. 2018. Calipatria Service Area Plan. Local Agency Formation Commission, Imperial County. https://www.iclafco.com/assets/cities/2018-city-of-calipatria-sap.pdf. Accessed October 30, 2022.

Clean Harbors. 2023. Buttonwillow Landfill Facility. Available online: http://www.cleanharbors.com/locations/index.asp?id=53. February 17.

Mullins, Ken/ Operations Manager – Copper Mountain Landfill, Yuma Transfer Station. 2023. Personal communication with Lindsey Xayachack/Jacobs. February 22.

Henry, Bob/Waste Management – Kettleman Hills Landfill. 2023. Personal communication with Lindsey Xayachack/Jacobs. February X.

Jacobs. 2022. *Phase I Environmental Site Assessment, Black Rock*. September.

Nadarro, Nydia, Engineer, City of Calipatria Fire Department. January 30, 2023. Personal communication with Emma McGinty, Jacobs; discussed fire department current information, staffing, and provided the most updated contact information. Confirmed that the Imperial County Fire Department's contact information has changed.

Waste Management, Inc. 2023. February 21. Available online: https://kettlemanhillslandfill.wm.com/facility-expansion/index.jsp.

5.15 Water Resources

This section discusses the environmental and regulatory setting and provides an analysis of potential impacts on water resources associated with the Black Rock Geothermal Project (BRGP or Project). Section 5.15.1 describes the existing hydrologic environment and water resources that could be affected by the Project. Section 5.15.2 presents potential environmental effects of Project construction and operation on water resources. Section 5.15.3 discusses cumulative Project effects. Section 5.15.4 discusses proposed mitigation measures. Section 5.15.5 presents applicable laws, ordinances, regulations, and standards (LORS) related to water resources. Section 5.15.6 describes permits that relate to water resources, lists contacts with relevant regulatory agencies, and presents a schedule for obtaining permits. Section 5.15.7 lists references cited in this section.

5.15.1 Affected Environment

5.15.1.1 Location

The Project is located within the Salton Sea Known Geothermal Resource Area (KGRA) in Imperial County, California, and includes the geothermal plant as well as all associated wells, well pads, pipelines, and gen-tie lines. The approximately 55-acre power plant site, referred to as the Plant Site in this analysis, is generally located on the southwestern corner of Boyle Road and McKendry Road. The Project is located approximately eight miles southwest of the town of Niland and approximately six miles northwest from the town of Calipatria. The Sonny Bono Wildlife Refuge Headquarters is approximately 0.75 mile northeast of the Plant Site. The Alamo River is approximately 2.5 miles northeast of the Plant Site and the New River is approximately five miles southwest.

The Project is in a region of the Imperial Valley characterized mostly by agriculture and geothermal power production, and solar power plants. The Plant Site is located northwest of the existing Vulcan power plant and the Hoch (Del Ranch) power plant. Several geothermal power plants operate in the Salton Sea KGRA within five miles of the Project and deliver renewable energy to a variety of customers. An estimated 2,000 megawatts of geothermal energy awaits development, in addition to the current 544 megawatts providing reliable, baseload power from facilities at the Salton Sea to California energy consumers (IID 2016).

5.15.1.2 Regional Setting

The Project will be located in the lowest part of a closed continental basin called the Salton Trough, a 3,100-square-mile structural depression near the San Andreas Fault system. The Salton Trough is the landward extension of the Gulf of California tectonic system and is one of the few existing regions where continental crust is actively being rifted and then replaced by oceanic crust. The trough had previously been open to the ocean but became enclosed behind the Colorado River delta to the south. Subsequent flooding of this enclosed basin by the Colorado River left a thick sequence of non-marine deposits. Magma emplacement along active rifting through the Salton Trough is the source of high-temperature hydrothermal systems including the Salton Sea Geothermal Resource that the Project will use. Active faulting within the Salton Trough has also created several moderate-temperature low salinity geothermal systems.

The general patterns of measured subsidence and seismicity are consistent with the natural regional activity in the Salton Trough. This is discussed further in Section 5.4, Geologic Hazards.

5.15.1.3 Temperature and Rainfall

The climate in the area is characterized by extreme aridity and high summer temperatures. Temperature variations between night and day tend to be relatively large, with a difference that can reach 32 degrees Fahrenheit in both summer and winter months.

The annual average precipitation in Niland is 3.23 inches. The wettest month of the year is January, with an average rainfall of 0.48 inch. The highest recorded daily rainfall recorded was 2.65 inches on July 6, 1968. While rainfall events generally occur in the winter, during summer months, warm moist tropical air from the Gulf of California and Mexico occasionally bring thunderstorms to the Imperial Valley area. Table 5.15-1 summarizes the typical temperature and precipitation for the area.

5.15.1.4 Surface Water Resources

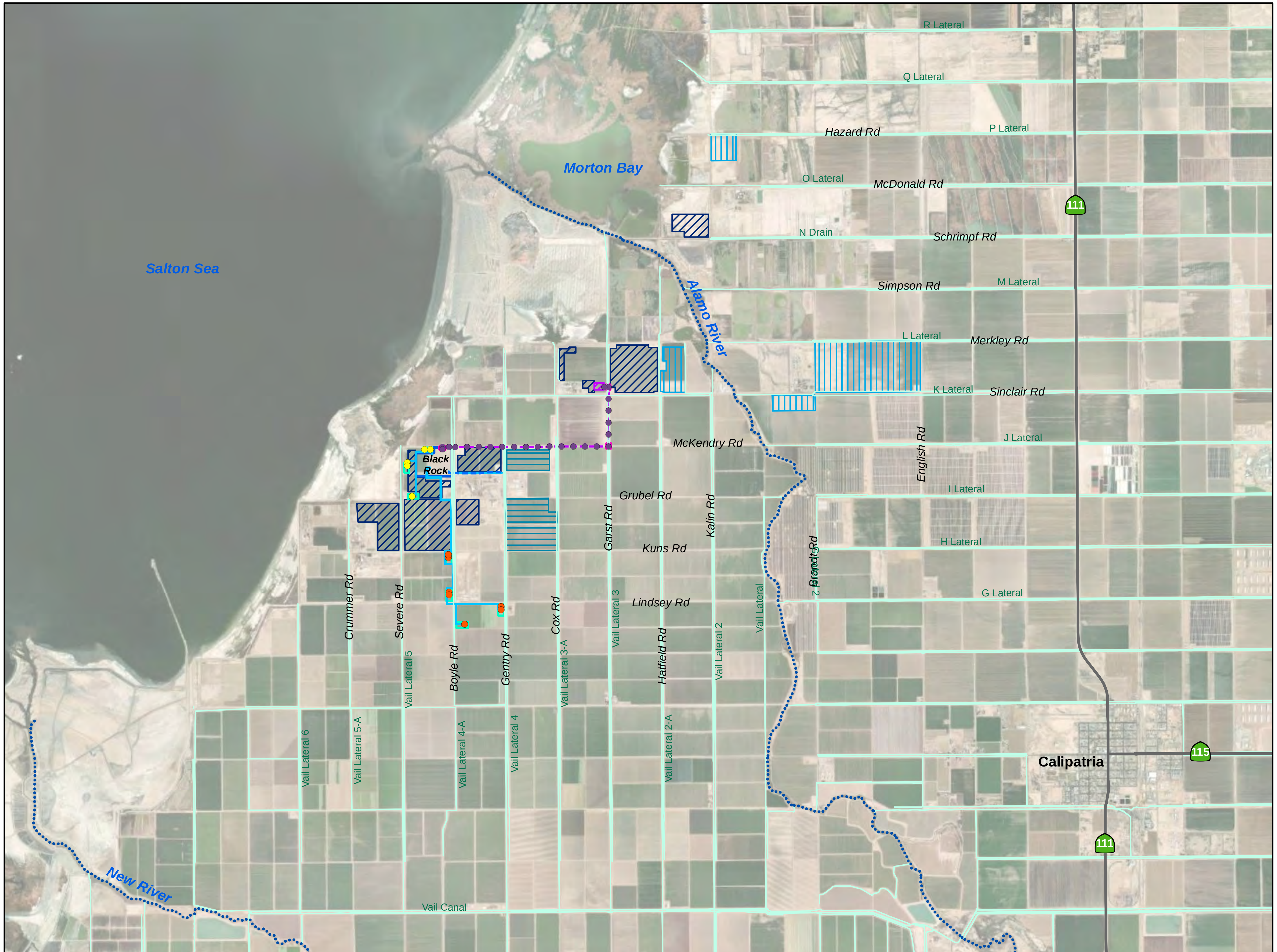
The Project is located in the Imperial Valley Planning Area of the Colorado River Water Basin (CRBRWQCB 2019a). It covers approximately 2,500 square miles in the southern portion of the basin, nearly all of it in Imperial County.

Surface water features in the vicinity of the Project include the Salton Sea, located approximately 0.5 mile to the west; the New River, located approximately 5.1 miles to the southwest; the Alamo River, located approximately 2.5 miles northeast; and two irrigation drains, Vail Drain 4a and Vail Lateral Drain 5, located adjacent to the east and west sides of the Plant Site, respectively (see Figure 5.15-1). All drainage from the Project site drains toward the Salton Sea.

In June 1901, the California Development Corporation began delivering irrigation water to the Imperial Valley by diverting it from the Colorado River through a channel originating from Mexico to the Alamo River. In 1905, the Colorado River flooded and ran uncontrolled through Imperial Valley, inundating 488 square miles of farmland and creating the Salton Sea. Currently, the Salton Sea is a saline body of water in a natural sink replenished predominantly by farm drainage and seepage, with occasional inputs from stormwater runoff. The Salton Sea fluctuates in size and capacity but is currently approximately 35 miles long and 15 miles wide, occupying 343 square miles, with a 95-mile long shoreline. The lake is relatively shallow with water depths of one to three feet extending thousands of feet from the shoreline. The deepest areas in the lake are less than 50 feet deep and are located in the north and south-central portions of the lake (IID 2022a). The surface elevation of the lake is approximately 233 feet below mean sea level. The Salton Sea lies at the lowest point in the Salton Basin and collects runoff and agricultural drainage from most of Imperial County, a portion of Riverside County, smaller portions of San Bernadino and San Diego Counties, and the northern portion of the Mexicali Valley in Baja California, Mexico (SWRCB 2023).

During larger storm events, runoff from adjacent planning areas, Coachella Valley, Anza-Borrego, and Imperial Valley drain into the Salton Sea. Because it has no outlet, water is lost only through evaporation, leaving dissolved salts behind and gradually increasing salinity. The salinity of the Salton Sea is approximately 44 parts per thousand, approximately 25 percent higher than ocean water. Other than negligible rainfall, the only source of fresh water to the region for both irrigation and domestic use is water diverted from the Colorado River.

The New and Alamo Rivers are both perennial streams with headwaters starting in Mexico. Both rivers convey predominantly agricultural irrigation drainage and some treated wastewaters. The New River also receives a considerable portion of untreated wastewater flows from Mexicali, Mexico. The source of the irrigation drainage is imported Colorado River water. There are U.S. Geological Survey (USGS) gauges on both rivers near the proposed facility. As of August 28, 2022, USGS gauge 10254730 on the Alamo River in Niland, which has recorded flow data since 1960, captured a mean flow of 809 cubic feet per second (cfs), minimum flow of 546 cfs in 1992, and maximum flow of 1,040 cfs in 1962. USGS gauge 10255550 on the New River near Westmorland, which has recorded flow data since 1952, captured a mean flow of 570 cfs, minimum flow of 384 cfs in 2009, and maximum flow of 857 cfs in 1988. Table 5.15-2 provides mean monthly flows as reported for both rivers via existing gauging data.



Legend

- Canal
- River
- Plant
- Well Pad
- Injection Well
- Production Well
- Pipeline
- Water Supply Pipeline
- Gen-Tie Line Pole
- Gen-Tie Line
- Pull Site
- Switching Station
- Borrow Pit
- Construction Camp
- Construction Laydown and Parking Areas

N

0 0.5 1 2
Miles

Figure 5.15-1
Surface Waters
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Water_Resources\BR\Figure_5.15-1_230315.mxd

Table 5.15-1. Niland, California Climate and Precipitation – Annual and Monthly Average

	Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ave Max Temp (°F)	88.6	70.4	74.7	79.5	86.1	93.8	99.9	99.9	99.9	99.9	91.4	78.9	70.3
Ave Mean Temp (°F)	72.0	54.8	58.7	63.2	69.1	76.3	84.6	90.4	90.5	85.4	74.5	62.1	54.5
Ave Min Temp (°F)	55.4	39.2	42.7	46.9	52.1	58.7	65.9	73.7	74.8	69.0	57.6	45.2	38.7
Ave. Total Precipitation (in)	3.23	0.48	0.45	0.46	0.08	0.02	0.04	0.25	0.34	0.30	0.29	0.17	0.35

Source: http://www.idcide.com/weather/ca/niland.htm. Temperature from BRAWLEY 2 SW Weather station, 9.99 miles from Niland. Precipitation from Niland Weather station, 2.76 miles from Niland.

Ave = Average

Max = Maximum

Temp = Temperature

°F = degrees Fahrenheit

in = inches

Table 5.15-2. Mean Monthly Flows (CFS) for Alamo River and New River

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Alamo River, USGS gauge 10254730	628	735	943	1,066	973	844	829	824	866	919	760	638
New River, USGS gauge 10255550	535	581	670	721	653	581	577	585	592	624	550	523

Source: waterdata.usgs.gov

5.15.1.5 Surface Water Quality

The Regional Water Quality Control Boards (RWQCBs) make critical water quality decisions for their designated regions, including setting standards, issuing waste discharge requirements, determining compliance with those requirements, and taking appropriate enforcement actions. The RWQCBs adopt water quality control plans, or Basin Plans, which establish water quality objectives to ensure the reasonable protection of beneficial uses and a program of implementation for achieving water quality objectives within the Basin Plans. For those waters not attaining water quality standards, the RWQCB establishes total maximum daily loads (TMDLs) and a program of implementation to meet the TMDL.

Section 303(d) of the Clean Water Act (CWA) requires that the states make a list of waters that are not attaining water quality standards. For waters on this list, the states are to develop TMDLs. A TMDL must account for all sources of the pollutants that caused the water to be listed. Federal regulations require that the TMDL, at a minimum, account for contributions from point sources (federally permitted discharges) and contributions from nonpoint sources. TMDLs are established at the level necessary to implement the applicable water quality standards. In California, the State Water Resources Control Board (SWRCB) has interpreted state law (Porter-Cologne Water Quality Control Act, California Water Code Sections 13000 et. seq.) to require that implementation be addressed when TMDLs are incorporated into water quality control plans (Basin Plans). The Porter-Cologne Act requires each RWQCB to formulate and adopt Basin Plans for all areas within its region. It also requires that a program of implementation be developed that describes how water quality standards will be attained. TMDLs can be developed as a component of the program of implementation, thus triggering the need to describe the implementation features, or alternatively as a water quality standard. When the TMDL is established as a standard, the program of implementation must be designed to implement the TMDL.

The Project site is within the jurisdictional boundaries of the Colorado River Basin RWQCB (CRBRWQCB). Water quality objectives for water resources potentially affected by the Project are contained in the Water Quality Control Plan for the Colorado River Basin (CRBRWQCB 2019a). The CRBRWQCB lists the Alamo River, New River, and Salton Sea as impaired water bodies that do not meet the water quality objectives (RWQCB 2019b). The Salton Sea has a history of water quality issues associated with increasing salinity and nutrient concentrations. The New and Alamo Rivers, which drain from Mexico through agricultural lands, also have histories of poor water quality. Agricultural runoff is the primary source of impairment. Table 5.15-3 provides the CWA Section 303(d) listed waterbodies and their respective pollutants and stressors.

Table 5.15-3. Colorado River Basin Hydrologic Region CWA Section 303(d) Impaired Water Bodies

Water Body	Pollutant/Stressor
Alamo River	Ammonia, chlordane, chloride, chlorpyrifos, cyhalothrin, cypermethrin, dichlorodiphenyldichlorethane (DDD), dichlorodiphenyldichlorethylene (DDE), dichlorodiphenyltrichlorethane (DDT), diazinon, dieldrin, Enterococcus, E. coli, malathion, mercury, polychlorinated biphenyls (PCBs), pyrethroids, sedimentation/siltation, selenium, toxaphene, toxicity
New River	Ammonia, bifenthrin, chlordane, chloride, chlorpyrifos, cyhalothrin, cypermethrin, DDD, DDE, DDT, diazinon, dieldrin, disulfoton, hexachlorobenzene, imidacloprid, indicator bacteria, mercury, naphthalene, malathion, nutrients, organic enrichment/low dissolved oxygen, PCBs, pyrerthroids, sediment, selenium, toxaphene, toxicity, trash
Salton Sea	Ammonia, arsenic, chloride, chlorpyrifos, DDE, DDT, low dissolved oxygen, Enterococcus, nutrients, salinity, toxicity
Imperial Valley Drains	Ammonia, chlordane, chlorpyrifos, DDE, DDT, dieldrin, disulfoton, imidacloprid, PCBs, sedimentation/siltation, selenium, toxaphene, toxicity

Source: RWQCB 2019b

The beneficial use designations for surface water bodies in the Project area are listed below (CRBRWQCB 2019a).

Salton Sea:

- Aquaculture
- Industrial Service Supply (potential)
- Water-contact Recreation
- Non-contact Water Recreation
- Warm Freshwater Habitat
- Wildlife Habitat
- Preservation of Rare, Threatened, or Endangered Species

Alamo River, New River, and Imperial Valley Drains including the Vail Drains:

- Freshwater Replenishment
- Industrial Service Supply (potential for New River only)
- Water-contact Recreation (unauthorized in Vail Drains; New River is unfit for any recreational use because of contamination)
- Non-contact Water Recreation
- Warm Freshwater Habitat
- Wildlife Habitat
- Hydropower Generation (potential for Alamo River only)
- Preservation of Rare, Threatened, or Endangered Species

5.15.1.6 Groundwater

The Colorado River Basin Region covers approximately 13 million acres (20,000 square miles) in the southeastern portion of California. It includes all of Imperial County and portions of San Bernardino, Riverside, and San Diego Counties. A significant geographical feature of the Region is the Salton Trough, which contains the Salton Sea and the Coachella and Imperial Valleys. The Salton Trough is a landward extension of the Gulf of California structural depression. In prehistoric times, it contained the Ancient Lake Cahuilla (not to be confused with the present Lake Cahuilla, located at the terminus of the Coachella Branch of the All-American Canal). Much of the agricultural economy and industry of the Region is located in the Salton Trough. The Salton Trough contains the Salton Sea KGRA, which as of 2017, included 10 generating geothermal plants.

The Imperial Valley Planning Area comprises 2,500 square miles in the southern portion of the region, almost all of it in Imperial County. The easterly and westerly boundaries are contiguous with the westerly and easterly boundaries of the East Colorado River Basin and the Anza-Borrego Planning Area, respectively. Its northerly boundary is along Salton Sea and the Coachella Valley Planning Area and its southerly boundary follows the International Boundary with Mexico. The Planning Area's central feature is the flat, fertile Imperial Valley. The principal communities are El Centro, Brawley, and Calexico.

Groundwater is stored in the Pleistocene sediments of the valley floor, the mesas on the west, and the East Mesa and sand hills on the east. However, the fine-grained lake sediments in the central portion of Imperial Valley inhibit ground water movement, and tile-drain systems are utilized to dewater the sediments to a depth below the root zone of crops and to prevent the accumulation of saline water on the surface. Few wells have been drilled in these lake sediments because the yield is poor and the water is generally saline (CRBRWQCB 2019a).

