

CEQA Initial Study

Surprise Valley Geothermal Exploration Project

Prepared for: Modoc County Planning Department

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Innovative solutions for a complex world

Catalyst
ENVIRONMENTAL SOLUTIONS

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Acronyms

AB	Assembly Bill
AAC	All-American Canal
ACS	American Community Survey
ADT	Average Daily Trips
AFY	Acre-feet per year
APEHA	Alquist-Priolo Special Studies Earthquake Hazards Act
APN	Assessor's Parcel Number
ALOHA	Areal Locations of Hazardous Atmospheres
ATCM	Airborne Toxic Control Measure
BACM	Best Available Control Measures
BFEs	Base Flood Elevations
bgs	Below ground surface
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOPE	Blowout prevention equipment
CAA	Federal Clean Air Act
CAL FIRE	California Department of Forestry and Fire Protection
CalGEM	California Department of Conservation – Geologic Energy Management Division
CALGreen	California Green Building Standards
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CAO	Cleanup and Abatement Orders
CARB	California Air Resources Board
CBC	California Building Code
CBOC	California Burrowing Owl Consortium
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDCA	California Desert Conservation Area
CDFW	California Department of Fish and Wildlife
CDO	Cease and Desist Orders
CDTSC	California Department of Toxic Substances Control
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFG	California Fish and Game
CFR	Code of Federal Regulations
CLOMR	Conditional letter of map revision
CM	Central Main
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level

CO	Carbon monoxide
CUP	Conditional Use Permit
CUPA	Certified Unified Program Agency
CWA	Federal Clean Water Act
dB	Decibel
dBA	A-weighted decibel scale
DDD	Dichlorodiphenyldichloroethane
DDT	Dichlorodiphenyltrichloroethane
DPM	Diesel particulate matter
DTSC	Department of Toxic Substances Control
EHL	East Highline
EIA	Economic Impact Analysis
EIR	Environmental impact report
EISA	Energy Independence and Security Act
EO	Executive Order
EOC	Emergency Operations Center
EOP	Modoc County Emergency Operations Plan
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
EPA RMP	Environmental Protection Agency's Risk Management Program
ERP	Emergency Response Plan
ESA	Federal Endangered Species Act
FEMA	Federal Emergency Management Agency's
FHWA	Federal Highway Administration
FGC	California Fish and Game Code
FIA	Fiscal Impact Analysis
FIFRA	Federal Insecticide Fungicide and Rodenticide Act
FIRM	Flood Insurance Rate Map
FLPMA	Federal Land Management and Policy Act
FMMP	Farmland Mapping and Monitoring Program
gpm	Gallons per minute
gpd	Gallons per day
GHG	Greenhouse gas
GIS	gas insulated switchgear
GWh	Gigawatt-hours
HA	Hazard Assessment
HAP	Hazardous air pollutants
HCP	Habitat Conservation Plan
HGEC	Heber 2 Geothermal Energy Complex (includes Goulds 2 and Heber South)
HFC	Heber Field Company
HGF	Heber Geothermal Field
HMBP	Hazardous Materials Business Plan
HSC	California Health and Safety Code
Hz	Hertz
H2	Heber 2

H2S	Hydrogen Sulfide
IPaC	Information for Planning and Consultation
IRWMP	Integrated Regional Water Management Plan
ITLU	Integrated Two Level Unit
IWSP	Interim Water Supply Policy
JIA	Employment (Jobs) Impact Analysis
KOP	Key Observation Point
kWh	Kilowatt-hour
KGRA	Known Geothermal Resource Area
Ldn	Day-Night Average Level
Leq	Equivalent level
Lmax	Maximum level
LF	Load Factor
LOS	Level of Service
LUP	Linear Utility Project
MBTA	Migratory Bird Treaty Act
MCAPCD	Modoc County Air Pollution Control District
MCDPW	Modoc County Department of Public Works
MCFD	Modoc County Fire Department
MCSO	Modoc County Sheriff's Office
MCTC	Modoc County Transportation Commission
MHMP	Multi-Jurisdictional Hazards Mitigation Plan
MLD	Most likely descendant
$MMTCO_2e$	Million metric tons carbon dioxide equivalent
MPO	Metropolitan Planning Organization
MRF	Material recovery facility
msl	Mean sea level
MS4	Municipal Separate Stormwater Sewer System
MW	Megawatt
MWh	megawatt-hours
NAAQS	National Ambient Air Quality Standards
NCCP	Natural Community Conservation Plan
NEHRP	National Earthquake Hazards Reduction Program
NFIP	National Flood Insurance Program
NHTSA	National Highway Traffic Safety Administration
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOP	Notice of Preparation
NOx	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory

OEC	Ormat Energy Converter
OES	Office of Emergency Services
OEHHA	Office of Environmental Health Hazard Assessment
OH	OrHeber 3
OMR	Department of Conservation's Office of Mine Reclamation
OPR	State Office of Planning and Research
ORCR	Office of Resource Conservation and Recovery
OSHA	Occupational Safety and Health Administration
O3	Ozone
Pb	Lead
PCR	Post-consumer recycled content
PEIR	Program environmental impact report
PJD	Preliminary Jurisdictional Delineation
PM10	Particulate matter less than 10 microns in diameter
PM2.5	Particulate matter less than 2.5 microns in diameter
POEs	Ports of Entry
PSD	Prevention of Significant Deterioration
PCB	Polychlorinated biphenyl
QSA	Quantification Settlement Agreement
RCRA	Resource Conservation and Recovery Act
RE	Renewable Energy
RFS	Renewable Fuel Standard
RFS1	Original RFS program
RFS2	Updated RFS program
RMP	Risk Management Plan
ROG	Reactive Organic Gases
ROW	Right-of-way
RPA	Registered Professional Archaeologist
RPS	Renewables Portfolio Standard
RPW	Relatively Permanent Water
RTP	Regional Transportation Plan
RWQCB	River Basin Regional Water Quality Control Board
SAA	Streambed alteration agreement
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SCAG	Southern California Association of Governments
SCS	Sustainable Community Strategy
SIP	State Implementation Plan
SMARA	Surface Mining and Reclamation Act
SMGB	State Mining and Geology Board
SO2	Sulfur dioxide
SPA	Specific Plan Area
SR	State Route
SRA	State Responsibility Area
SSAB	Salton Sea Air Basin

SWMP	Stormwater management plan
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TA	Transfer Agreement
TAC	Toxic Air Contaminant
TLCFP	Temporary Land Conversion Fallowing Policy
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMT	Vehicle miles traveled
VOC	Volatile organic compound
VRMU	Vapor recovery maintenance unit
W	Watts
WDR	Waste Discharge Requirements
WEAP	Worker Environmental Awareness Program
Wh	Watt-hours
WQMP	Water Quality Management Plan
WSA	Water Supply Assessment
WSM	Westside Main

Executive Summary

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
I. Aesthetics. Would the Project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In nonurbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐
II. Agriculture. Would the Project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☒	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☒	☐
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☒	☐	☐
III. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the Project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐
IV. BIOLOGICAL RESOURCES. Would the Project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
V. CULTURAL RESOURCES. Would the Project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐
VI. ENERGY. Would the Project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐
VII. GEOLOGY AND SOILS. Would the Project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☒	☐
(i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial	☐	☐	☒	☐

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				
(ii) Strong seismic ground shaking?	☐	☐	☒	☐
(iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
(iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) 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 on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐
VIII. GREENHOUSE GAS EMISSIONS. Would the Project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐
IX. HAZARDS AND HAZARDOUS MATERIALS. Would the Project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) 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?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard for people residing or working in the Project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☒	☐
X. HYDROLOGY AND WATER QUALITY. Would the Project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☒	☐	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c) 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 which would:	☐	☒	☐	☐
i. result in a substantial erosion or siltation on- or off-site;	☐	☐	☒	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☒	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☒	☐
iv. Impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐
XI. Land Use and Planning. Would the Project:				