Imperial Valley groundwater is of generally poor quality and is unsuitable for domestic or irrigation use due to high levels of total dissolved solids (TDS), fluoride concentration, and boron concentration. Groundwater in the area is hydraulically connected to the Salton Sea and is very saline. The fine-grained deposits that are characteristic of the area have transmissivities of only 1,000 to 10,000 gallons per day per foot to depths of approximately 500 feet. At greater depths, the transmissivities are likely to be even less (Westec 1981). The low transmissivity of these deposits limits the ability of water to percolate downward into deeper aquifers. As a result, depleted groundwater levels recharge slowly and limit the potential for development in the area. Except for withdrawals made for geothermal energy production, the deep aquifer is too saline for irrigation and most other uses.

The amount of usable near-surface groundwater in the central Imperial Valley is unknown, but this resource has not been significantly exploited because of low well yields and poor chemical quality. Figure 5.15-2 displays the general site location as it relates to groundwater. Studies of groundwater conditions in the Imperial Valley focus exclusively on the upper 1,000 feet of water-bearing strata; however, data are limited owing to the fact that groundwater in the upper 300 feet of this area is generally of poor quality (saline) and well yields are quite low. In addition, historically there has been little need to investigate and develop the groundwater in the Imperial Valley due to the availability and relatively higher quality of imported Colorado River water (IID 2012).

As a result of surface application of irrigation water and the low permeability of much of the soil, a perched water table exists throughout much of the Imperial Valley. These perched groundwater conditions may occur two to five feet below ground surface (bgs). Previous geotechnical investigations performed at the Project site found that the depth to groundwater is shallow, ranging from approximately three to six feet bgs. The average groundwater gradient has been estimated at approximately 28 feet per mile toward the west near Niland and approximately nine feet per mile toward the northeast near Calipatria. The primary source of groundwater recharge in both areas is suspected to be seepage from the East Highline and Coachella Canals (IID 2012). Both the East Highline and Coachella Canals are recipients of waters from the All-American Canal System.

5.15.1.7 Groundwater Water Quality

The Project site is located in the Imperial Hydrologic Unit Area Code 723.00 of the Imperial Valley Planning Area (CRBRWQCB 2019a). Groundwater in the Imperial Hydrologic Unit has a designated beneficial use for industrial supply purposes. Additionally, a small portion of the groundwater in this hydrologic unit is also designated as having beneficial use for municipal purposes. However, based on the Sources of Drinking Water Policy (SWRCB 2006), groundwater is exempted from municipal beneficial use designation if TDS exceed 3,000 milligrams per liter (mg/L) and it is not reasonably expected to supply a public water system, or if the aquifer is regulated as a geothermal producing source.

Because low vertical permeabilities inhibit mixing of waters from different depths, the quality of water that comprises the main aquifer beneath the Imperial Valley varies locally from fresh to saline. According to Department of Health Services data from five public supply wells, TDS concentrations average 712 mg/L and range from 662 to 817 mg/L (CDWR 2020). Historical records indicate relatively shallow groundwater tapped by drains was of a sodium chloride type with high TDS (15,700 mg/L) and salinity ascribed to evaporation of shallow groundwater. Deeper waters were also found to be sodium chloride in nature but had lower TDS content (1,500 to 1,600 mg/L) and salinity. In general, groundwater beneath the basin is unusable for domestic and irrigation purposes without treatment. TDS values typically exceeding 2,000 mg/L are reported from a limited number of test wells drilled in the western part of the basin. Groundwater in areas of the basin has higher than recommended levels of fluoride and boron. Approximately 7,000 acre-feet per year (afy) of groundwater is estimated to recharge the basin from the New River which drains the Mexicali Valley. This groundwater is related to surface flow from the highly polluted New River and negatively affects groundwater quality in the basin.

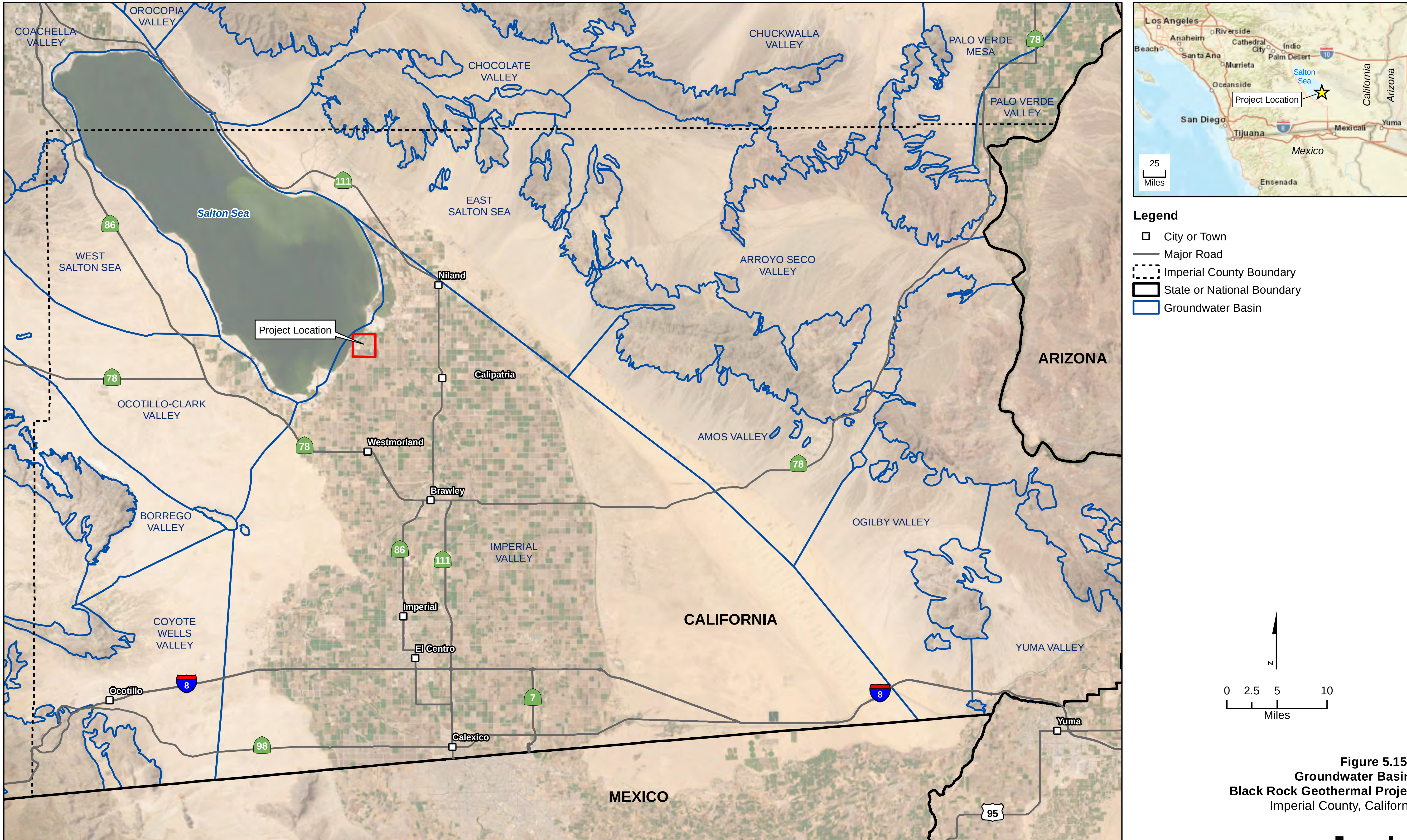


Figure 5.15-2
Groundwater Basins
Black Rock Geothermal Project
Imperial County, California

Jacobs

Groundwater is not proposed for use as part of the Project. Groundwater underlying the Imperial Valley is generally of poor quality unsuitable for domestic or irrigation purposes (Jacobs 2023). Groundwater in the area of the Project is brackish (contains a high salt content). Agricultural practices in the Imperial Valley, including in the Project vicinity, consist of aerial and ground application of pesticides and application of chemical fertilizers to both ground and irrigation water at the farm delivery gate. Most of the agricultural fields in the valley are underlain by tile drainage systems (perforated pipelines encapsulated by sand/gravel) installed at a depth of approximately five to seven feet below the ground surface. The tile drains maintain groundwater at levels below the root system of crops, discharging to the agricultural drains. The tile drains transport soluble salts contained in the Colorado River water and that are leached from the soil profile during irrigation.

5.15.1.8 Flooding Potential

The Imperial County General Plan indicates that a portion of the Project site, including the power plant, is within the 100-year floodplain (Figure 5.15-3a). The Applicant is preparing a Federal Emergency Management Agency (FEMA) a Letter of Map Revision (LOMR) request based on past changes to the Salton Sea elevation. The revised FEMA 100-year floodplain analysis conducted by the Applicant shows the 100-year flood will result in 1.61 feet of flooding at the BRGP site. Based on FEMA regulations regarding berm design (Title 44, Code of Federal Regulations [CFR], Part 65.10), the flood protection feature will require 3.5 feet of freeboard, making the expected berm height approximately 5 feet above the existing grade. Figure 5.15-3b shows the revised 100-year floodplain. The Applicant expects to submit the LOMR requests to FEMA and the County in the second quarter of 2023.

5.15.1.9 Water Supply

This subsection describes the quantity of water required, the sources of the water supply, water treatment requirements, and the water quality of the source and treated water.

5.15.1.9.1 Process Water

The largest water demand for the facility is cooling tower makeup to offset water lost through evaporation. Cooling tower make-up water will primarily be provided by condensed geothermal steam from the main condenser except during high ambient conditions when supplemental water will be used from the service water pond. The proposed facility would also use condensate for steam wash water, purge water for pump seals, and water for the solids dewatering system. Approximately 80 percent of the operational water required by the facility will be generated by steam condensed in the main condenser. Figure 2-5 in Section 2.0 Project Description shows the water balance diagram for the Project.

On an annual average basis during operation, water needs from the Imperial Irrigation District (IID) canal are approximately 1,125 afy, which is approximately 20 percent of the total facility water needs. IID canal water will also serve as the water source for maintenance activities, fire protection system, and to fill the cooling tower prior to startup. The source of external freshwater for the facility will be IID canal water. The delivery point for the IID canal water will be the Vail 4A Lateral, Gate 459 or 460, with a second connection via a pipeline east from the Project site along an unnamed dirt road connecting at Vail 4 Lateral, located adjacent to Gentry Road. Transfer to the service water pond will be via a gravity fed or pumped water transfer pipeline from the Vail 4A lateral at Boyle Road east of the power plant site. Water quality data for the IID water source is shown in Table 5.15-4.

Table 5.15-4. Expected Supply Water Quality

Parameter	Units	MCL	Amount Detected
Aluminum	µg/L	200	160
Arsenic	µg/L	300	170
Fluoride	mg/L	2	0.37

Parameter	Units	MCL	Amount Detected
Nitrate as Nitrite	mg/L	10	0.40
Chloride	mg/L	500	120
Color	color units	15	10
Odor	odor units	3	1
Sulfate	mg/L	500	260
Total Dissolved Solids	mg/L	1,000[f]	289
Turbidity	NTU	5	12
Boron	µg/L	Not Regulated	190
Calcium	mg/L	Not Regulated	93
Hardness, total	mg/L	Not Regulated	370
Magnesium	mg/L	Not Regulated	34
pH	pH units	Not Regulated	8.3
Sodium	mg/L	Not Regulated	120
Potassium	mg/L	Not Regulated	5.0

µg/L = micrograms per liter

NTU = nephelometric turbidity unit

µmho/cm = micromhos per centimeter

MCL = Maximum Contaminant Level

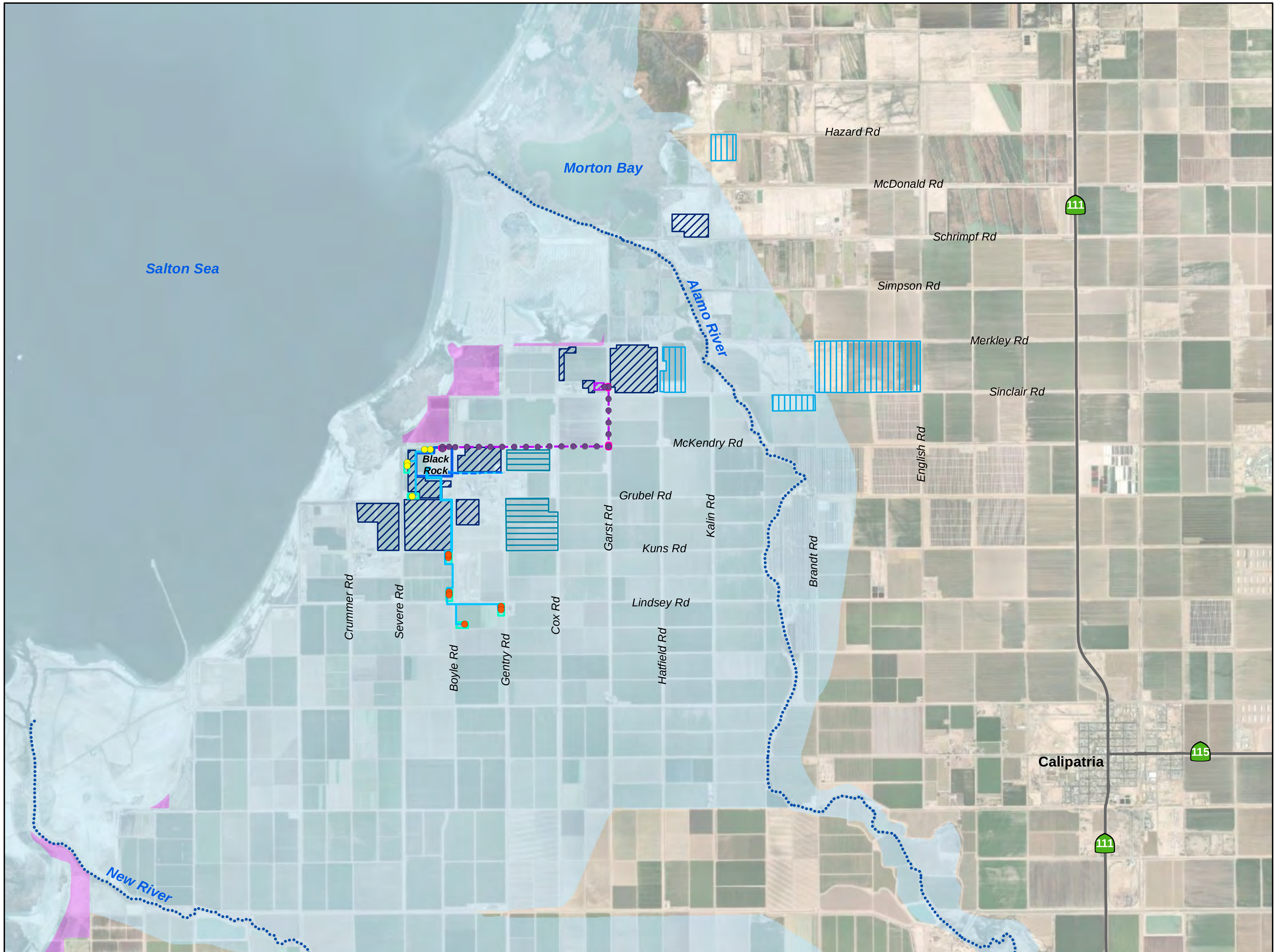
The IID holds rights to take water from the Colorado River and deliver it to farmers, tenants, and landholders in Imperial County. The IID receives an average of 3.1 million acre-feet of water annually from the Colorado River. IID is not a treated water provider. If a new facility is constructed, the IID may provide raw water to that facility. However, the IID does not provide raw water service for landscaping and related irrigation purposes where potable water is available.

In 2021, IID provided irrigation water to 446,670 acres, out of 471,364 farmable acres in its service area (IID 2022b). IID serves the irrigation water through approximately 5,600 delivery gates. It operates and maintains 1,668 miles of main and lateral canals to distribute water and 12,456 miles of drains used to collect surface runoff and subsurface drainage from farmland (IID 2022b). Three main canals, the East Highline, Central Main, and Westside Main, receive water from the All-American Canal and distribute water to smaller lateral canals and private ditches throughout the Imperial Valley. Most of the drainage ditches discharge water into either the Alamo River or New River and ultimately the Salton Sea.

The Interim Water Supply Policy for Non-Agricultural Projects (IWSP) adopted by the IID Board on September 29, 2009, governs how IID will make water available to new industrial projects, including the proposed Project. The IWSP currently designates up to 25,000 afy (each) of water for potential Non-Agricultural Projects within IID's water service area. The IWSP is to remain in effect pending the approval of policies that will be adopted in association with the Integrated Regional Water Management Plan (IRWMP) (Jacobs 2023). IID has indicated that, provided a water supply agreement is approved and executed by IID under the provisions of the IWSP, IID will have sufficient water to support the water needs of the Project (Jacobs 2023).

5.15.1.9.2 Domestic and Sanitary Water Use

A reverse osmosis (RO) potable water system will treat IID raw water to supply drinking water, wash basin water, eyewash equipment water, water for showers and lavatories in crew change quarters, restrooms and kitchen facilities in the control building, and sink water in the sample laboratory.



Legend

- River
- Plant
- Well Pad
- Injection Well
- Production Well
- Pipeline
- Water Supply Pipeline
- Gen-Tie Line Pole
- Gen-Tie Line
- Pull Site
- Switching Station
- Borrow Pit
- Construction Camp
- Construction Laydown and Parking Areas

FEMA Flood Zones

- Existing Floodplain to be Modified
- Zone D: Areas in Which Flood Hazards are Undetermined, but Possible

N

0 0.5 1 2
Miles

Figure 5.15-3a
Existing FEMA Floodplain
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Water_Resources\BR\Figure_5.15-3a_230315.mxd

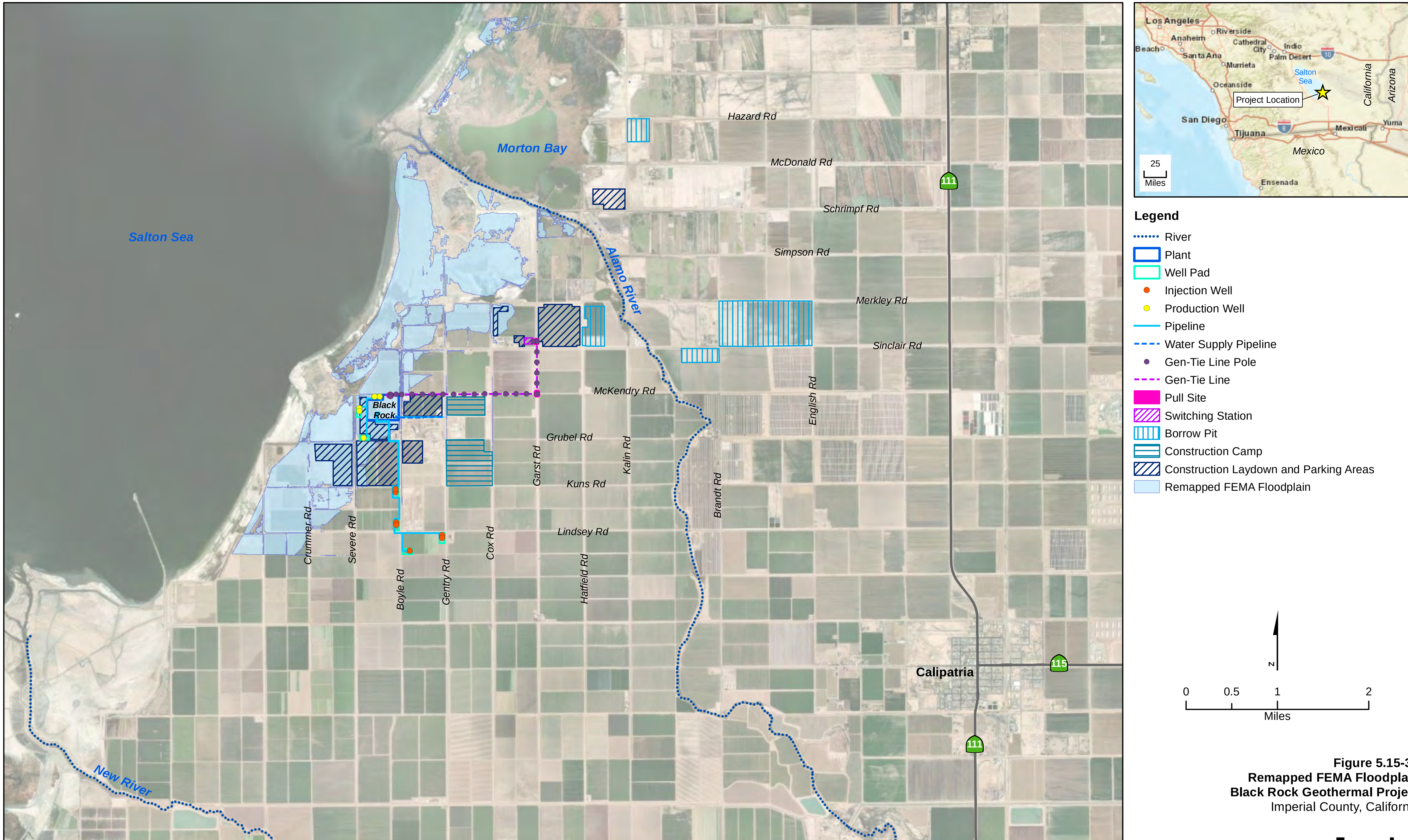


Figure 5.15-3b
Remapped FEMA Floodplain
Black Rock Geothermal Project
Imperial County, California

Jacobs

\\dc1vs01\gisproj\B\BHE_Renewables\Imperial_Valley\MapFiles\Water_Resources\BR\Figure_5.15-3b_230315.mxd

5.15.1.10 Stormwater

The permanent stormwater management system will consist of ditches/swales in general areas and culverts under roadways draining to the retention pond on the west side of the site. Stormwater in the retention pond will be either pumped to an injection well or allowed to evaporate.

5.15.2 Environmental Analysis

Project effects on water resources can be evaluated relative to significance criteria derived from the California Environmental Quality Act (CEQA) Appendix G checklist. The Project is considered to have a potentially significant effect on water resources if it would do the following:

- Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade surface or ground water quality.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that will result in substantial erosion or siltation on- or offsite; substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage stems or provide substantial additional sources of polluted runoff; or impede or redirect flood flows.
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation.
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.
- Require or result in the relocation or construction of new or expanded water, wastewater treatment, or storm water drainage facilities, the construction or relocation of which could cause significant environmental effects.
- Have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years.

5.15.2.1 Water Supply

Potential impacts to water supply from construction and operation of the Project are discussed below.

5.15.2.1.1 Construction

During construction, water will be used onsite primarily for dust suppression, concrete preparation, hydrostatic testing of pipelines, potable, and sanitary use. Construction-phase water demand will be greatest during site grading (all rough grading). Estimated average annual water use during construction is expected to be approximately 150 afy supplied by IID. The 150 afy is significantly less than the existing agricultural use at the site (see discussion below). In addition, the construction use is temporary.

5.15.2.1.2 Operation

Project operations require approximately 1,125 afy of water when operating at full plant load for uses including cooling tower makeup, plant wash down, and RO for potable use. The Project includes an onsite service water pond, a lined earthen structure that would hold canal water for facility service water needs.

The IWSP adopted by the IID Board on September 29, 2009, governs how IID will make water available to new industrial projects, including the proposed Project. The IWSP currently designates up to 25,000 afy (each) of water for potential Non-Agricultural Projects within IID's water service area. The IWSP is to remain in effect pending the approval of policies that will be adopted in association with the IRWMP (Jacobs 2023).

In years when agricultural demand is higher than the projected use with conservation as in years of low rainfall or due to market driven cropping choices, IID water use may exceed the quantified amount. If there are not drought conditions on the Colorado River, IID has up to three years under the Inadvertent Overrun Payback Policy (IOPP) to pay that water back. However, in years of drought (Lake Mead water level at 1,125 feet or less), the 2007 Interim Guidelines, developed by the United States Bureau of Reclamation (USBR) to address lower basin shortages, come into effect and outstanding overruns must be paid back in the calendar year following publication of the overrun in the USBR Lower Colorado River (LCR) Decree Accounting Report.

In years of inadvertent overrun payback, less water would be available for non-agricultural development contractors. Under such conditions, IID will work with the Applicant to ensure it can manage the reduction is available water during dry years. IID has further indicated that, provided a water supply agreement is approved and executed by IID under the provisions of the IWSP, IID will have sufficient water to support the water needs of this Project.

Implementation of the Project, including the power plant and ancillary facilities, will convert approximately 130 acres of agricultural land to industrial use. Historical water delivery data from IID for Gates 459 and 460 that serve the parcel of land on which the Project site will be located show that IID supplies approximately 650 afy to the parcel. Conversion of the Project site to industrial uses therefore would reduce agricultural water use in the IID service area by approximately 650 afy. Conversion of the land from agricultural use to industrial use therefore would increase water use in the service area by approximately 475 afy.

As discussed in Section 5.15.1, IID will deliver water to the Project through existing facilities. The Project includes construction of production and injection wells, geothermal fluid supply and injection pipelines, and process water storage facilities needed for its operations. No new or expanded off-site water facilities would be required.

5.15.2.2 Groundwater

Production and injection wells will include casings and other engineering controls as appropriate to minimize potential release of both drilling fluids and production-related geothermal fluids to the shallow groundwater aquifer. Construction and operation of all production and injection wells will be done in accordance with California Department of Conservation, Geologic Energy Management Division (CalGEM) regulations, which will promote the avoidance of significant groundwater impacts. Production and injection well construction and operation are addressed in more detail in Section 5.4, Geologic Hazards. Application of CalGEM requirements and proper operation and maintenance of production and injection wells will ensure that the Project's potential impacts to groundwater from production and injection wells are less than significant

The Project is not expected to substantially deplete groundwater supplies, interfere substantially with groundwater recharge, or impede sustainable groundwater management of the basin.

5.15.2.3 Process Fluid Collection/Discharge/Disposal

Potential impacts associated with wastewater collection, discharge, and disposal, resulting from construction and operation of the Project, are discussed below.

5.15.2.3.1 Construction

During construction, wastewater will be generated by construction workers use of portable toilets at the construction site and portable restrooms, showers, and kitchens at the crew construction camps. The portable facilities will store wastewater for removal and disposal at an appropriate wastewater facility. The amount of wastewater generated will be accommodated by existing wastewater facilities.

Accidental spills and releases during construction are discussed in Section 5.15.2.4.

5.15.2.3.2 Operation

The Project will dispose of fluid wastewater streams, in accordance with CalGEM injection parameters.

Under normal operating conditions, the primary discharge from the Project will consist of spent geothermal fluid that is returned to the geothermal reservoir through injection wells. Under these circumstances, geothermal fluid is considered a geologic resource, not a hazardous waste or wastewater, pursuant to California Health and Safety Code Section 25143.1, although direct injection is subject to regulation by CalGEM and the RWQCB and Class II surface impoundment (brine pond) are regulated by the RWQCB. During normal operations, geothermal fluid will be injected into the injection wells immediately following the low-pressure (LP) separator. During startup and shutdown, some geothermal fluid may be directed to the Project's brine pond and subsequently injected into the aerated fluid injection wells on the plant site. Process geothermal fluid waste characteristics are summarized in Table 2-3 in Section 2.0, Project Description.

The brine pond is depicted in Figure 2-1 in Section 2.0, Project Description. The brine pond is a concrete-surfaced pond that is sized to accommodate draining of the primary and secondary clarifiers, plus two feet of freeboard. The brine pond will be "U" shaped, approximately 750-foot by 85-foot. The center of the "U" allows for equipment access when the pond requires maintenance. The pond will be designed in accordance with Title 27, Division 2 of the California Code Regulations (CCR) – Special Requirements for Surface Impoundment. The triple lined brine pond will contain a Leachate Collection and Removal System (LCRS) to detect any leaks in the primary layer.

During upset conditions, spent geothermal fluid that overflows from the clarifiers and the thickener would be directed to the brine pond for temporary storage, after which this fluid is pumped to the aerated fluid injection well. In addition to temporarily retaining spent geothermal fluid prior to injection, the brine pond temporarily stores solids that have either precipitated or settled out of the geothermal fluid during the power generation process. The brine pond also holds fluids generated during emergency situations, maintenance operations, and water from hydro blasting, safety showers and eye wash stations, vehicle wash station effluent, water from the plant conveyance system and reject water from RO. The brine pond would also collect fluid from production wells during flow-testing after drilling and from start-up of production wells during initial introduction of fluid to the Resource Production Facility (RPF) and Power Generation Facility (PGF). This fluid would be injected into an injection well after startup is complete.

A secondary process stream is blowdown from the cooling towers, which is sourced from condensed geothermal steam and canal supply water. This process water will be injected into the dedicated injection well.

Prior to operation, a site assessment work plan will be completed and groundwater compliance wells identified. The monitoring wells will be provided adjacent to the brine pond to comply with RWQCB groundwater protection regulations. The brine pond will be designed in accordance with Title 27 requirements for surface impoundments and a waste management unit (WMU) will be permitted under Waste Discharge Requirements (WDR) issued by the CRBRWQCB. A release from this pond or its associated systems has the potential to impact both surface and groundwater water quality. The triple lined brine pond will include an LCRS to detect any leaks in the primary liner. and managed (including monitoring wells) per CRBRWQCB specifications, significant impacts to water quality from the operation of the brine pond are not expected.

Sanitary waste from restroom, kitchen, and similar facilities will be directed to a septic tank constructed to Imperial County specifications. Waste from the septic tank may be pumped out periodically. The septic tank will outlet to a dispersal system, such as a leach field, evapotranspiration bed, or other approved disposal method based on site constraints. For these reasons, no significant impacts to water quality would occur as a result of the septic system.

No new or expanded off-site wastewater treatment facilities would be required as a result of the Project.

5.15.2.4 Stormwater Runoff and Drainage

Potential impacts associated with stormwater runoff and drainage, including impacts from accidental spills or releases, from construction and operation of the Project are discussed below.

5.15.2.4.1 Construction

Construction activities for the BRGP would include clearing, grading, excavation, and foundation installation. Pipeline construction would consist of various activities, including, but not limited to, clearing and grubbing, excavation for pipeline supports, pipe handling, and welding. Construction activities for an interconnection gen-tie line would include access road construction, site clearing, and foundation installation.

Construction parking, laydown yards, construction crew camps, and/or borrow pits sites have been identified for use during construction. Some of these construction sites may be shared with other proposed geothermal projects. Proposed improvements for the laydown yards and construction crew camp include best management practice (BMP) installation, clearing and leveling the sites, installation of temporary ground cover/gravel suitable for material and equipment staging areas, parking, power and security site lighting installation, perimeter fencing, and portable construction trailers and associated utility construction. Construction activities associated with the development of the laydown yards and the construction person camp that could affect water resources include vegetation removal, excavation, minor grading, gravel application, mobile trailer installations, temporary utility construction, material/equipment staging and storage, temporary stockpiling, and worker reporting/parking. Construction activities associated with borrow pits that could affect water resources include vegetation removal, excavation, grading, and temporary stockpiling. Topsoil removed from the Project site will be segregated and stockpiled at the borrow sites as feasible. After necessary fill material has been procured from the borrow sites, the stockpiled topsoil will be used to backfill the borrow site.

Clearing of the protective vegetative cover and subsequent soil disturbance will likely result in short-term increases in water and wind erosion rates. Soil erosion causes the loss of topsoil and can increase the sediment load in surface receiving waters downstream of the construction site. Soil compaction can decrease infiltration rates, resulting in increased runoff and erosion rates. Potential contamination of surface waters could occur as a result of accidental spills of hazardous materials associated with construction.

Construction activities will be performed in accordance with the California National Pollution Discharge Elimination System (NPDES) General Permit for the Discharge of Storm Water Associated with Construction Activity. The NPDES Permit will require the development of a Storm Water Pollution Prevention Plan (SWPPP) and the implementation of measures to control erosion, sedimentation, and the release of contaminated runoff. In addition, the California Energy Commission (CEC) requires that Project owners develop and implement a drainage, erosion, and sediment control plan (DESCP) to reduce the impact of runoff from construction sites. The SWPPP and DESCP will include BMPs such as grass-covered swales and ditches, stabilized construction entrances, gravel-covered construction lay down areas, silt fencing, covering stockpiles, regular watering of exposed soils, and seeding of the disturbed areas. Runoff from all affected areas will be diverted to erosion control measures before discharging off-site. Monitoring will be performed as part of the SWPPP and DESCP and will include inspections to ensure that the BMPs described in the SWPPP and DESCP are properly implemented and effective.

The Surface Mining and Reclamation Act of 1975 (Surface Mining and Reclamation Act (SMARA), Public Resources Code, Sections 2710-2796) provides a comprehensive surface mining and reclamation policy for the regulation of surface mining operations to assure that adverse environmental impacts are minimized and excavated lands are reclaimed to a usable condition. This policy, in addition to the SWPPP and DESCP, would apply to the borrow pits. The County enacts ordinances to implement SMARA at the local level and acts as the lead agency for the issuance of permits, acts as lead agency for development of reclamation plans, and is the holder of reclamation financial assurances.

During production and injection well drilling activities, oil and chemicals may be stored on the well pads within secondary containment. In addition, management practices employed to prevent spills or releases of oil and chemicals used in well development or plant construction are discussed in Section 5.5, Hazardous Materials. Utilizing these practices would result in no significant adverse impacts to water resources due to a release of oil, chemicals, or drilling fluids during construction of production and injection wells.

Upon completion of Project construction, areas disturbed by construction will be stabilized. After sediment removal and stabilization of the site, all construction sediment control measures will be removed. Therefore, potentially significant impacts to water resources during the construction of the Project are not anticipated.

5.15.2.4.2 Operation

The potential risks to surface water quality from accidental releases from pipelines are minimized by protective pipeline design, including use of corrosion-resistant materials; a detailed inspection routine; preparation of a release response plan; and expeditious containment, control, and cleanup of released fluids. In addition, the pipelines at each wellhead will be equipped with remotely operated electrical emergency shutoff valves, as well as manual isolation valves, to prevent potential releases.

Stormwater runoff could result in erosion and sediment deposition and water quality impacts. The Project is designed such that there will be no discharges. Site grading will convey all runoff to the northwest corner of the site to a lined earthen retention pond. The stormwater drainage system, including the retention pond, will be designed to contain the 100-year storm event. Runoff will be conveyed via ditches, swales, and culverts. Stormwater flows from areas of the facility with potential for oil contamination will be contained in the secondary containment facilities for offsite disposal at a permitted facility. Chemical storage areas will have secondary containment to prevent chemical spills from contaminating stormwater. Oils and other hazardous materials will be stored on-site within secondary containment to minimize the potential impacts to groundwater and surface water, as described in detail in Section 5.5, Hazardous Materials. Containment areas will be inspected to verify that rainwater accumulation in the containment area is free of contamination before the containment area is drained to stormwater conveyances. If contamination is identified, the containment area will be pumped out by vacuum truck and disposed of off-site at an appropriate waste management facility (see Section 5.14, Waste Management). The Project site will also be enclosed by a perimeter berm. Therefore, significant adverse impacts from Project drainage and runoff, including impacts from spills and releases, would not occur.

Storm drainage collected in the retention pond will be either pumped to an injection well or allowed to evaporate. Regulatory requirements for Project stormwater operations will be guided under the DESCP. Because the retention pond is designed not to discharge under a 100-year storm condition, a separate NPDES permit is not required.

The entire Project site will be protected from flooding by a berm surrounding the site of suitable height to provide flood protection up to an elevation of at least -223.80 mean sea level, in accordance with County flood control requirements and the request to FEMA to revise the 100-year flood zone in the Salton Sea area. Potentially significant flood-related impacts are not anticipated.

5.15.3 Cumulative Effects

The potential cumulative impact of the Project and other projects considers the additive construction and operational impacts of the individual projects (Public Resources Code §21083; 14CCR §15064[h], 15065[c], 15130, and 15355). Eight potential projects were identified and considered in this cumulative impact assessment. These projects include:

1. Wilkinson Solar Farm
2. Lindsey Solar Farm
3. Midway Solar Farm IV
4. Ormat Wister Solar
5. Hell's Kitchen Geothermal Exploration Project
6. Energy Source Mineral ALTiS
7. Elmore North Geothermal Project
8. Morton Bay Geothermal Project

The Project is expected to have less than significant cumulative impacts on water supply. As discussed in Section 5.15.2.1, the IWSP currently designates up to 25,000 afy of water for each potential Non-Agricultural Projects within IID's water service area. The Integrated Water Resources Management Plan (IWRMP) estimated that, in 2020, geothermal project water use in the IID service area would be 81,287 afy without conservation and 65,030 with conservation; by 2050, geothermal water use is projected to be 180,000 afy without conservation and 144,000 with conservation (IID 2012, Table 5-22). The Project's 1,125 afy water use represents only about 1.1 percent of the increased geothermal water use (98,713 afy) difference from 2020 to 2050 without conservation, and 1.4 percent of the (78,790 afy) difference with conservation. Multiple projects at a similar scale could be accommodated with the projected increase in geothermal water use.

Total non-agricultural water use in 2050 is projected to be 305,059 afy without conservation and 256,323 afy with conservation. Agricultural water deliveries between 2006 and 2011 ranged from 2.207 million afy to 2.522 million afy (IID 2012, Table 5-29). Given that most farmland in the service area is in production, some agricultural areas may be converted to non-agricultural use, and efforts are ongoing to increase water efficiency and conservation, it is reasonable to assume that future agricultural water deliveries will not increase. Groundwater is typically not used in this region for irrigation (Jacobs 2023), so its use would not need to be offset in the future.

IID's net available water for consumption use is estimated to be 2,665 million afy in 2050, and IID is in a good position to receive their allotments in the future (Jacobs 2023). If agricultural water deliveries continue as discussed above, IID would have approximately 143,000 to 458,000 afy available for non-agricultural uses. At the approximate average of the 2006-2011 agricultural water use years, there would be approximately 300,500 afy available, enough to meet the 256,323 afy projected non-agricultural water use with conservation.

Because the Project will be designed such that no runoff leaves the site, there is no potential for cumulative erosion and sedimentation impacts. The Project's brine pond will be designed, constructed, and operated in compliance with LORS that make releases from these impoundments unlikely.

Potential cumulative impacts to groundwater resources are primarily related to depletion of the power producing geothermal reservoir and surface subsidence resulting from geothermal fluid withdrawal from the proposed site and currently existing geothermal power-generating facilities in the area. With the injection of spent geothermal fluid into the geothermal resource area, cumulative impacts are not expected to be significant.

5.15.4 Mitigation Measures

Potential impacts to water resources are less than significant, so no mitigation measures are required. This section presents Applicant commitments that will further reduce potential impacts to water resources by Project construction and operation. These commitments are described below

- The Project owner shall comply with all of the requirements of the General NPDES Permit for Discharges of Storm Water Associated with Construction Activity. The Project owner shall develop and implement a SWPPP, in accordance with SWRCB Water Quality Order No. 2009-0009-DWQ (or an updated order) for the construction of the entire Project, including all areas of disturbance associated with the transmission and pipeline routes, substations, and offsite borrow areas. Prior to beginning site mobilization associated with any Project element, the Project owner shall submit to the Compliance Project Manager (CPM) a copy of the Notice of Intent for Construction (and any other necessary documents) accepted by the SWRCB and obtain Energy Commission CPM approval of the construction activity SWPPP for Project, as well as any other documents required by the permit.