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐
XII. Mineral Resources. Would the Project:				
a) 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?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒
XIII. Noise. Would the Project:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒
XV. POPULATION AND HOUSING. Would the Project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
XVI. PUBLIC SERVICES. Would the Project:				
a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	☐	☐	☒	☐

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
i. Fire protection?	☐	☐	☒	☐
ii. Police protection?	☐	☐	☒	☐
iii. Schools?	☐	☐	☒	☐
iv. Parks?	☐	☐	☒	☐
v. Other public facilities?	☐	☐	☒	☐
XVII. RECREACTION. Would the Project:				
a) Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
XVIII. TRANSPORTATION. Would the Project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☒
b) Conflict or be inconsistent with CEQA Guidelines §15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐
XIX. TRIBAL CULTURAL RESOURCES.				
a) Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:	☐	☒	☐	☐

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or				
i. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐
XIX. UTILITIES AND SERVICE SYSTEMS. Would the Project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b) Have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c) Result in a determination by the waste water treatment provider, which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐
XX. Wildfire: If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may	☐	☐	☐	☒

Issues	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?				
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒
XXII. MANDATORY FINDINGS OF SIGNIFICANCE. Would the Project:				
a) a. Does the Project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒
b) b. Does the Project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☒
c) c. Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

SECTION 1 Introduction

Ormat Surprise Valley LLC (Applicant) proposes to develop up to eleven geothermal test wells on nine well pads to assess the potential of the Lake-City Surprise Valley 1 Known Geothermal Resource Area for commercial geothermal energy generation (Figure 1.1-1). The proposed well pads would be located in areas leased to the Applicant on APN 026-080-018; APN 026-100-014; APN 026-100-006; APN 026-100-008, and APN 026-100-004 in Modoc County, California.

1.1 Purpose of this CEQA Document

CEQA requires that public agencies document and consider the potential environmental effects of the agency's actions that meet CEQA's definition of a "project." Briefly summarized, a "project" is an action that has the potential to result in direct or indirect physical changes in the environment. A project includes the agency's direct activities, as well as activities that involve public agency approvals or funding. Guidelines for an agency's implementation of CEQA are found in the "CEQA Guidelines" (Title 14, Chapter 3 of the California Code of Regulations).

Provided that a project is not exempt from CEQA, the first step in the agency's consideration of its potential environmental effects is the preparation of an Initial Study. The purpose of an Initial Study is to determine whether the project would involve "significant" environmental effects, as defined by CEQA, and to describe feasible mitigation measures that would avoid significant effects or reduce them to a level that is less than significant. If the Initial Study does not identify significant effects, then the agency prepares a Negative Declaration. If the Initial Study notes significant effects but also identifies mitigation measures that would reduce these significant effects to a level that is less than significant, then the agency prepares a Mitigated Negative Declaration (MND). If a project involves significant effects that cannot be readily mitigated, then the agency must prepare an Environmental Impact Report (EIR). The agency may also decide to proceed directly with the preparation of an EIR without an Initial Study.

The proposed project is a "project" as defined by CEQA and is not exempt from CEQA consideration. The County has determined that the project may potentially have significant environmental effects and therefore would require preparation of an Initial Study. This Initial Study describes the proposed project and its environmental setting, discusses the potential environmental effects of the project, and identifies feasible mitigation measures that would eliminate any potentially significant environmental effects of the project or reduce them to a level that would be less than significant.

This Initial Study is a public information document that describes the proposed project, existing environmental setting at the project site, and potential environmental impacts of construction and operation of the proposed project. It is intended to inform the public and decision-makers of the proposed project's potential environmental impacts and to document the lead agency's compliance with CEQA and the State CEQA Guidelines.

This Initial Study concludes that the Project would have potentially significant environmental effects, all of which would be avoided or reduced to a level that would be less than significant with recommended

mitigation measures. As a result, the County has prepared an MND as the appropriate level of CEQA compliance.