- Prior to beginning any site mobilization activities for any Project element, the Project owner shall obtain CPM approval for a site-specific DESCP that addresses all Project elements. The plan shall address revegetation and be consistent with the approved grading and drainage plan. The plan shall include design plans that have been developed in accordance with Imperial County Code Title 12, Chapter 12.10.020 Section B and include an analysis demonstrating that the site storm retention facilities can store the volume required, are capable of handling overflow situations while maintaining structural integrity and ensure that the facilities are designed to completely drain in 72 hours.
- Prior to beginning facility operation, the Project owner shall obtain CPM approval for a site-specific Facility Operation DESCP that addresses all plant site elements. The plan shall include detailed plans and information for all of the following:
  - A narrative discussion and appropriate site maps and plans showing how storm water and sediment erosion will be managed during plant operation, including locations of permanent BMPs to be employed.
  - A narrative discussion of what permanent BMPs and materials management practices will be employed at the site.
  - A narrative discussion and schedule detailing how and when inspections and maintenance of all plant operation storm water management structures will be undertaken.
- The Project owner shall comply with the WDRs for the construction and operation of the Project’s brine pond.
- The Project shall not use any fresh water supplies in addition to water supplied by IID as proposed during these proceedings. Use of fresh water supplied by IID shall not exceed the agreed-upon amount. Prior to the start of Project construction, the Project owner shall provide to the CPM evidence of a valid water supply agreement with IID for supply for both the Project construction period and the expected life of the Project. Project construction shall not start until evidence of a valid water supply contract is provided to the CPM.
- The Project owner shall provide certification by a California registered civil engineer or architect that the floodproofing methods for the Project meet the floodproofing criteria in Section 74301(c)(2) of the Imperial County Flood Damage Prevention Regulations.
- Prior to the start of construction of any Project monitoring wells, the Project owner shall submit to the County of Imperial (County) for review and comment, and to the CPM for review and approval, plans, and diagrams for the construction and operation of the Project’s monitoring wells. These plans and diagrams shall comply with the monitoring well requirements set forth in the Title 9, Imperial County Municipal Code, Sections 92101.00 et seq., and applicable section of Appendices A, B, and C. Project construction shall not proceed until the CPM has approved the monitoring well construction plans and diagrams. The Project owner shall remain in compliance with the County water well requirements (including requirements for reworking or destroying the monitoring wells) for the life of the Project.

5.15.5 Laws, Ordinances, Regulations, and Standards

Federal and state LORS applicable to water resources and anticipated compliance are discussed in this subsection and are summarized in Table 5.15-5.

Table 5.15-5. LORS for Water Resources

Laws, Ordinances, Regulations, and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
CWA of 1977 (including 1987 amendments) Section 402, 33 United States Code (USC) Section 1342, 40 CFR Parts 112, 122 – 131	The objective of the CWA (1977) is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The CWA regulates both direct and indirect discharges, including storm water discharges from construction and industrial activities.	USEPA, CRBRWQCB	Section 5.15.5.1
CWA § 311, 33 USC Section 1321, Oil and Hazardous Substance Liability; 40 CFR 112	Section 311 provides the U.S. Environmental Protection Agency (EPA) and the U.S. Coast Guard with authority to establish a program to prevent, prepare for, and respond to oil spills that occur in navigable waters of the U.S.	USEPA, Region IX; CRBRWQCB, and the California Office of Emergency Services (OES).	Section 5.15.5.1 Section 5.17.2 Section 5.4.5.1, Section 5.1.4.
CWA § 401, Water Quality Certification	Requires applicant for a Federal license or permit to conduct any activity that may result in a discharge to navigable waters to provide Section 401 certification. The certification, made by the state in which the discharge originates, declares that the discharge will comply with applicable provisions of the Act, including water quality-standards requirements.	CRBRWQCB	Section 5.15.5.1 Section 5.17.2 and Section 5.3, Biological Resources;
CWA § 404, Regulatory Programs; 33 CFR 323 and 328	40 CFR 112 implements CWA oil spill prevention provisions (Spill Prevention Control and Countermeasures [SPCC] Plan requirements).	U.S. Army Corps of Engineers (USACE)	Section 5.15.5.1 Section 5.17.2 and Section 5.3, Biological Resources Section 5.4.5.1
Title 42, USC, Section 300f, et seq. – Public Health Service Act, Section 1401 et seq. (known as the Safe Drinking Water Act).	The Safe Drinking Water Act (SDWA) establishes requirements and provisions for the Underground Injection Control (UIC) program to protect public health by preventing injection wells from contaminating underground sources of drinking water (USDW). General provisions for the UIC program (including state primacy for the program) are established in Sections 1421 – 1426. The California Division of Oil, Gas, and Geothermal Resources (DOGGR) has been delegated the authority to issue federal Class V UIC permits for geothermal fluid injection.	California Division of Oil, Gas, and Geothermal Resources (DOGGR)	Section 5.15.5.1
Title 40, CFR, Chapter I, Subchapter D – Water Programs (Parts 100 – 149).	These federal regulations provide specific requirements for implementation of water-related environmental laws by the EPA. Among other things, the regulations establish minimum administrative and technical standards and criteria for both the NPDES and UIC programs, including requirements for state implementation of the programs.	EPA, DOGGR	Section 5.15.5.1

Laws, Ordinances, Regulations, and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
State			
California Porter-Cologne Water Quality Control Act 1998; California Water Code (CWC) § 13000 - 14957; Division 7, Water Quality	Requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect State waters, including identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures.	CEC, CRBRWQCB, SWRCB.	Section 5.15.5.2
CWC, Division 7, Chapter 4 §13260 et seq.	Requires filing with the appropriate RWQCB a Report of Waste Discharge (ROWD) for issuance of a WDR for any discharge that could affect the water quality of the state, unless the requirement is waived pursuant to CWC §13269 (a).	CRBRWQCB	Section 5.15.5.2 Sections 5.17.2 and 5.17.4
CCR, Title 23, Waters, Division 3 — SWRCB and RWQCBs	These regulations implement provisions of the CWC. Among other things, the regulations address water rights, implementation of the federal CWA, discharges to land, underground tanks, and waste discharge requirements/NPDES permits.	CRBRWQCB	Section 5.15.5.2
CCR, Title 27, CCR, Environmental Protection, Division 2, Solid Waste, Subdivision 1, Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid	These regulations address both the California Integrated Waste Management Board (CIWMB) and SWRCB requirements for solid waste management units (including brine ponds).	California Integrated Waste Management Board	Section 5.15.5.2
CCR, Title 27, Division 2, Chapter 3	Outlines classification and siting and construction criteria for WMUs discharges of waste to land, and monitoring. Provides ROWD submittal guidance for the issuance of WDRs for WMUs, also stipulates operational and maintenance procedures to minimize mobility of waste materials.	CRBRWQCB	Section 5.15.5.2 Sections 5.17.2 and 5.17.4
CWC, Division 7, Chapter 10 §13571	Requires a well completion report for constructing, altering, or destroying a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well.	California Department of Water Resources	Section 5.15.5.2 Section 5.17.2
The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)	Prohibits the discharge or release of chemicals known to the State of California to cause cancer or reproductive harm.	California Office of Environmental Health Hazard Assessment (OEHHA)	Section 5.15.5.2 Section 5.17.3 (also see 5.6, Hazardous Materials)
CWC Division 7, Article 4 §§13271 - 13272; CCR, Title 23 §§2250 - 2260	Requires reporting of the releases of specified reportable quantities of hazardous substances or sewage and releases of specified quantities of oil or petroleum products when the release is into, or where it will likely discharge into, waters of the State.	CRBRWQCB, California Office of Emergency Services	Section 5.15.5.2 Section 5.17.2

Laws, Ordinances, Regulations, and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
CWC Division 1, Chapter 6 § 461; California Constitution, Article 10, §2	Prohibits the waste or unreasonable use of water, regulates the method of use and method of diversion of water, and requires all water users to conserve and reuse available water supplies to the maximum extent possible.	SWRCB	Sections 5.15.5.3
California Public Resources Code Section 25523(a), 20 CCR §§1752, 1752.5, 2300 – 2309, and Chapter 2 Subchapter 5. Article 1, Appendix B, Part (1)	Provides for the inclusion of requirements in the CEC's decision on an Application for Construction (AFC) to ensure protection of environmental quality and requires submission of information to the CEC concerning proposed water resources and water quality protection.	CEC	Section 5.15.5.2 Sections 5.17.2 5.17.4 and 5.17.6
SWRCB Resolution 75-58	Prescribes State policy on the use of inland water used for power plant cooling.	SWRCB	Sections 5.15.5.2 and 5.17.4
SWRCB Water Quality Order No. 2009-0009-DWQ	The SWRCB regulates storm water discharges associated with construction projects to protect water quality throughout the state. Effective July 1, 2010, Order No. 2009-0009-DWQ will supersede Order 99-08-DWQ and implement NPDES General Permit No. CAS000002 for storm water discharges associated with construction activity affecting areas greater than or equal to one acre. Those subject to the order can qualify for the permit if they meet the criteria, prepare and implement an acceptable SWPPP and other assessments as necessary, and file with the SWRCB all necessary Permit Registration Documents [including a Notice of Intent (NOI)] prior to beginning construction.	RWQCB Colorado River Basin Regional 7	Section 5.15.5.2
Colorado River Basin Regional Water Quality Control Board, Order No. 98-300. NPDES General Permit No. CAG677001	This order establishes general WDR for the discharge of wastewater from the hydrostatic testing of pipes, tanks, or any storage vessel to surface waters or tributaries of surface waters within the Colorado River Basin Region.	CRBRWQCB	Section 5.15.5.2
Warren-Alquist Act, Public Resources Code (PRC), Section 25000 et seq.	This law gives the CEC authority to certify the construction and operation of thermal electric power plants 50 megawatts (MW) or larger. However, geothermal production wells and related facilities are not included in the definition of thermal power plant and are therefore excluded from the certification process (PRC Section 25120). The Energy Commission certification is also "in lieu of" any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law (PRC Section 25500).	California Energy Commission	Section 5.15.5.2

Laws, Ordinances, Regulations, and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
CCR, Division 20,Chapter 6.5, Article 4, Section 25143.1, Health and Safety Code	This regulation defines the terms "waste" and "wastewater" and exempts wastes resulting from drilling for geothermal resources from management requirements set for managing hazardous wastes, because those wastes are regulated by the California RWQCBs.	CRBRWQCB	Section 5.15.5.2
Local			
Imperial County Municipal Code, Title 9, Land Use Code, Division 10, Building, Sewer, and Grading Regulations, Section 91001.00 et seq.	These code sections establish minimum standards and permitting requirements for building construction, site grading, and sewage disposal systems within Imperial County. The Uniform Plumbing Code requirements are established in Chapter 4 (starting with Section 91004.00); grading permit requirements are provided in Chapter 10 (starting with Section 91010.00); and septic tank and sewage disposal system requirements are provided in Chapter 12 (starting with Section 91012.00).	Imperial County Planning & Development	Section 5.15.5.3
Imperial County Municipal Code, Title 9, Division 10, Chapter 12	Identifies requirements to obtain a permit for private sewage disposal systems in Imperial County.	Imperial County Planning & Development	Section 5.15.5.3
Imperial County Municipal Code, Title 9, Land Use Code, Division 21, Water Well Regulations, Sections 92101.00 et seq.	These regulations establish the minimum well standards and permitting requirements for the construction, operation, and destruction of ground water wells within Imperial County. Wells subject to the regulations include domestic water wells, commercial wells, test or exploratory holes, and observation (monitoring) wells.	Imperial County Planning & Development	Section 5.15.5.3
Imperial County Municipal Code, Title 12, Chapter 12.10.020 Section B –Street Improvement Requirements	This code section establishes standards, specifications, and directions for design and construction of any road, or other land division improvements, required to be constructed in the unincorporated territory of Imperial County.	Imperial County Planning & Development	Section 5.15.5.3
Imperial County Municipal Code, Title 9, Division 16, Chapters 3 and 4	Identifies requirements for flood hazard protection in Imperial County; and requires development permit for construction in special flood hazard areas.	Imperial County Planning & Development	Sections 5.15.5.3
Imperial County Municipal Code, Title 9, Division 3, Chapter 1	Requires submittal of a plan for surface drainage disposal prior to issuance of a grading permit.	Imperial County Planning & Development	Section 5.15.5.3 and 5.17.6
Imperial County Municipal Code, Title 9, Division 16, Chapters 3 and 4:	Requires projects to comply with Division 16. Division 16 requires special attention during planning and construction to reduce/eliminate safety and property damage hazards associated with flood or erosion. Requires development permit for construction in special flood hazard areas.	Imperial County Planning & Development	Section 5.15.5.3

Laws, Ordinances, Regulations, and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Imperial Irrigation District, Interim Water Supply Policy for Non-Agricultural Projects, September 29, 2009. Resolution No. 31-2009.	IID adopted their Interim Water Supply Policy (IWSP) for Non-Agricultural Projects to address water requests from proposed projects while the District's IWRMP is under development. The IWRMP will help IID manage existing water supplies and store water when available, or develop new water supplies. It is estimated that 50,000 afy may be needed for Non-Agricultural Projects over the next 10 to 20 years. The IWSP currently allocates up to 25,000 afy of water for Non-Agricultural Projects within IID's service area. Non-Agricultural Projects requesting water from IID may be required to pay a Reservation Fee. The reserved water would be made available for other users until the Non-Agricultural projects require the reserved water supply.	Imperial Irrigation District	

5.15.5.1 Federal LORS

This section describes in detail the Federal LORS potentially applicable to the Project. In general, Federal LORS applicable to water resources for the Project are implemented by the SWRCB and the CRBRWQCB.

Clean Water Act of 1977, as amended, §402, 33 USC §1342; 40 CFR Parts 112, 122 through 131

The primary objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's surface waters. Pollutants regulated under the CWA include "priority" pollutants, including various toxic pollutants; "conventional" pollutants, such as biochemical oxygen demand, total suspended solids, oil and grease, and pH; and "nonconventional" pollutants, including any pollutant not identified as either conventional or priority.

The CWA regulates both direct and indirect discharges. The NPDES program (CWA § 402) regulates direct discharges into waters of the U.S. NPDES permits set discharge limitations based on applicable State or Federal water quality standards and industry-specific, technology-based limitations. In 1987, the CWA was amended to include a program to address storm water discharges from industrial and construction activities. In California, the NPDES program, including storm water permitting, is delegated to the SWRCB and the nine RWQCBs. The CRBRWQCB administers both the NPDES and storm water discharge permits in the Project area.

Clean Water Act Section 311

This section prohibits the discharge of oil to the environment in harmful quantities and also establishes requirements of the SPCC program. As required under 40 CFR § 112, facilities with the potential to impact waters of the U.S. with releases of oil are required to develop and implement an SPCC Plan. The Plan must describe both spill prevention and response measures. Secondary containment is required for oil storage containers with a capacity of 55 gallons or more. Secondary containment is also required for oil-filled equipment. The SPCC Plan must be certified by a Professional Engineer.

The Applicant will prepare a SPCC Plan for the Project because the total quantity of oil stored aboveground is expected to exceed 1,320 gallons in the steam turbine lubrication systems, oil-filled transformers, and diesel fuel tanks. Secondary containment for hazardous materials, including oil, is discussed in more detail in Section 5.6, Hazardous Materials.

Clean Water Act Section 401

Under the CWA, U.S. Army Corps of Engineers (USACE) Section 404 permits are subject to RWQCB Section 401 Water Quality Certification. Section 401 of the CWA requires certification from the RWQCB that the proposed Project is in compliance with established water quality standards. Projects that have the potential to discharge pollutants are required to comply with established water quality objectives. Section 401 provides the SWRCB and the RWQCB with the regulatory authority to waive, certify, or deny any proposed federally permitted activity, which could result in a discharge to waters of the State. To waive or certify an activity, these agencies must find that the proposed discharge will comply with state water quality standards. According to the CWA, water quality standards include beneficial uses, water quality objectives, and compliance with the EPA's anti-degradation policy.

Clean Water Act Section 404

Activities resulting in the dredging or filling of jurisdictional waters of the U.S. require authorization under a Section 404 permit issued by the USACE. The USACE may grant authorization under either an individual permit or a nationwide permit (NWP). The Project will require the USACE to issue an authorization under NWP 12 for potential impacts to ephemeral drainages along the gen-tie line route. Refer to Section 5.3, Biological Resources for a discussion of potential impacts to jurisdictional waters.

Title 42, USC, Section 300f, et seq. – Public Health Service Act, Section 1401 et seq. (Safe Drinking Water Act).

The SDWA was established to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designed for drinking use, whether from above ground or underground sources. The Act authorizes EPA to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards. The 1996 amendments to SDWA require that EPA consider a detailed risk and cost assessment, and best available peer-reviewed science, when developing these standards. State governments, which can be approved to implement these rules for EPA, also encourage attainment of secondary standards (nuisance-related). Under the Act, EPA also establishes minimum standards for state programs to protect USDW from endangerment by underground injection of fluids.

Title 40, CFR, Chapter I, Subchapter D – Water Programs (Parts 100 – 149)

Establishes effluent standards for toxic pollutant criteria for state, local, and regional oil removal contingency plans, oil pollution prevention measures, designations of hazardous substances, reportable hazardous material quantities, criteria, and standards for the NPDES, UIC Program criteria and standards, and state Program requirements.

5.15.5.2 State LORS

The administering agencies for the State LORS are the CEC, the SWRCB, and the CRBRWQCB. The Project will comply with the applicable State LORS related to water use and quality.

Porter Cologne Water Quality Control Act; CWC, Division 7, Chapter 4 §13260 et seq.

The Porter-Cologne Water Quality Control Act of 1967, Water Code §13000 et seq. requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect State waters. Those criteria include the identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures. Water quality criteria for the proposed Project area are contained in the Water Quality Control Plan for the Colorado River Basin (Basin Plan) which was adopted in 1994 and is in the process of being amended. This plan sets numerical and/or narrative water quality standards controlling the discharge of wastes to the State's waters and land.

CWC Division 7, Chapter 4 establishes the regulatory authority of the SWRCB and RWQCBs to issue WDRs for any discharge with the potential to impact State water quality. The code requires the filing of a ROWD and provides for the issuance of WDR with respect to the discharge of any waste that can affect the quality of the waters of the state. The WDR will serve to enforce the relevant water quality protection objectives of the RWQCB's Region 7 Water Quality Control Plan and federal, technology-based effluent standards applicable to the proposed BRGP Discharge of waste must comply with the groundwater protection and monitoring requirements of Resource Conservation and Recovery Act (RCRA). Discharge of waste earthen material into surface waters resulting from land disturbance may require the filing of a ROWD (Water Code §13260[a]) and provides for the issuance of WDR with respect to the discharge of any waste that can affect the quality of the waters of the state.

The administering agencies for the above regulation are the CEC, SWRCB, and the Regional Water Quality Control Board, Colorado River Basin, Region 7.

California Construction Storm Water Program

Construction activities that disturb equal to or greater than one acre are required to obtain coverage under California's General Permit for Discharges of Storm Water Associated with Construction Activity, Water Quality Order 99-08-DWQ (General Construction Permit CAS 000002). Activities subject to permitting include clearing, grading, stockpiling, and excavation.

The General Construction Permit requires the development and implementation of a SWPPP. The SWPPP specifies BMPs that will reduce or prevent construction pollutants from leaving the site in storm water runoff and will also minimize erosion associated with the construction Project. The SWPPP must contain site map(s) that show the construction site perimeter; existing and proposed structures and roadways; storm water collection and discharge points, general topography both before and after construction; and drainage patterns across the site. Additionally, the SWPPP must describe the monitoring program to be implemented. A NOI for coverage under the construction general permit will be submitted for the Project.

California Industrial Storm Water Program

Industrial activities with the potential to impact storm water discharges are required to obtain a NPDES permit for those discharges. In California, an Industrial Storm Water General Permit, Order 97-03-DWQ (General Industrial Permit CAS 000001) may be issued to regulate discharges associated with 10 broad categories of industrial activities, including electrical power generating facilities. The General Industrial Permit requires the implementation of management measures that will protect water quality. In addition, the discharger must develop and implement a SWPPP and a monitoring plan. Through the SWPPP, sources of pollutants are to be identified and the means to manage the sources to reduce storm water pollution described. The monitoring plan requires sampling of storm water discharges during the wet season and visual inspections during the dry season. A report must be submitted to the RWQCB each year by July 1 documenting the status of the program and monitoring results.

Based on a legal opinion from the SWRCB, geothermal power plants are exempt from the requirement for coverage under the General Permit (SWRCB 1993). The existing geothermal plants owned and operated by affiliates of the Applicant do not currently have SWPPPs. Even if the Project were not exempt as a geothermal power plant, California’s General Permit exempts a facility from permit requirements (and the need to develop a SWPPP) if the facility has no potential to discharge storm water to waters of the State (i.e., no offsite discharge). As discussed in Section 2.0, Project Description, the Project plant site will be constructed with a berm surrounding the entire site and a storm water retention pond designed to contain the storm water from the largest anticipated storm event. Thus, the Project will have no discharge and be exempt from permit.

CCR, Title 27, Division 2, Subdivision 1, Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste

This subdivision sets forth standards to protect public health and safety and the environment. Chapter 3 of Subdivision 1 identifies siting criteria for WMUs, including surface impoundments. This code establishes that WMUs must comply with applicable SWRCB design requirements and RWQCB WDR. Articles 2040 and 20310 establish specific design requirements, including at least 5 feet of separation between the base of the waste management unit and the highest anticipated elevation of the underlying water and liner criteria. The administering agency for the above regulation is the CRBRWQCB. The Project brine pond is classified as a WMU. The design and operation of the brine pond will comply with the appropriate sections of this code.

CWC, Division 7, Chapter 10 §13701

This section authorizes the California Department of Water Resources (DWR) to regulate the construction of water wells. Requires the submittal of a well completion report to the DWR for any activity involving constructing, altering, or destroying a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well. The Applicant will submit required well completion reports for the construction of groundwater monitoring wells for the Project.

CCR Title 22, Division 2, Part 2, Subdivision 1, Chapter 3 et seq. - California Safe Drinking Water and Toxic Enforcement Act (Proposition 65), HSC § 25249.5 et seq.;

Proposition 65 requires persons who emit/release certain chemicals that cause cancer and reproductive toxicity to provide a warning to exposed persons, and to prevent certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water. Certain exemptions apply for chemicals emitted in low quantities or low concentrations. The administering agency for Proposition 65 is the California OEHHA, although the program has no reporting requirements, and OEHHA has no inspection or direct oversight responsibilities for individual facilities. The Attorney General and private plaintiffs enforce Proposition 65.

The Project will use and/or release several chemical substances that contain Proposition 65-listed chemicals. The geothermal fluid contains several Proposition 65-listed chemical substances that may be emitted during the course of normal facility operations, either through the cooling tower, steam vents, rock muffler, or air pollution control device. In addition, Proposition 65-listed chemical substances may be emitted as combustion byproducts from the facility from propane combustion in the air pollution control device, or from diesel fuel combustion in the emergency engine. However, the emission levels of Proposition 65-listed chemicals are not expected to exceed Proposition 65 thresholds for which public notification would be required. The facility operator will provide warnings to employees who may be exposed to listed chemicals by posting Proposition 65-compliant warning signs and through safety training pursuant to Cal/OSHA requirements. A Health Risk Assessment for the Project is provided in Section 5.10, Public Health.

CCR, Title 14, Division 2, Chapter 4, Subchapter 4, Statewide Geothermal Regulations § 1931-§1932; §1937.1. This subchapter set forth the rules and regulations governing the geothermal regulation program of CalGEM as provided for by Chapter 4 (Sections 3700-3776), Division 3, of the PRC. This code establishes requirements for drilling, constructing, and operating geothermal production and injection wells in a manner to protect or minimize damage to the environment, usable ground waters (if any), surface water, geothermal resources, life, health, and property.

The administering agency for the above regulation is CalGEM.

The Project would comply with the appropriate rules and reporting requirements of this regulation.

California PRC, Division 3, Chapter 4, §3700-3776. This code establishes requirements for drilling, constructing, and operating geothermal production and injection wells. This code sets standards for geothermal exploration and development that protect geothermal resources and prevent damage to underground and surface waters suitable for irrigation or domestic purposes from the drilling, operation, maintenance, and abandonment of geothermal wells. For the purpose of CEQA (commencing with Section 21000), this code establishes the CalGEM as the lead agent however the CalGEM can delegate its authority to the County, if appropriate. The permit and reporting requirements set forth in this code are consistent with those described in CCR, Title 14, Division 2, Subchapter 4, Statewide Geothermal Regulations § 1931-§1932; §1937.1.

CWC, Division 7, Chapter 4, Article 4 §§13271 – 13272 and CCR Title 23 §§ 2250 through 2260

These code sections require reporting of releases of specified reportable quantities of hazardous substances or sewage (§ 13271) and releases of specified quantities of oil or petroleum products (§ 13272), when the release is into, or where it will likely discharge into, waters of the State. For releases into or threatening surface waters, a "hazardous substance" and its reportable quantities are those specified in 40 CFR § 116.5, pursuant to § 311(b)(2) of the Federal CWA, 33 USC § 1321(b)(2). For releases into or threatening ground water, a "hazardous substance" is any material listed as hazardous pursuant to the California Hazardous Waste Control Act, Health & Safety Code §§ 25100 et seq., and the reportable quantities are those specified in 40 CFR Part 302. The administering agencies for the above regulation are the CRBRWQCB, and the California OES. Although such releases are not anticipated, if necessary, the Project would comply with the reporting requirements. A detailed discussion of reporting and compliance requirements is provided in Sections 5.5, Hazardous Materials, and 5.16, Waste Management.

CWC Division 1, Chapter 6 § 461; California Constitution, Article 10 §2 and PRC §§25300 – 25523(a)

Article 10 §2 of the California Constitution prohibits the waste or unreasonable use of water. The water code regulates the method of use and method of diversion of water, and requires all water users to conserve and reuse available water supplies to the maximum extent possible. CWC §13552.8 states that the use of potable water for power plant cooling is an unreasonable use if suitable reclaimed water is available. The availability of reclaimed water is determined by the SWRCB based on criteria presented in CWC § 13550. Those criteria address whether the quality and quantity of the reclaimed water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use will not impact downstream users or biological resources.

Under PRC §§ 25300-25523(a), the CEC can approve the use of "fresh inland" water for cooling purposes by power plants under certain circumstances. The Project will utilize non-potable agricultural water from IID. The analysis of alternatives for the original Project demonstrated that the use of reclaimed water or of dry cooling were not reasonably feasible. The Project will use the same IID source for water supply given that the conditions for the use of reclaimed water or dry cooling at the Project site have not changed.

California PRC §25523(a), 20 CCR §§1752, 1752.5, 2300 – 2309, and Chapter 2 Subchapter 5, Article 1, Appendix B, Part (1)

The PRC provides for the inclusion of requirements in the CEC's decision on an AFC to assure protection of environmental quality and requires submission of information to the CEC concerning proposed water resources and water quality protection. The administering agency for the above regulation is the CEC.

This Project would have less than significant impacts to water resources. The Applicant commitments in Section 5.15.4 would be implemented to further minimize impacts.

California Environmental Quality Act, PRC §21000 et seq.; CEQA Guidelines, Appendix G. The CEQA Guidelines (Appendix G) contain definitions of projects that can be considered to cause significant impacts to water resources.

The administering agency for the above regulation is the CEC.

This Project would have less than significant impacts to water resources. Applicant commitments in Section 5.15.4 would be implemented to further minimize impacts.

State Water Resources Control Board, Resolution 75-58

On June 19, 1975, the SWRCB adopted the Water Quality Control Policy on the Use and Disposal of Inland Waters used for Power Plant Cooling. The purpose of the policy is to provide consistent State-wide water quality principles and guidance for adoption of discharge requirements, and implementation actions for power plants that depend on inland waters for cooling. The SWRCB policy uses as criteria whether the quality and quantity of the reclaimed water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use will not impact downstream users or biological resources. Alternative water supplies or cooling technologies must be "economically unsound" or "environmentally undesirable" in order for the use of "fresh inland" water to be used. Alternatives to the use of IID water for a small portion of the Project's cooling load (95 percent of the cooling water makeup will come from condensate), do not meet the criteria: dry cooling would exact an efficiency penalty that could render the Project economically unviable and there is no available source (wastewater treatment plant) of reclaimed water in the general area that meets tertiary treatment standards.

Colorado River Basin RWQCB Order No. CAG677001, Permit No. 98-300

This order identifies the requirements for the discharge of hydrostatic test water. Hydrostatic tests may be conducted at the Project on fluid storage and conveyance facilities including pipelines, tanks, and secondary containment. Coverage under the General Permit for Discharge of Hydrostatic Test Water to Surface Water is required at least 30 days prior to any discharge. The Project will seek coverage under the general permit prior to conducting any hydrostatic tests.

The 2003 California Energy Commission Integrated Energy Policy Report (IEPR)

The 2003 IEPR was developed and adopted pursuant to PRC Sections 25301 and 25302. It includes a water and wastewater policy, based on SWRCB Policy 75-58, which states that the Energy Commission will approve the use of fresh water for cooling purposes by power plants it licenses only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound." In addition, the policy states that the Energy Commission will also require that zero-fluid discharge technologies be used to manage Project wastewater unless such technologies are shown to be "environmentally undesirable" or "economically unsound."

5.15.5.3 Local LORS

Imperial County is the administering agencies for the local LORS. The following policies are to ensure the availability of an adequate and safe water supply and to ensure the maintenance of high quality water in water bodies and aquifers.

Imperial County Land Use Code Title 9, Division 16, Chapter 3, Section 91603.00, Chapter 4, Section 91604.00.

Division 16, Chapter 3 applies to areas of special flood hazards, including land around the Salton Sea and land lying at or below the minus 220-foot elevation contour. It requires that no structure or land be constructed, located, extended, converted, or altered without full compliance with the terms of Division 16 and other applicable regulations. Division 16 requires special attention be paid during planning and construction in order to reduce/eliminate safety and property damage hazards associated with flood or erosion.

Imperial County Land Use Code Title 9, Division 16, Chapter 4

Division 16, Chapter 4 identifies development permit requirements for special flood hazard areas. Application for a development permit shall be made on forms furnished by the floodplain administrator and may include, but not be limited to, plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question, existing or proposed structures, fill, storage of materials, and drainage facilities, and the Project location.

The administering agency for the above regulation is the Imperial County Planning/Building Department, Floodplain Administrator. However, the AFC process supplants local permits.

The Project would apply for a Development Permit. Proposed drainage facilities for storm water runoff and flood overland flow would be submitted for review and approval.

Imperial County Land Use Code Title 9, Division 10, Chapter 12

Division 10, Chapter 12 identifies the requirement to obtain a permit for private sewage disposal systems in Imperial County. Permit applications must be accompanied by the following items: 1) Soil Percolation Report; 2) Site Plan; 3) Engineered design if estimated maximum daily flow is greater than 2,500 gallons; and 4) permit fee.

Imperial County Land Use Code Title 9, Division 17, Chapter 1 Section 91701.01; Section 91701.05; Chapter 2, Section 91702.00; Section 91702.01 and 91702.02. This chapter establishes regulations to facilitate the beneficial use of the geothermal resource for the general welfare of the people of Imperial County and California; to protect the resource from wasteful or detrimental uses and to protect people, property, and the environment from detriments that might result from the improper use of the resource. Item "G" of Section 91701.01 requires that bonds or other forms of security acceptable to the County, in addition to that of the amount set by the CalGEM and approved by that office, be filed with the County Planning/Building Department. Item "J" of Section 91701.01 requires an Emergency Response Plan be prepared with consultation from appropriate agencies to address possible emergencies such as blowouts, major fluid spills, and other emergencies. Item "O" of Section 91701.01 requires that Project facilities shall be designed to protect surface and groundwater quality, including BMPs to contain spills of geothermal fluids, and adequate provision for handling onsite drainage. Item “EE” of Section 91701.01 requires that waste shall be disposed of in compliance with local, state, and federal regulations.

Chapter 2, Section 91702.00 Specific Standards: C) Every site shall be designed to retain the maximum amount of usable agricultural land and the site shall not interfere with the irrigation and drainage pattern, and shall comply with requirements and regulations of the IID; H) Permanent sumps, brine ponds, waste holding ponds, and any other pond, be designed and constructed to meet sound engineering standards and the regulations and requirements of the RWQCB. Chapter 2, Section 91702.01 and 91702.02 establishes drilling and production standards for geothermal projects.

The administering agency for the above regulation is the Imperial County Planning/Building Department.

The Project would comply with the appropriate requirements set forth in land use code.

Division 17, Chapter 1 establishes regulations to facilitate the beneficial use of geothermal resources; to prevent wasteful or detrimental uses; and to protect people, property, and the environment from adverse impacts of improper use.

Imperial County Land Use Code Title 9, Division 3, Chapter 1 Section 90301.02

Division 3, Chapter 1 requires that a plan for disposal of all onsite surface drainage water must be submitted to, and approved by, the Imperial County Department Planning/Building Department and the Imperial County Department of Public Works prior to issuance of a Grading Permit.

The administering agencies for the above regulation are the Imperial County Planning/Building Department and the Imperial County Public Works Department.

The Project would submit grading and drainage plans and a permanent storm water drainage plan.

Imperial County Land Use Code Title 9, Division 10, Chapter 10 Sections 91010.01 91010.02.

This is the County’s grading ordinance that incorporates regulations pertaining to excavation, grading, and construction. This section of the Code also identified procedures and requirements for applying for a construction permit.

No person, firm, association, corporation, or organization except public entities and their officers, employees, or contractors who are performing work within publicly owned rights-of-way, shall, within the unincorporated territories of the County of Imperial, do any grading, excavation, or earthwork construction without having first obtained a permit therefore from the County Engineer.

Application for a permit must include drainage systems, protective devices, and existing and proposed elevations. Item 2 of the Permit Conditions establishes that the depth of grading, excavation, or earthwork will not preclude the use of drain tile in irrigated lands; and Item “3” establishes that grading, excavation, or earthwork construction cannot extend below the water table of the immediate area.

The administering agency for the above regulation is the Imperial County Planning/Building Department. However, the AFC process supplants local permits.

The Applicant would prepare the information required in a grading permit application and comply with the ordinance requirements.

5.15.5.3.1 Imperial County General Plan - Conservation and Open Space Element

Goal and Objectives

Conservation of Environmental Resources for Future Generations

Goal 1: Environmental resources shall be conserved for future generations by minimizing environmental impacts in all land use decisions.

The administering agency for the above regulation is the Imperial County Planning/Building Department.

The Project incorporates engineered grading and drainage plans to minimize grading and assure appropriate drainage of the facility. Additionally, the Project includes groundwater injection and engineering controls that would further minimize environmental impacts to water resources. Applicant commitments in Section 5.15.4 would be implemented to further minimize impacts. The Project, as proposed, complies with the objectives of this goal.

Preservation of Biological Resources

Goal 2: Objective 2.6. - Attempt to identify, reduce, and eliminate all forms of pollution, which adversely impact vegetation and wildlife.

The administering agency for the above regulation is the Imperial County Planning/Building Department.

Project features such as groundwater injection and engineering controls would be implemented to minimize any environmental impacts associated with water resources that would adversely impact vegetation and wildlife. Applicant commitments in Section 5.15.4 would be implemented to further minimize impacts. The Project, as proposed, would comply with the objectives of this goal.

Conservation of Energy Sources

Goal 6: Objective 6.4.- Minimize environmental impact of energy sources.

The administering agency for the above regulation is the Imperial County Planning/Building Department.

Project features such as groundwater injection and engineering controls would be implemented to minimize environmental impacts to water resources associated with development of geothermal energy sources. Applicant commitments in Section 5.15.4 would be implemented to further minimize impacts. The Project, as proposed, would comply with objective 6.4.

Preservation of Water Resources

Goals 8: The County will conserve, protect, and enhance the water resources in the planning area.

Objective 8.1 - Protect all bodies of water (e.g., the Salton Sea) and watercourses for their continued use and development.

Objective 8.2 - Maintain the salinity of the Salton Sea at 40,000 parts per million salinity and encourage the advantageous usage of the Salton Sea for agricultural and natural drainage, recreation, and development.

Objective 8.3 - Regulate development in or adjacent to water bodies and courses, protect water bodies and minimize property damage. Zone the areas around the Salton Sea below elevation -220 feet as open space to minimize property damage from fluctuating sea elevations.

Objective 8.4 - Ensure the use and protection of the rivers and other waterways in the County. Ensure proper drainage and provide accommodation for storm runoff from urban and other developed areas in manners compatible with requirements to provide necessary agricultural drainage.

Objective 8.5. - Protect and improve water quality and quantity for all water bodies in Imperial County.

Objective 8.6. - Eliminate potential surface and groundwater pollution through regulations as well as educational programs.

Objective 8.7. - Reclaim polluted water bodies, such as the New and Alamo Rivers and the Salton Sea, if deemed necessary.

Objective 8.8. - Ensure protection of water bodies that are important for recreational fishing.

Objective 8.10. - Discourage the use of hazardous materials in areas of the County where significant water pollution could pose hazards to humans or biological resources.

Objective 8.11. - Identify watersheds (recharge areas) and key areas for the protection of water quality and groundwater.

Objective 8.12. - Protect aquifer recharge areas including specifying minimum parcel size.

Objective 8.13. - Encourage water conservation and efficient water use among municipal and industrial water users, as well as reclamation and reuse of wastewater.

Objective 8.14. - Coordinate with the appropriate agencies for the availability of water to meet future domestic, industrial/commercial and agricultural needs.

The administering agency for the above regulation is the Imperial County Planning/Building Department.

The Project incorporates engineered grading and drainage plans to minimize grading and assure appropriate drainage of the facility. Additionally, the Project includes groundwater injection and engineering controls and Applicant commitments described in Section 5.15.4 that would further minimize environmental impacts to water resources. The Project, as proposed, complies with the objectives of this goal.

Imperial County General Plan - Water Element

Adequate Domestic Water Supply

Goal 1: The County will secure the provision of safe and healthful sources and supplies of domestic water adequate to assure the implementation of the County General Plan and the long-term continued availability of this essential resource.

The administering agency for the above goal is the Imperial County Planning/Building Department.

The Project would not adversely impact water quality. The Project, as proposed, would comply with the goals of this element.

Protection of Surface Waters

Goal 2: Long-term viability of the Salton Sea, Colorado River, and other surface waters in the County will be protected for sustaining wildlife and a broad range of ecological communities.

The administering agency for the above goal is the Imperial County Planning/Building Department.

The Project would implement Best Management Practices to protect surface water and would comply with the goals and objectives of this element.

Protection of Water Resources from Hazardous Materials

Goal 4: The County will adopt and implement ordinances, policies, and guidelines that assure the safety of County ground and surface waters from toxic or hazardous materials and wastes.

The administering agency for the above goal is the Imperial County Planning/Building Department.

The Project, as proposed, would comply with the goals and objectives of this element (see Section 5.1.4.2).