1.2 Overview of the Proposed Project

There are two primary components of this exploration project – 1) geothermal well pads and test wells; and 2) the access roads to the well pads. All developments would occur within a 39.5-acre disturbance area.

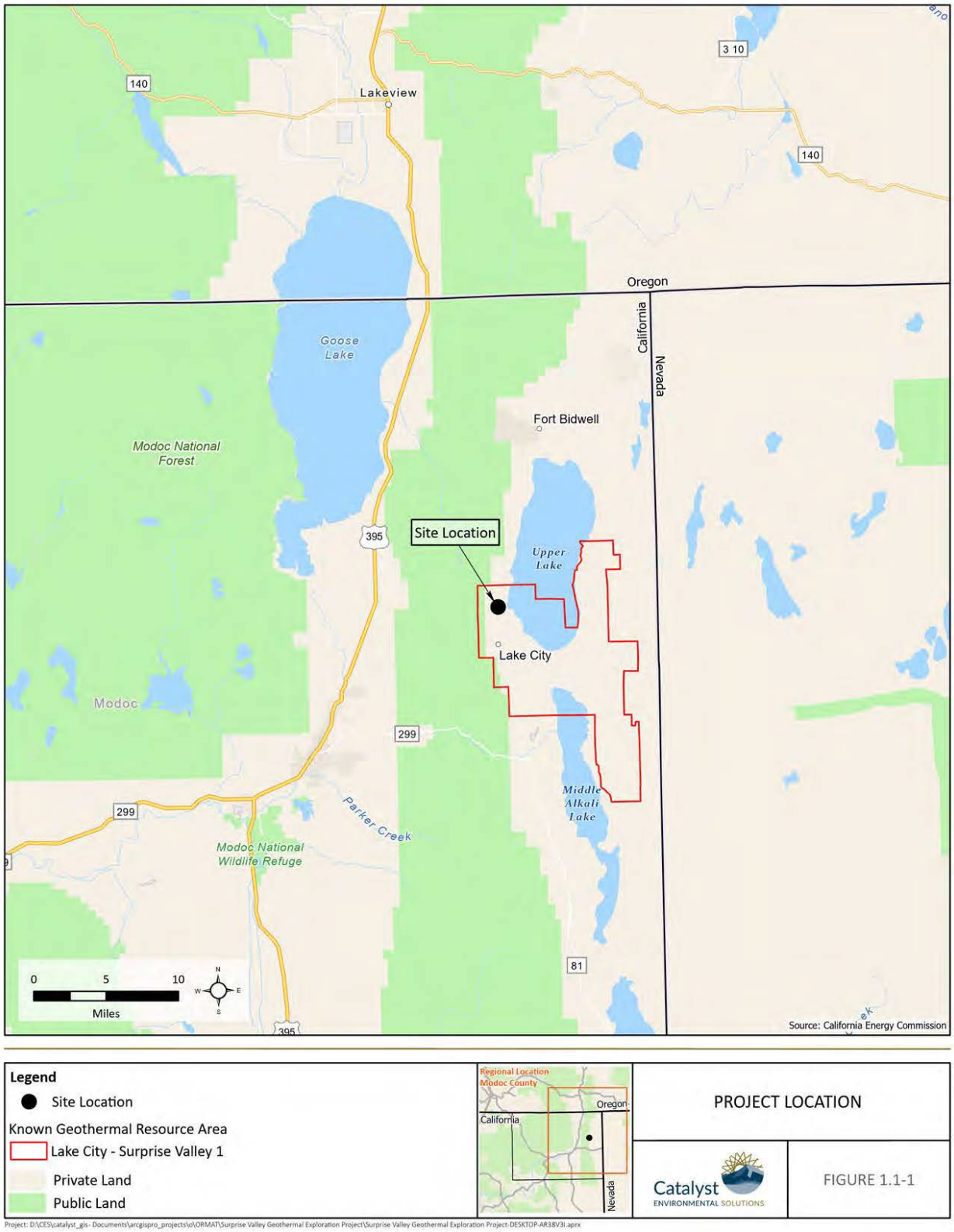
The Applicant proposes to develop up to eleven geothermal test wells on nine well pads drilled to a depth of 3,000-5,000 feet on APN 026-080-018; APN: 026-100-004; APN 026-100-014; APN 026-100-006; APN 026-100-007; and APN 026-100-008 in Modoc County, California. During well installation, each well pad would accommodate a drilling rig, support equipment, portable bathroom, baker tanks, and project vehicles (Figure 2.1-1). Well testing would consist of flowing the exploration well into baker tanks stationed on the well pad and monitoring the captured geothermal fluid for temperatures, pressures, flow rates, chemistry and other parameters.