Imperial County General Plan –Geothermal/Transmission Element (Water related goals)

Goal 3: Geothermal operations will be required to efficiently utilize water.

The administering agency for the above goal is the Imperial County Planning/Building Department.

The expected Project water usage is expected to be less than, or equal to the amount currently used for agricultural purposes. The Project, as proposed, would comply with the goal of this element.

Imperial Irrigation District, Interim Water Supply Policy for Non-Agricultural Projects, September 29, 2009. Resolution No. 31-2009.

IID adopted their IWSP for Non-Agricultural Projects to address water requests from proposed projects while the District's IWRMP is under development. The IWRMP will help IID manage existing water supplies and store water when available or develop new water supplies. It is estimated that 50,000 afy may be needed for Non-Agricultural Projects over the next 10 to 20 years.

The IWSP currently allocates up to 25,000 afy of water (each) for Non-Agricultural Projects within IID's service area. Non-Agricultural Projects requesting water from IID may be required to pay a Reservation Fee. The reserved water would be made available for other users until the Non-Agricultural projects require the reserved water supply.

5.15.6 Agency Contacts, Permits, and Permit Schedule

Agency contacts and required permits are listed in Table 5.15-6.

Table 5.15-6. Permits and Agency Contacts for Water Resources

Permit or Approval	Agency Contact	Schedule
WDR	Herb Jackson Senior Water Resources Engineer Colorado River Basin RWQCB 573-720 Fred Waring Dr, Suite 100 Palm Desert, CA 92260 (760) 346-7491 hjackson@waterboard.ca.gov	The ROWD application for a WDR will be submitted after Amendment Petition submittal and the permitting process is expected to take six to nine months.
NOI for coverage under the California General Storm Water Permit for Construction Activities	Herb Jackson Senior Water Resources Engineer Colorado River Basin RWQCB 573-720 Fred Waring Dr, Suite 100 Palm Desert, CA 92260 (760) 346-7491 hjackson@waterboard.ca.gov	The complete NOI must be filed two weeks prior to construction start for coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity. A SWPPP will be prepared and submitted prior to beginning construction.
NOI for coverage under the Order No. CAG677001 for coverage under the CRBRWQCB General Permit for Discharge of Hydrostatic Test Water to Surface Waters	Herb Jackson Senior Water Resources Engineer Colorado River Basin RWQCB 573-720 Fred Waring Dr, Suite 100 Palm Desert, CA 92260 (760) 346-7491 hjackson@waterboard.ca.gov	Coverage under the General Permit for Discharge of Hydrostatic Test Water to Surface Water is required at least 30 days prior to any discharge.
Report of Completion for groundwater monitoring wells and geothermal heat exchange well	Blanca Zendejas Junior Engineering Technician 770 Fairmont Avenue, Suite 200 Glendale, CA 91203-1035 818-549-2336 (office) SRO_WCR@water.ca.gov	File a Well Completion Report with DWR within 60 days of the completion of the work.

Permit or Approval	Agency Contact	Schedule
Grading and Septic System Permits	Jim Minnick, Director Imperial County Planning and Development Services Department 801 Main Street El Centro, CA 92243-2811 (442) 265-1736 Jimminnick@co.imperial.ca.us	File with County together with building permit prior to beginning of construction.
Monitoring well construction permit	Sergio Rubio Senior Building Inspector, Imperial County Building Department 801 Main Street El Centro, CA 92243-2811 (760) 265-1736 (office) sergiorubio@co.imperial.ca.us	Permit applications must be submitted to County a minimum of 10 days prior to construction of the well.
CWA 404 permit	South Coast Branch for San Diego and Imperial Counties Section USACE 5900 La Place Ct. Suite 100 Carlsbad, CA (760) 602-4834 (office) splregcbad@usace.army.mil	Prior to construction, after 401 certification
CWA 401 certification	Herb Jackson Senior Water Resources Engineer Colorado River Basin RWQCB 573-720 Fred Waring Dr, Suite 100 Palm Desert, CA 92260 (760) 346-7491 hjackson@waterboard.ca.gov	Prior to construction, after Alquist-Priolo approval by CEC

Note:

SMARTS = Stormwater Multiple Application and Report Tracking System

5.15.7 References

California Department of Water Resources (CDWR). 2020. California's Groundwater Bulletin 118 Update. Available at https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118. Accessed February 17, 2023.

California Energy Commission. Final Commission Decision. 2003. Salton Sea Unit 6 Geothermal Project. December.

Colorado River Basin Regional Water Quality Control Board (CRBRWQCB). 2019a. *Water Quality Control Plan for the Colorado River Basin Region (Basin Plan).*

CRBRWQCB. 2019b. *Clean Water Act Sections 305(b) and 303(d) 2018 Integrated Report for the Colorado River Basin Region*. Final Staff Report. November.

Imperial County Planning and Development Services Department. 2015. *Imperial County General Plan Renewable Energy and Transmission Element.*

Imperial County Planning and Development Services Department. *Draft Programmatic Environmental Impact Report.*

Imperial Irrigation District (IID). 2022a. Website https://www.iid.com/water/water-transportation-system#:~:text=IID%20is%20entitled%20to%203.1,southeastern%20California%2C%20Arizona%20and%20Mexico. Accessed September 1.

IID. 2022b. *Imperial Irrigation District Water & QSA Implementation Report, 2021*. Available at 638030680614770000 (iid.com)

IID. 2016. Salton Sea Restoration and Renewable Energy Initiative Information Sheet. May 12. Available at https://www.iid.com/home/showdocument?id=8599. Accessed February 2023

IID. 2012. Imperial Integrated Regional Water Management Plan. Prepared by GEI Consultants. Available at https://www.iid.com/water/water-supply/water-plans/imperial-integrated-regional-water-management-plan

IID. 2022. Vail Canal Lateral 4 Water Quality Testing Data. Prepared by Clinical Laboratory of San Bernardino, Inc.

Jacobs. 2023. *Draft Water Supply Assessment for the Black Rock Geothermal Project*. Prepared for Berkshire Hathaway. March.

State Water Resources Control Board (SWRCB). 1993. Storm Water Permit: Geothermal Power Plants. Memorandum from Elizabeth Miller Jennings, Senior Staff Counsel, Office of the Chief Counsel, State Water Resources Control Board to Archie Matthews, Division of Water Quality. February 23.

State Water Resources Control Board. 2023. "About the Salton Sea" webpage. https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/salton_sea/. Accessed February 16, 2023.

Westec Services, Inc. 1981. Final Salton Sea Anomaly, Master Environmental Impact Report. Cited in CRBRWQCB Order R7-2021-0008, March 9, 2020.

5.16 Worker Health and Safety

This section summarizes the worker health and safety issues that may be encountered during the construction and operation of the proposed Black Rock Geothermal Project (BRGP or Project). It contains worker safety information, including applicable laws, ordinances, regulations, and standards (LORS). Section 5.16.1 is a brief description of the work environment and setting. Section 5.16.2 describes the health and safety programs in terms of analyses conducted to identify hazards and the safety compliance and training programs that will be established onsite. Section 5.16.3 discusses the applicable LORS. Section 5.16.4 lists the regulatory agencies involved and key agency contacts. Section 5.16.5 presents permits required and the permitting schedules.

5.15.1 Setting

The proposed site is located adjacent to the Salton Sea and within the Salton Sea Known Geothermal Resource Area. The BRGP will provide approximately 77 megawatts (MW) of gross output and a maximum net output of 77 MW. The Project will be located on approximately 55 acres of a 160-acre parcel within the unincorporated area of Imperial County, California, and is bounded by McKendry Road to the north, Severe Road to the west, and Boyle Road to the east. The town of Niland is approximately eight miles to the northeast, and the town of Calipatria is approximately six miles southeast of the plant site. The surrounding area consists of actively farmed fields as well as other geothermal plants located throughout the area. The Project comprises the geothermal power plant as well as associated infrastructure, including seven new well pads and associated production and injection wells. In addition, the Project includes up to nine laydown and parking areas, two construction crew camps, and up to four borrow pits located throughout the region. Most of the laydown and parking areas for BRGP will be adjacent to the site immediately south and east. However, as many as 15 sites may be used and will be shared between three proposed projects: the Project, Elmore North Geothermal Project, and Morton Bay Geothermal Project. Construction of the BRGP is expected to take approximately 29 months, beginning in the 2nd quarter of 2024.

5.15.2 Health and Safety Programs

5.15.2.1 Environmental Checklist

Impacts generally would be evaluated with respect to the California Environmental Quality Act (CEQA) checklist. However, the CEQA checklist does not have specific questions for worker health and safety. Related questions are addressed in the Hazardous Materials (HAZMAT) Management and Noise sections.

5.15.2.2 Hazard Analysis

Workers will be exposed to construction and plant operation safety hazards. A hazard analysis follows to evaluate these hazards and assess control measures. The analysis identifies the hazards anticipated during construction and operation, and indicates which safety programs should be developed and implemented to mitigate and appropriately manage these hazards. The hazard analysis for construction activities is presented in Table 5.16-1; the hazard analysis prepared for plant operation is presented in Table 5.16-2. Because the types of hazards anticipated during construction and operation are similar, there is duplication between the tables.

Programs are overall plans that set forth the method or methods that will be followed to achieve health and safety objectives. For example, the Fire Protection and Prevention Program will describe what must be done to protect against and prevent fires. This will include equipment required, such as alarm systems and firefighting equipment, and procedures to follow to protect against fires. The Emergency Action Program and Plan will describe escape procedures, rescue and medical procedures, alarm and communication systems, and response procedures for every hazardous material that can migrate, such as hydrogen sulfide (H_2S). The programs or plans are set forth in written documents that are usually kept at specific locations within the facility.

Each program or plan will contain training requirements that are translated into detailed training courses. These courses are taught to plant construction and operating personnel, as needed. For example, all plant operating personnel will receive training in escape procedures under the Emergency Action Program and Plan, but only those operating forklifts will receive forklift operator training.

Tables 5.16-1 and 5.16-2, which list construction and operation activities and associated hazards, also identify (in the "Control" column) the program designed to reduce the occurrence of each hazard.
In addition, hazards specific to geothermal fluid during well drilling and facility operations are addressed in Sections 5.16.2.2.1 and 5.16.2.2.2, respectively.

Table 5.16-1. Construction Hazard Analysis for BRGP

Activity	Hazard[a]	Control
Motor vehicle and heavy equipment use	Employee injury and property damage from collisions between people and equipment	Motor Vehicle and Heavy Equipment Safety Program
Forklift operation	Employee injury and property damage from collisions between people and equipment	Forklift Operation Program
Trenching and excavation	Employee injury and property damage from the collapse of trenches and excavations or exposure to fumes or vapors that have collected in the trench/excavation	Excavation/Trenching Program
Working at elevated locations	Falls from the same level and elevated areas	Fall Prevention Program; Scaffolding/Ladder Safety Program; Articulating Boom Platforms Program
Use of cranes and derricks	Property damage from falling loads; employee injuries from falling loads; and injuries and property damage from contact with crane or derrick	Crane and Material Handling Program; Crane Operator Certification
Working with flammable and combustible fluids	Fire/spills	Fire Protection and Prevention Program; Housekeeping and Material Handling and Storage Program
Hot work (including cutting and welding)	Employee injury and property damage from fire; exposure to fumes during cutting and welding; ocular exposure to ultraviolet and infrared radiation during cutting and welding	Hot Work Safety Program; Respiratory Protection Program; Employee Exposure Monitoring Program; Personal Protective Equipment (PPE) Program
High Ambient Heat Index	Employee exposure to extreme heat stress results in heat stroke, heat exhaustion, heat cramps or heat rashes,	High Heat Index work program; Cooling stations; Indoor Potable water stations; Reinforce safety program during high heat index work environment
Inspection and maintenance of temporary systems used during construction activities	Employee injury and property damage from contact with hazardous energy sources	Electrical Safety Program
Working on electrical equipment and systems	Employee contact with live electricity and energized equipment	Electrical Safety Program; PPE Program, Hazardous Energy Control (Lockout/Tagout)

Activity	Hazard[a]	Control
Exposure to hazardous waste	Employee exposure to contaminated soil, groundwater, or construction-generated hazardous wastes or debris during construction	Hazardous Waste Program
Exposure to hazardous gases, vapors, dust, and fumes	Injury from employee exposure or overexposure to hazardous gases, vapors, dusts, and fumes.	Hazardous Substances Program; Respiratory Protection Program; PPE Program; Employee Exposure Monitoring Program
Confined-space entry	Employee injury from physical and chemical hazards	Permit-required Confined-Space Entry Program
General construction activity	Employee injury from hand and portable power tools	Hand and Portable Power Tool Safety Program; PPE Program
	Employee injury/property damage from inadequate walking and work surfaces	Housekeeping and Material Handling and Storage Program
	Employee exposure to occupational noise	Hearing Conservation Program; PPE Program
	Employee injury from improper lifting and carrying of materials and equipment	Back Injury Prevention Program
	Employee injury to head, eye/face, hand, body, foot, and skin	PPE Program
	Employee exposure to hazardous gases, vapors, dusts, and fumes	Hazard Communication Program; Respiratory Protection Program; PPE Program; Air Monitoring Program
	Employee exposure to various hazards; reporting of hazardous conditions during construction	Injury and Illness Prevention Program
	Heat and cold stress	Heat and Cold Stress Monitoring and Control Program
Construction and testing of high pressure steam and air systems	Employee injury and property damage from failure of pressurized system components or unexpected release of pressure	Pipeline to be designed and constructed to applicable Codes and Standard and Pressure Vessels to be constructed to American Society of Mechanical Engineers (ASME) BPV Section VIII. Pressure Vessel and Pipeline Safety Program; Implement Tag Out Lock Out Procedures

[a] The hazards and hazard controls provided are generic to construction activities. During various phases of construction, a hazard analysis will be performed to evaluate the relevant hazards more specifically and to develop appropriate hazard controls.

Table 5.16--2. Operation Hazard Analysis for BRGP

Activity	Hazard[a]	Control
Motor vehicle and heavy equipment use	Employee injury and property damage from collisions between people and equipment	Motor Vehicle and Heavy Equipment Safety Program
Forklift operations	Employee injury and property damage from collisions between people and equipment	Forklift Operation Program
Trenching and excavation	Employee injury and property damage from the collapse of trenches and excavations	Excavation/Trenching Program
Working at elevated locations	Falls from the same level and elevated areas	Fall Protection Program; Scaffolding/Ladder Safety Program
Use of cranes or derricks	Property damage from falling loads; employee injuries from falling loads; injuries and property damage from contact with crane or derrick	Crane and Material Handling Program
Working with flammable and combustible fluids	Fire/spills	Fire Protection and Prevention Program
Working with HAZMAT	Employee injury from ingestion, inhalation, dermal contact with HAZMAT	Hazard Communication Program
Hot work (including cutting and welding)	Employee injury and property damage from fire; exposure to fumes during cutting and welding; ocular exposure to ultraviolet and infrared radiation during cutting and welding	Hot Work Safety Program; Respiratory Protection Program; Employee Exposure Monitoring Program; PPE Program; Fire Protection and Prevention Program
Troubleshooting and maintenance of plant systems and general operational activities	Employee injury and property damage from contact with hazardous energy sources	Electrical Safety Program
Working on electrical equipment and systems	Employee contact with live electricity	Electrical Safety Program; PPE Program, Program, Hazardous Energy Control (Lockout/Tagout)
Confined-space entry	Employee injury from physical and chemical hazards	Permit-required Confined-Space Entry Program
General plant operation activities	Employee injuries from hand and portable power tools	Hand and Portable Power Tool Safety Program; PPE Program
	Employee injury and property damage from inadequate walking and work surfaces	Housekeeping and Material Handling and Storage Program
	Employee overexposure to occupational noise	Hearing Conservation Program; PPE Program
	Employee injury from improper lifting and carrying of materials and equipment	Back Injury Prevention Program
	Employee injury and property damage from unsafe driving	Safe Driving Program

Activity	Hazard[a]	Control
	Employee overexposure to hazardous gases, vapors, dusts, and fumes	Hazard Communication Program; Respiratory Protection Program; PPE Program; Employee Exposure Monitoring Program
	Reporting and repair of hazardous conditions	Injury and Illness Prevention Program
	Heat and cold stress	Heat and Cold Stress Monitoring and Control Program
	Ergonomic injuries	Ergonomic Awareness Program
Maintenance and repair of high-pressure steam and air systems	Employee injury and property damage from failure of pressurized system components or unexpected release of pressure	Pressure Vessel and Pipeline Safety Program; Electrical Safety Program

[a] The hazard and hazard controls provided are generic to operational activities. This hazard analysis may have to be updated if plant operations change or new equipment is added that was not considered during this evaluation

5.15.2.2.1 Drilling and Construction of Wells

Because of the potential of H_2S and geothermal steam exposure during the drilling and construction of geothermal wells, the Project will develop and implement a plan to minimize risks from these hazards consistent with the state of California, Division of Oil, Gas, and Geothermal Resources, Publication No. M10, *Drilling and Operating Oil, Gas, and Geothermal Wells in an H_2S Environment* (Dosch 1997). The plan will be provided to the local emergency service providers and may include provisions related to hazard detection and monitoring, fire prevention, site control, emergency response, and specialized equipment and techniques.

The Project's non-condensable gas (NCG) stream is expected to contain benzene, which indicates a possibility that worker exposure to benzene could occur during well installation and development. Therefore, monitoring will be conducted to determine whether benzene exposure is within the California Division of Occupational Safety and Health Administration (Cal-OSHA) exposure limits. If monitoring results suggest possible exposures higher than the Cal-OSHA limits, a program to minimize exposures will be implemented in conformance with the Cal-OSHA benzene occupational exposure standard (8 California Code of Regulations [CCR] § 5218).

5.15.2.2.2 Operations and Maintenance Geothermal Fluid Exposure

The primary chemical exposure concerns are anticipated to be H_2S that naturally exists in the geothermal fluids, inorganic arsenic that can potentially build up in the scale created from the steam, hydrochloric acid, and sodium hydroxide used in geothermal fluids handling. Although ammonia is known to be present in geothermal fluids, the concentration will not be high enough in any process stream (geothermal fluids, condensate, NCG) to expose a worker to airborne concentrations exceeding OSHA or National Institute of Occupational Safety and Health (NIOSH) exposure thresholds.

The NCG H_2S abatement system using spargers and the oxidation box system proposed for H_2S treatment in the condensate will minimize the risk of worker exposure to H_2S emissions from routine operations. During commissioning and startup, and during outages and upset conditions, steam may be routed through the steam atmospheric flash tank (AFT). The AFT would release H_2S to the atmosphere without control through the rock muffler. Although emissions of H_2S are anticipated to be higher when routed through the AFT/rock muffler (versus through the turbine and control system), the concentrations at the worker level are expected to be below applicable worker exposure standards, including the Immediately Dangerous to Life and Health limit of 100 parts per million (ppm) and the NIOSH Ceiling Limit of 10 ppm.

Procedures addressing employee exposure, response, and evacuation will be included in the Emergency Action Plan.

Potential exposures to trace amounts of toxic metals and other elements will most likely occur during outages and other maintenance and repair activities that require exposing surfaces that have been subjected to steam; similarly, H_2S exposure potential also could exist during outages and other maintenance and repair activities that involve exposing surfaces subjected to steam. PPE will be employed to minimize worker exposure. In addition, worker monitoring will be used to establish the exposure levels and, if necessary, the Applicant will institute additional mitigation measures to protect the workers from potential arsenic exposure pursuant to 8 CCR § 5214.

5.15.2.3 Training and Safety Programs

To protect the safety and health of workers during the construction and operation of BRGP, health and safety programs designed to mitigate hazards and comply with applicable regulations will be implemented. Qualified individuals will perform periodic audits to determine whether proper work practices are being used to mitigate hazardous conditions and to evaluate regulatory compliance.

5.15.2.3.1 Construction Health and Safety Program

The following construction safety programs will be developed and implemented during construction of BRGP as outlined in the following lists.

Injury and Illness Prevention Program

- Philosophy and safety commitment
- Safety leadership and responsibilities
- Accountability
- Specific core safety processes (refer to Construction Safety Programs later in this section)
- Employee communication
- Planning job hazard analysis and pretask
- Compliance with work rules and safe work practices
- Measurement of compliance and effectiveness of prevention methods, inspections/audits
- Communication of performance and implementation of necessary improvements
- Training and other communication requirements

Fire Protection and Prevention Program

- General requirements
- Housekeeping and proper material storage
- Employee alarm/communication system
- Portable fire extinguishers
- Fixed firefighting equipment
- Fire control and containment
- Flammable and combustible fluid storage
- Dispensing and disposal of flammable fluids
- Service and refueling areas
- Training

PPE Program

- Personal protective devices
- Head protection
- Eye/face protection
- Body protection
- Hand protection
- Foot protection
- Skin protection

- Fall protection
- High-voltage protection
- Respiratory protection
- Hearing protection
- Hazard analysis
- Training

Emergency Action Program and Plan

- Emergency procedures for the protection of personnel, equipment, the environment, and materials:
  - Fire and emergency reporting procedures
  - Response actions for accidents involving personnel and property
  - Bomb threat response procedures
  - Site assembly and emergency evacuation route procedures
  - Natural disaster response
- Reporting and notification procedures for emergencies and contacts, including offsite and local authorities:
  - Alarm and communication systems
  - Spill response, prevention, and control action plan
  - Emergency response equipment
  - Emergency personnel (response team) responsibilities and notification roster
  - Training requirements

Construction Safety Programs

- Motor Vehicle and Heavy Equipment Safety Program
  - Operation and maintenance of vehicles
  - Inspection
  - PPE
  - Training
- Forklift Operation Program
  - Trained and certified operators
  - Fueling operations
  - Safe operating parameters
  - Training
- Excavation/Trenching Program
  - Shoring, sloping, and benching requirements
  - Cal-OSHA permit requirements
  - Inspection
  - Air monitoring
  - Access and egress
- Fall Protection Program
  - Evaluation of fall hazards
  - Protection devices
  - Training
- Scaffolding/Ladder Safety Program
  - Construction and inspection of equipment
  - Proper use
  - Training

- Articulating Boom Platforms Program
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Operator training
- Crane and Material Handling Program
  - Certified and licensed operators
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Training
- Hazardous Waste Program
  - Evaluation of hazard
  - Training
  - Air monitoring
  - Medical surveillance
  - Health and Safety Plan (HSP) preparation
- Hot Work Safety Program
  - Welding and cutting procedures
  - Fire watch
  - Hot work permit
  - PPE
  - Training
- Employee Exposure Monitoring Program
  - Exposure evaluation
  - Monitoring requirements
  - Reporting of results
  - Medical surveillance
  - Training
- Electrical Safety Program
  - Grounding procedure
  - Lock-out/tag-out (LO/TO) procedures
  - Overhead and underground utilities
  - Utility clearance
  - Assured Grounding Program/Ground Fault Circuit Interrupters
  - Training
- Permit-required Confined-space Entry Program
  - Air monitoring and ventilation requirements
  - Rescue procedures
  - LO/TO and blocking, blinding, and blanking requirements
  - Permit completion
  - Training
- Hand and Portable Power Tool Safety Program
  - Guarding and proper operation
  - Training

- Housekeeping and Material Handling and Storage Program
  - Storage requirements
  - Walkways and work surfaces
  - Equipment handling requirements
  - Training
- Hearing Conservation Program
  - Identifying high-noise environments
  - Exposure monitoring
  - Medical surveillance requirements
  - Hearing-protective devices
  - Training
- Back Injury Prevention Program
  - Proper lifting and material-handling procedures
  - Training
- Hazard Communication Program
  - Labeling requirements
  - Storage and handling
  - Safety Data Sheet (SDS)
  - Chemical inventory
  - Training
- Respiratory Protection Program
  - Selection and use
  - Storage
  - Fit testing
  - Medical requirements
  - Inspection and repair
  - Training
- Heat and Cold Stress Monitoring and Control Program
  - Monitoring requirements
  - Prevention and control
- Pressure Vessel and Pipeline Safety Program
  - Line-breaking program
  - Equipment inspection and maintenance
  - Blocking, bleeding, and blanking
  - Training
- Safe Driving Program
  - Inspection and maintenance
  - Training

5.15.2.3.2 Operation Health and Safety Program

Upon completion of construction and commencement of operations at BRGP, the construction HSP will transition into an operations-oriented program reflecting the hazards and controls necessary during operation. The following outline sets forth the topics that will be included in the Operations Health and Safety Program.

Injury and Illness Prevention Program

- Personnel with the responsibility and authority for implementing the plan
- Safety and health policy
- Work rules and safe work practices
- System for ensuring that employees comply with safe work practices
  - Employee communications
  - Identification and evaluation of workplace hazards
  - Methods and procedures for correcting unsafe or unhealthy conditions, work practices, and work procedures in a timely manner based on the severity of the hazards
  - Specific safety procedures (refer to Plant Operation Safety Program)
  - Training and instruction

First Aid, Cardiopulmonary Resuscitation (CPR), and Automated External Defibrillator

- General requirements
- Written program
- Training
- Maintenance

Fire Protection and Prevention Program

- General requirements
- Fire hazard inventory, including ignition sources and mitigation
- Housekeeping and proper materials storage
- Employee alarm/communication system
- Portable fire extinguishers
- Fixed firefighting equipment
- Fire control
- Flammable and combustible fluid storage
- Use of flammable and combustible fluids
- Dispensing and disposal of fluids
- Training
- Personnel to contact for information on plan contents

Emergency Action Program/Plan

- Emergency escape procedures and emergency escape route assignments
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate
- Procedures to account for all employees after emergency evacuation has been completed
- Rescue and medical duties for those employees performing rescue and medical duties
- Fire and emergency reporting procedures
- Alarm and communication system
- Personnel to contact for information on plan contents
- Response procedure for H_2S release
- Training requirements

PPE Program

- Hazard analysis and prescription of PPE
- Personal protective devices
- Head protection
- Eye and face protection
- Body protection
- Hand protection

- Foot protection
- Skin protection
- Sanitation
- Safety belts and lifelines for fall protection
- Protection for electric shock
- Medical services and first aid/bloodborne pathogens
- Respiratory protective equipment
- Hearing protection
- Training

Plant Operation Safety Program

- Motor Vehicle and Heavy Equipment Safety Program
  - Operation and maintenance of vehicles
  - Inspection
  - PPE
  - Training
- Forklift Operation Program
  - Trained and certified operators
  - Fueling operations
  - Safe operating parameters
  - Training
- Excavation/Trenching Program
  - Shoring, sloping, and benching requirements
  - Cal-OSHA permit requirements
  - Inspection
  - Air monitoring
  - Access and egress
- Fall Protection Program
  - Evaluation of fall hazards
  - Protection devices
  - Training
- Scaffolding/Ladder Safety Program
  - Construction and inspection of equipment
  - Proper use
  - Training
- Articulating Boom Platforms Program
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Operator training
- Crane and Material Handling Program
  - Certified and licensed operators
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Training

- Hot Work Safety Program
  - Welding and cutting procedures
  - Fire watch
  - Hot work permit
  - PPE
  - Training
- Workplace Ergonomics Program
  - Identification of personnel at risk
  - Evaluation of personnel
  - Workplace and job activity modifications
  - Training
- Employee Exposure Monitoring Program
  - Exposure evaluation
  - Monitoring requirements
  - Reporting of results
  - Medical surveillance
  - Training
- Electrical Safety Program
  - Grounding procedure
  - LO/TO procedures
  - Overhead and underground utilities
  - Utility clearance
  - Training
- Permit-required Confined-space Entry Program
  - Air monitoring and ventilation requirements
  - Rescue procedures
  - LO/TO and blocking, blinding, and blanking requirements
  - Permit completion
  - Training
- Hand and Portable Power Tool Safety Program
  - Guarding and proper operation
  - Training
- Housekeeping and Material Handling and Storage Program
  - Storage requirements
  - Walkways and work surfaces
  - Equipment handling requirements
  - Training
- Hearing Conservation Program
  - Identifying high-noise environments
  - Exposure monitoring
  - Medical surveillance requirements
  - Hearing-protective devices
  - Training
- Back Injury Prevention Program
  - Proper lifting and material-handling procedures
  - Training

- Hazard Communication Program
  - Labeling requirements
  - Storage and handling
  - SDS
  - Chemical inventory
  - Training
- Respiratory Protection Program
  - Selection and use
  - Storage
  - Fit testing
  - Medical requirements
  - Inspection and repair
  - Training
- Heat and Cold Stress Monitoring and Control Program
  - Monitoring requirements
  - Prevention and control
- Pressure Vessel and Pipeline Safety Program
  - Line-breaking policy
  - Equipment inspection and maintenance
  - Blocking, bleeding, and blanking
  - Communication
  - Training
- Safe Driving Program
  - Inspection and maintenance
  - Training

5.15.2.3.3 Safety Training

To ensure that employees recognize and understand how to protect themselves from potential hazards during this Project, comprehensive training programs for construction and operation will be implemented as indicated in Tables 5.16-3 and 5.16-4. Each of the safety procedures developed to control and mitigate potential site hazards will require some form of training. Training will be delivered in various ways, depending on the requirements of Cal-OSHA standards, the complexity of the topic, the characteristics of the workforce, and the degree of risk associated with each of the identified hazards.

Table 5.16-3. Construction Training Program for BRGP

Training Course	Target Employees
Injury and Illness Prevention Training	All
Emergency Action Program/Plan	All
PPE Training	All
Fire Protection and Prevention Training	All
Motor Vehicle and Heavy Equipment Safety Training	Employees working on, near, or with heavy equipment or vehicles
Forklift Operation Training	Employees operating forklifts
Excavation/Trenching Safety Training	Employees involved with trenching or excavation
Fall Protection Training	Employees working at heights greater than four feet or required to use fall protection

Training Course	Target Employees
Scaffolding/Ladder Safety Training	Employees required to erect or use scaffolding
Crane Safety Training	Employees supervising or performing crane operations
Hazard Communication Training	Employees handling or working with HAZMAT
Hazardous Waste	Employees handling or excavating hazardous waste
Hot Work Safety Training	Employees performing hot work
Electrical Safety Training	Employees performing LO/TO or working on systems that require LO/TO activities
Electrical Safety Training	Employees required to work on electrical systems and equipment, or use electrical equipment and cords
Permit-required Confined-space Entry Training	Employees required to supervise or perform confined-space entry activities
Hand and Portable Power Tool Safety Training	Employees who will be operating hand and portable power tools
Heat Stress and Cold Stress Safety Training	Employees who are exposed to temperature extremes
Hearing Conservation Training	All
Back Injury Prevention Training	All
Safe Driving Training	Employees supervising or driving motor vehicles
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized systems or equipment
Respiratory Protection Training	All employees required to wear respiratory protection
Fire Protection and Prevention Training	All

Table 5.16-4. Operations Training Program for BRGP

Training Course	Target Employees
Injury and Illness Prevention Training	All
Emergency Action Plan	All
PPE Training	All
Fire Protection and Prevention Training	All
Excavation/Trenching Safety Training	Employees involved with trenching or excavation
Scaffolding/Ladder Safety Training	Employees required to erect or use scaffolding
Fall Protection Training	Employees required to use fall protection
Forklift Operator Training	Employees operating forklifts
Crane Safety Training	Employees supervising or performing crane operations
Workplace Ergonomics	Employees performing repetitive activities
Hot Work Safety Training	Employees performing hot work
Electrical Safety Training	Employees performing LO/TO
Electrical Safety Training	Employees required to work on electrical systems and equipment
Permit-required Confined-space Entry	Employees required to supervise or perform confined-space entry
Hand and Portable Power Tool Safety Training	Employees that will be operating hand and portable power tools
Heat Stress and Cold Stress Safety Training	Employees exposed to temperature extremes

Training Course	Target Employees
Hearing Conservation Training	All
Back Injury Prevention Training	All
Safe Driving Training	Employees supervising or driving motor vehicles
Hazard Communication Training	Employees handling or working around HAZMAT
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized systems or equipment
Respiratory Protection Program	All employees required to wear respiratory protection
Fire Protection and Prevention Training	All
First Aid, CPR, and Automated External Defibrillator	All

5.15.2.4 Fire Protection

The BRGP will rely on both onsite fire protection systems and local fire protection services. The contractor will develop a Fire Protection and Prevention Plan to be followed throughout all phases of construction and provide the necessary firefighting equipment.

During construction, the permanent facility fire suppression systems will be placed in service as early as practicable. Construction fire prevention regulations in 8 CCR §§ 1920, et seq., will be followed as necessary to prevent construction fires. Special attention will be given to operations involving open flames, such as welding, and the use of flammable materials. Personnel involved in such operations will have appropriate training by the contractor. A fire watch, using the appropriate class of extinguishers or other equipment, will be maintained during hazardous or hot work operations as required. Site personnel will not be expected to fight fires past the incipient stage. As necessary, the fire protective measures will be coordinated with the local fire protection services.

Materials brought onsite must conform to contract requirements, such as flame resistance and fireproof characteristics. Specific materials in this category include fuels, paints, solvents, plastic materials, lumber, paper, boxes, and crating materials. Specific attention will be given to compressed gas, fuel, solvent, and paint storage. Electrical wiring and equipment located inside storage rooms used for Class I fluids will be stored in accordance with Electrical Safety Orders and as prescribed by 8 CCR § 5530. Outside storage areas will be designed to divert possible spills away from buildings and will be kept clear of vegetation and other combustible materials. Precautions will be taken to protect storage areas against tampering where necessary.

Elements of the onsite fire suppression system during construction will consist of portable and fixed firefighting equipment. Portable firefighting equipment will consist of fire extinguishers and small hose lines that conform to Cal-OSHA and the National Fire Protection Association (NFPA). The contractor's safety representative will conduct periodic fire prevention inspections.

Fire extinguishers will be inspected routinely and replaced immediately if defective or in need of recharge as required by 8 CCR § 6151. All firefighting equipment will be located to allow for unobstructed access to the equipment and will be conspicuously marked. A temporary or permanent water supply, of sufficient volume, duration, and pressure to operate the required firefighting equipment, will be provided as combustible materials accumulate. Designated, approved flammable materials storage areas and flammable materials storage containers will be provided with adequate fire prevention systems.

The Project site will be served by the Imperial County Fire Department (ICFD) and the City of Calipatria's Fire Department (CFD). The ICFD has one station located at 1078 Dogwood Road, Heber, California, approximately 31 miles south of the Project. The CFD has one station located at 125 North Park Avenue, Calipatria, California, approximately seven miles southeast of the Project. The CFD is the primary responder and has a total staff of 16 personnel who are on call. There are two to three firefighters on call seven days a week during working hours and two to three night shift personnel on call. All personnel will be notified if an event occurs regardless of who is on call (Nadarro 2023). The response time to an emergency to the Project site is approximately 15 to 20 minutes (City of Calipatria 2018). The CFD and ICFD have mutual aid plans with surrounding fire stations. If additional assistance is needed, the Niland Fire District (located at 8071 Luxor Avenue in Niland, California) and the California State Prison Fire Department will respond.

The ICFD and CFD are responsible for commanding all HAZMAT incidents at the Project site. Imperial County has a HAZMAT Task Force that comprises firefighters with HAZMAT training from stations in cities and the county (Nadarro 2023). The task force members have HAZMAT response training, and they are located around Imperial County to balance the distribution of HAZMAT protection resources.

Refer to Section 5.10, Socioeconomics, for additional information relating to local emergency response capabilities.

5.15.3 Laws, Ordinances, Regulations, and Standards

BRGP construction and operation will be conducted in accordance with all applicable LORS. Table 5.16-5 summarizes the federal, state, and local (Imperial County) LORS relating to worker health and safety. Table 5.16-5 also provides a summary of the applicable national consensus standards.

Table 5.16-5. Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency
Federal		
Title 29 Code of Federal Regulations (CFR) Part 1910	Contains the minimum occupational safety and health standards for general industry in the United States	OSHA
Title 29 CFR Part 1926	Contains the minimum occupational safety and health standards for the construction industry in the United States	OSHA
State		
California Occupational Safety and Health Act, 1970	Establishes minimum safety and health standards for construction and general industry operations in California	Cal-OSHA
8 CCR 339	Requires list of hazardous chemicals relating to the Hazardous Substance Information and Training Act	Cal-OSHA
8 CCR 450	Addresses hazards associated with pressurized vessels	Cal-OSHA
8 CCR 750	Addresses hazards associated with high-pressure steam	Cal-OSHA
8 CCR 1509	Addresses requirements for construction, accident, and prevention plans	Cal-OSHA
8 CCR 1509, et seq., and 1684, et seq.	Addresses construction hazards, including head, hand, and foot injuries and noise and electrical shock	Cal-OSHA
8 CCR 1528, et seq., and 3380, et seq.	Requirements for PPE	Cal-OSHA
8 CCR 1597, et seq., and 1590, et seq.	Requirements addressing the hazards associated with traffic accidents and earth-moving	Cal-OSHA
8 CCR 1604, et seq.	Requirements for construction hoist equipment	Cal-OSHA
8 CCR 1620, et seq., and 1723, et seq.	Addresses miscellaneous hazards	Cal-OSHA

LORS	Requirements/Applicability	Administering Agency
8 CCR 1709, et seq.	Requirements for steel reinforcing, concrete pouring, and structural steel erection operations	Cal-OSHA
8 CCR 1920, et seq.	Requirements for fire protection systems	Cal-OSHA
8 CCR 2300, et seq., and 2320, et seq.	Requirements for addressing low-voltage electrical hazards	Cal-OSHA
8 CCR 2395, et seq.	Addresses electrical installation requirements	Cal-OSHA
8 CCR 2700, et seq.	Addresses high-voltage electrical hazards	Cal-OSHA
8 CCR 3200, et seq., and 5139, et seq.	Requirements for control of hazardous substances	Cal-OSHA
8 CCR 3203, et seq.	Requirements for operational accident prevention programs	Cal-OSHA
8 CCR 3270, et seq., and 3209, et seq.	Requirements for evacuation plans and procedures	Cal-OSHA
8 CCR 3301, et seq.	Requirements for addressing miscellaneous hazards, including hot pipes, hot surfaces, compressed air systems, relief valves, enclosed areas containing flammable or HAZMAT, rotation equipment, pipelines, and vehicle-loading dock operations	Cal-OSHA
8 CCR 3360, et seq.	Addresses requirements for sanitary conditions	Cal-OSHA
8 CCR 3511, et seq., and 3555, et seq.	Requirements for addressing hazards associated with stationary engines, compressors, and portable, pneumatic, and electrically powered tools	Cal-OSHA
8 CCR 3649, et seq., and 3700, et seq.	Requirements for addressing hazards associated with field vehicles	Cal-OSHA
8 CCR 3940, et seq.	Requirements for addressing hazards associated with power transmission, compressed air, and gas equipment	Cal-OSHA
8 CCR 5109, et seq.	Requirements for addressing construction accident and prevention programs	Cal-OSHA
8 CCR 5110, et seq.	Requirements for the implementation of an ergonomics program	Cal-OSHA
8 CCR 5139, et seq.	Requirements for addressing hazards associated with welding, sandblasting, grinding, and spray-coating	Cal-OSHA
8 CCR 5150, et seq.	Requirements for confined-space entry	Cal-OSHA
8 CCR 5155, et seq.	Requirements for use of respirators and for controlling employee exposure to airborne contaminants	Cal-OSHA
8 CCR 5160, et seq.	Requirements for addressing hot, flammable, poisonous, corrosive, and irritant substances	Cal-OSHA
8 CCR 5192, et seq.	Requirements for conducting emergency response operations	Cal-OSHA
8 CCR 5193, et seq.	Requirements for controlling employee exposure to blood borne pathogens associated with exposure to raw sewage water and body fluids associated with first aid/CPR duties	Cal-OSHA
8 CCR 5194, et seq.	Requirements for employee exposure to dusts, fumes, mists, vapors, and gases	Cal-OSHA

LORS	Requirements/Applicability	Administering Agency
8 CCR 5214	Requirements for control of occupational exposure to arsenic	Cal-OSHA
8 CCR 5218	Requirements for control of occupational exposure to benzene	Cal-OSHA
8 CCR 5405, et seq.; 5426, et seq.; 5465, et seq.; 5500, et seq.; 5521, et seq.; 5545, et seq.; 5554, et seq.; 5565, et seq.; 5583, et seq.; and 5606, et seq.	Requirements for flammable fluids, gases, and vapors	Cal-OSHA
8 CCR 5583, et seq.	Requirements for design, construction, and installation of venting, diking, valving, and supports	Cal-OSHA
8 CCR 6150, et seq.; 6151, et seq.; 6165, et seq.; 6170, et seq.; and 6175, et seq.	Fire protection requirements	Cal-OSHA
Title 24, Part 3, California Electrical Code	The Cal-OSHA electrical safety regulations incorporate the requirements of the Uniform Electrical Code located in Title 24, Part 3	Cal-OSHA
8 CCR, Part 6	Provides health and safety requirements for working with tanks and boilers	Cal-OSHA
Health and Safety Code Section 25531, et seq.	Requires that every new or modified facility that handles, treats, stores, or disposes of more than the threshold quantity of any of the listed regulated materials prepare and maintain a Risk Management Plan (RMP)	Cal-OSHA
Health and Safety Code Sections 25500 through 25541	Requires the preparation of a Hazardous Material Business Plan that details emergency response plans for a HAZMAT emergency at the facility	Cal-OSHA
Local HAZMAT		
Specific hazardous material-handling requirements	Provides response agencies with necessary information to address emergencies	Imperial County Dept. of Environmental Management
Emergency Response Plan	Allows response agency to integrate BRGP emergency response activities into any response actions	Imperial County Dept. of Environmental Management
Business Plan	Provides response agency with overview of BRGP purpose and operations	Imperial County Dept. of Environmental Management
RMP (Certified Unified Program Agency, administered by the County)	Provides response agency with detailed review of risks and hazards located at BRGP and mitigation implemented to control risks or hazards	Imperial County Dept. of Environmental Management

LORS	Requirements/Applicability	Administering Agency
National Standards		
Uniform Fire Code, Article 80	Addresses the prevention, control, and mitigation of dangerous conditions related to storage, dispensing, use, and handling of HAZMAT and information needed by emergency response personnel	ICFD & CFD
NFPA 10, Standard for Portable Fire Extinguishers	Requirements for selection, placement, inspection, maintenance, and employee training for portable fire extinguishers	ICFD & CFD
NFPA 11, Standard for Low-Expansion Foam and Combined-Agent Systems	Requirements for installation and use of low-expansion foam and combined-agent systems	ICFD & CFD
NFPA 11A, Standard for Medium- and High-Expansion Foam Systems	Requirements for installation and use of medium- and high-expansion foam systems	ICFD & CFD
NFPA 12, Standard on Carbon Dioxide Extinguishing Systems	Requirements for installation and use of carbon dioxide extinguishing systems	ICFD & CFD
NFPA 13, Standard for Installation of Sprinkler Systems	Guidelines for selection and installation of fire sprinkler systems	ICFD & CFD
NFPA 14, Standard for the Installation of Standpipe and Hose Systems	Guidelines for selection and installation of standpipe and hose systems	ICFD & CFD
NFPA 15, Standard for Water Spray Fixed Systems	Guidelines for selection and installation of water spray fixed systems	ICFD & CFD
NFPA 17, Standard for Dry Chemical Extinguishing Systems	Guidance for selection and use of dry chemical extinguishing systems	ICFD & CFD
NFPA 20, Standard for the Installation of Centrifugal Fire Pumps	Guidance for selection and installation of centrifugal fire pumps	ICFD & CFD
NFPA 22, Standard for Water Tanks for Private Fire Protection	Requirements for water tanks for private fire protection	ICFD & CFD
NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances	Requirements for private fire service mains and their appurtenances	ICFD & CFD
NFPA 30, Flammable and Combustible Liquid Code	Requirements for storage and use of flammable and combustible fluids	ICFD & CFD
NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	Fire protection requirements for installation and use of combustion engines and gas turbines	ICFD & CFD
NFPA 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites	Fire protection requirements for hydrogen systems	ICFD & CFD
NFPA 54, National Fuel Gas Code	Fire protection requirements for use of fuel gases	ICFD & CFD

LORS	Requirements/Applicability	Administering Agency
NFPA 59A, Standard for the Storage and Handling of Liquefied Petroleum Gases	Requirements for storage and handling of liquefied petroleum gases	ICFD & CFD
NFPA 68, Guide for Explosion Venting	Guidance in design of facilities for explosion venting	ICFD & CFD
NFPA 70, National Electric Code	Guidance on safe selection and design, installation, maintenance, and construction of electrical systems	ICFD & CFD
NFPA 70B, Recommended Practice for Electrical Equipment Maintenance	Guidance on electrical equipment maintenance	ICFD & CFD
NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces	Employee safety requirements for working with electrical equipment	ICFD & CFD
NFPA 70, National Fire Alarm and Signaling Code	Requirements for installation, maintenance, and use of local protective signaling systems	ICFD & CFD
NFPA 75, Standard for the Protection of Information Technology Equipment	Requirements for fire protection systems used to protect computer systems	ICFD & CFD
NFPA 78, Guide on Electrical Inspections	Lightning protection requirements	ICFD & CFD
NFPA 80, Standard for Fire Doors and Windows	Requirements for fire doors and windows	ICFD & CFD
NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems	Requirements for installation of air conditioning and ventilating systems	ICFD & CFD
NFPA 101, Code for Safety to Life from Fire in Buildings and Structures	Requirements for design of means of exiting the facility	ICFD & CFD
NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants	Guidelines for testing and marking of fire hydrants	ICFD & CFD
NFPA 850, Recommended Practice for Fire Protection for Fossil-Fuel Steam Electric Generating Plants	Requirements for fire protection in fossil-fuel steam electric generating plants	ICFD & CFD
NFPA 1961, Standard for Fire Hose	Specifications for fire hoses	ICFD & CFD
NFPA 1962, Standard for the Care, Maintenance, and Use of Fire Hose Including Connections and Nozzles	Requirements for care, maintenance, and use of fire hoses	ICFD & CFD
NFPA 1963, Standard for Screw Threads and Gaskets for Fire Hose Connections	Specifications for fire hose connections	ICFD & CFD

LORS	Requirements/Applicability	Administering Agency
American National Standards Institute (ANSI)/ASME, Boiler and Pressure Vessel Code	Specifications and requirements for pressure vessels	ICFD & CFD
ANSI, B31.2, Fuel Gas Piping	Specifications and requirements for fuel gas piping	N/A

5.15.4 Agencies and Agency Contacts

Several agencies are involved to ensure protection of worker health and safety. Agency contacts relative to worker health and safety and fire are shown in Table 5.16-6.

Table 5.16-6. Agency Contacts for Worker Health and Safety

Issue	Agency	Contact
Hazardous Waste Land and Water Quality Community Health	Imperial County Department of Public Health, Environmental Health Services Department 797 Main Street, Suite B El Centro, CA 92243	Jeff Lanoure Deputy Department Manager (442) 265-1888
CUPA for HAZMAT Inventory and Emergency Business Plan and Risk Management Plan	Department of Toxic Substances Control 627 Wake Avenue El Centro, CA 92243	Robert Krug Program Manager (760) 336-8919
Fire Response	Imperial County Fire Department 1078 Dogwood Road, Heber, CA 92249	Rotating contacts (24/7), Battalion Chief Christian Guzman (A Shift Supervisor), Battalion Chief Hector Garcia (B Shift Supervisor), and Battalion Chief Oscar Robles (C Shift Supervisor). (442) 265-3010
	Calipatria Fire Department 125 N Park Avenue Calipatria, CA 92233	Jesse Llanas, Fire Captain (760) 348-4144 J_Llanas@calipatria.com
Worker Health and Safety	Cal-OSHA, San Diego	Michele Boswell 7575 Metropolitan Drive, Suite 207 San Diego, CA 92108 (619) 767-2280

Sources: Confidential 2023; Lopez 2023; Nadarro 2023; Perez 2023.

5.15.5 Permits and Permit Schedule

Table 5.16-7 lists applicable permits related to the protection of worker health and safety for BRGP certification. The activities covered and application requirements to obtain each permit are provided.

All permits noted in Table 5.16-7[1] may be obtained from any Cal-OSHA district or field office as needed. Notification requirements are listed as 24 hours because the permits may be required at several points in the construction of the plant or during operations; no specific permitting schedule is provided.

[1] Dosch 1997.

Table 5.16-7. Permits and Permit Schedule for Worker Health and Safety[1]

Permit	Agency Contact	Schedule
Trenching and excavation and erection or demolition permit	Any Cal-OSHA district or field office	Submit completed permit application to any Cal-OSHA district or field office prior to commencing construction
Permit to erect a fixed tower crane	Any Cal-OSHA district or field office	Submit completed permit application to any Cal-OSHA district or field office at least 24 hours prior to initiation of activity
Pressure vessel permit	Any Cal-OSHA district or field office	Submit completed permit application to any Cal-OSHA district or field office prior to commencing construction

5.15.6 References

City of Calipatria. 2018. Calipatria Service Area Plan. Local Agency Formation Commission, Imperial County. https://www.iclafco.com/assets/cities/2018-city-of-calipatria-sap.pdf. Accessed October 30, 2022.

Confidential, Office Technician, California Division of Occupational Safety and Health. January 30, 2023. Personal communication with Emma McGinty, Jacobs; provided the most updated contact information and confirmed contact person was still Michele Boswell.

Dosch, M.W., and Hodgson, S.F. 1997. *Drilling and Operating Oil, Gas, and Geothermal Wells in an H2S Environment*. State of California, Division of Oil, Gas, and Geothermal Resources, Publication No. M10, Sacramento, CA.

Lopez, Veronica, Office technician, Department of Toxic Substances Control. January 30, 2023. Personal communication with Emma McGinty, Jacobs; provided the most updated contact information for the department of toxic substance control.

Nadarro, Nydia, Engineer, City of Calipatria Fire Department. January 30, 2023. Personal communication with Emma McGinty, Jacobs; discussed fire department current information, staffing, and provided the most updated contact information. Confirmed that the Imperial County Fire Department's contact information has changed.

Perez, George, Environmental Health Services Manager, Imperial County Department of Public Health, Environmental Health Services Department. January 30, 2023. Personal communication with Emma McGinty, Jacobs; provided the most updated contact information for the department.

6. Alternatives

The California Environmental Quality Act (CEQA) requires consideration of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives" (Title 14, California Code of Regulations [CCR]15126.6[a]).

Thus, the focus of an alternatives analysis is on alternatives that "could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects" (14 CCR 15126.6[c]). The CEQA Guidelines further provide that "among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are: (i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts."

The Energy Facilities Siting Regulations (Title 20, CCR, Appendix B) guidelines titled *Information Requirements for an Application* require the following:

> A discussion of the range of reasonable alternatives to the project, including the no project alternative… which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and an evaluation of the comparative merits of the alternatives.

The data adequacy regulations also require the following:

> A discussion of the applicant's site selection criteria, any alternative sites considered for the project and the reasons why the applicant chose the proposed site.

A range of reasonable alternatives are identified and evaluated in this section, including the "no project" alternative (i.e., not developing a new power generation facility), alternative site locations for constructing and operating Black Rock Geothermal Project (BRGP or Project), alternative Project design features (including linear routes and water supply source), and various technology alternatives. This section also describes the site selection criteria used in determining the proposed location of BRGP.

6.1 Project Objectives

BRGP's primary goal is to develop, construct and operate a baseload renewable electrical generating facility that supports grid reliability and the State's goal for a transition to a 100 percent renewable energy and zero-carbon resource supply to end-use customers by 2045.

BRGP's objectives are as follows:

1. To construct and operate an approximately 77 megawatt (net) baseload renewable electrical generating facility that utilizes geothermal resources.
2. Develop a renewable electrical generating facility that minimizes significant environmental impacts of project development through the utilization of existing infrastructure, existing real property interests and rights-of-way, project design measures, and feasible mitigation measures.
3. Develop new incremental capacity from a facility eligible under California's Renewables Portfolio Standard (RPS) program with a capacity factor of at least 80 percent capable of satisfying the procurement requirements of load serving entities (LSEs), including California's utilities under the California Public Utilities Commission's (CPUC) Mid-Term Reliability Decision 21-06-035 and related decisions.
4. Develop an eligible renewable energy resource facility that can assist community choice aggregators, investor-owned utilities, and publicly-owned utilities in meeting their load serving obligations, including Resource Adequacy (RA) and California Renewables Portfolio Standard (RPS) requirements.

5. Encourage the responsible development of the Salton Sea Known Geothermal Resource Area region in a manner that benefits local and regional communities and tribes.
6. Create new, high-paying construction jobs, operations and maintenance jobs, and skilled trades and professional roles in Imperial County, California.

6.2 The "No Project" Alternative

If the Project were not constructed, basic project objectives would not be met, and the grid reliability renewable baseload, environmental, and policy benefits would not be realized. BRGP's renewable, baseload capacity provides electrical system stability. Enhanced stability of the electrical grid will also allow for further integration of renewable resources, providing the state with a path forward toward achieving the RPS mandate. Further, the no project alternative does not meet California's environmental policy goals of encouraging development and deployment of baseload renewable resources.

The no project alternative could result in greater fossil fuel consumption, air pollution, and other environmental impacts in the State as older, less efficient plants with higher air emissions would continue to generate power instead of being replaced with renewable technologies such as the BRGP. As a baseload resource, BRGP also can provide renewable energy at all hours under all weather, ambient and seasonal conditions, unlike certain intermittent resources, thereby avoiding the impacts associated with reliance on conventional fossil fuel facilities. Because the no project alternative would not satisfy any of the basic project objectives, it was rejected in favor of the proposed Project.

6.3 Power Plant Site Alternatives

As the BRGP is reliant on the geothermal resource, selecting an alternative site within the Salton Sea Known Geothermal Resource Area (KGRA) would likely not result in a reduction of the already less than significant environmental impacts. Although an alternative BRGP site in one of the other KGRAs within Imperial County (East or South Brawley, Mesa, Heber, Glamis, Dunes, East Mesa) could meet many of the project objectives, they would not likely reduce any potential environmental impacts as these KGRAs are in similar habitat areas (primarily farmland) and within the same jurisdiction. Relocating to another KGRA within Imperial County eliminates the Applicant's extensive knowledge of the Salton Sea KGRA, as the Applicant's parent company has over 40 years of experience operating power plants in the Salton Sea KGRA. Gaining site control at any other sites is speculative. Furthermore, relocating BRGP to another area outside of the Salton Sea KGRA eliminates the potential of resource sharing (staff, maintenance facilities/equipment, and transmission interconnections) between the BRGP, other projects being licensed at this time, and existing geothermal power plants owned by the parent company of the Applicant. Moreover, Section 25540.2 of the Warren-Alquist Act exempts geothermal powerplants from the Notice of Intent's alternative site selection process where, as here, the Applicant has reasonably demonstrated that the site is capable of providing geothermal resources in commercial quantities.

Finally, relocating the BRGP to an undeveloped Imperial County KGRAs would likely result in substantially higher traffic impacts due to the need to haul filter cake solids to the Desert Valley Company monofill, which is a substantially longer trip than what is currently proposed by the Applicant.

6.4 Alternative Project Design Features

This subsection addresses alternatives to some of the BRGP design features such as the linear facility routing, interconnection location, and water supply source.

6.4.1 Electrical Transmission Interconnection Line Route Alternatives

The facility will connect with the Imperial Irrigation District (IID) switching station via a 2.3-mile generator tie line. This is the most direct interconnection route while avoiding federal and Wildlife Refuge land. An alternative route added further power lines of different voltages on Gentry and Sinclair Roads and required more poles.

6.4.2 Water Supply Source Alternatives

BRGP will require water supplied by IID via two connections to IID supply canals. The primary connection is approximately 50 feet long, and the secondary connection is located approximately 0.5 miles east. These two connections are the most direct route to the supply canals and the only feasible route.

Alternative water sources evaluated include: water wells, which could lead to local land subsidence; agricultural farmland drainage, which can be intermittent and vary in water quality; and local bodies of water such as the Alamo River and Salton Sea, which could impact species habitat. Further, recycled water has been excluded as an alternative as the nearest communities, Niland and Calipatria, are not large enough to support development of a recycled water facility with sufficient capacity to meet the Project's freshwater needs.

6.4.3 Well Pad/Pipeline Alternatives

BRGP well pads and pipelines were selected based on the Applicant's extensive understanding of the geothermal resource in the area. Pad location selection was further refined to reduce environmental impacts to the extent practical. Alternative well pad sites had impacts on species habitat, farmland, and pipeline length.

6.5 Technology Alternatives

6.5.1 Generation Technology Alternatives

Selection of the power generation technology focused on those technologies that meet the objective of the CPUC's Mid-Term Reliability Decision 21-06-035 that specified procurement mandates for capacity from RPS-eligible generation sources with a capacity factor of 80% or more. There are only two technologies that currently have the potential of meeting these requirements - geothermal or biomass. The following is a discussion of the suitability of biomass generation as it applies to the BRGP.

6.5.1.1 Biomass Generation

Biomass electrical generation involves either the direct combustion of biomass materials in a boiler with a steam turbine or the conversion of the biomass to a synthetic gas used in either an internal combustion engine or gas turbine. There are existing biomass plants in the state with capacities in the range of BRGP. However, a comparably sized biomass plant will likely emit significantly more air pollutants (primarily oxides of nitrogen, carbon, and particulate matter) and greenhouse gases (GHGs) than the BRGP. The Project will only emit these air pollutants from the emergency generators and fire water pump, which are expected to operate less than 50 hours per year for routine testing and maintenance.

In addition, the procurement of a fuel supply to support biomass operations likely will require significant transportation impacts due to hauling of fuel to the site and then hauling the waste material (ash) from the combustion process. Although this technology meets most of the project objectives, it will likely have environmental impacts greater than those of BRGP.

The geothermal technology proposed for BRGP is proven and reliable while minimizing air pollutants and GHGs. This technology clearly outperforms the others considered in meeting the project's objectives.

6.5.2 Cooling Alternatives

BRGP require the use of a cooling tower to condense steam from the steam turbine. The condensate is then used as makeup water for approximately 80 percent of the cooling water required for the project. Use of alternative cooling technology, an air-cooled condenser (ACC), in Imperial County may be achievable from an engineering perspective; however, use of an ACC will likely result is a significant degradation in plant performance due to the parasitic load as well as high ambient temperatures in the area, most likely in times when the grid is already stressed by heat storms or similar events challenging grid stability. Further, due to size, an ACC would require a larger project footprint which may result in additional permanent environmental impacts.

The cooling tower technology proposed for BRGP is proven and reliable and identical to the Applicant's parent company's nearby facilities. While an ACC may potentially use less water, the use would decrease the net generation capacity for the site due to parasitic load reducing the Project's ability to help in meeting the RPS requirements and provide grid stability during heat storms and other system challenging events.