Three new access roads would be developed to access well pads. The proposed access roads would stem off from Surprise Valley Road to the well pads. Existing access roads may require improvements to accommodate transportation of well and drilling equipment. Improved roads may be widened and surfaced as needed.

1.3 Agency Roles, Responsibilities, and Decisions

The Project will trigger multiple regulations and permitting requirements. This section summarizes the regulatory framework governing the Project, including the regulatory permits and approvals potentially required to implement the Project. This CEQA document has been prepared to comply with all the required environmental reviews and public involvement requirements. The permits and Agency decisions potentially required for the Project are provided below by level of government and permitting authority.

Figure 1.1-1: Project Location



1.3.1 Lead Agency - Modoc County

The triggering document for the CEQA process is the Use Permit Application, submitted pursuant to the County General Plan. As the primary permitting entity, Modoc County serves as the Lead Agency for the CEQA process.

1.3.2 Other Agencies Reviews and/or Consultations

1.3.2.1 U.S. Fish & Wildlife Service Consultation

The U.S. Fish and Wildlife Service (USFWS) enforces compliance with regulations related to special-status species or their habitat as required under the Endangered Species Act (ESA). The potential presence of species listed under ESA (e.g., sandhill crane) may warrant consultation.

1.3.2.2 U.S. Army Corps of Engineers Section 404 Permit

The Clean Water Act (CWA) establishes a program to regulate the discharge of dredge and fill material into waters of the U.S. including wetlands. Activities regulated under this program include fills for development, water resource projects (e.g., dams and levees), infrastructure development (e.g., highways and airports), and conversion of wetlands to uplands for farming and forestry. Either an individual 404b permit or authorization to use an existing United States Army Corps of Engineers (USACE) Nationwide Permit will need to be obtained if any portion of the construction requires fill into a river, stream, or stream bed that has been determined to be a jurisdictional waterway.

1.3.2.3 California Department of Fish & Wildlife

The California Department of Fish and Wildlife (CDFW) enforces compliance with regulations related to California special-status species or their habitats as required under the California Endangered Species Act (CESA).

1.3.2.4 California Regional Water Quality Control Board

National Pollution Discharge Elimination System Construction General Permit Order No. 2009-009-DWQ requires the Applicant to file a public Notice of Intent to discharge stormwater and to prepare and implement a stormwater pollution prevention plan (SWPPP). Agencies and/or project proponents must consult with the Regional Water Quality Control Board (RWQCB) regarding compliance with the CWA Section 401 Water Quality Certification or permitting under California Porter-Cologne Act.

1.3.2.5 Modoc County Air Pollution Control District

The proposed Project may require issuance of a construction air permit, such as an Authority to Construct (ATC), from Modoc County Air Pollution Control District.

1.4 Relationship to Statutes, Regulations, and Other Plans

1.4.1 Federal

1.4.1.1 Clean Air Act

The legal authority for federal programs regarding air pollution control is based on the 1990 Clean Air Act (CAA) Amendments. These are the latest in a series of amendments made to the CAA. This legislation modified and extended federal legal authority provided by the earlier Clean Air Acts of 1963 1970, and 1977.

The Air Pollution Control Act of 1955 was the first Federal legislation involving air pollution. This Act provided funds for federal research in air pollution. The CAA of 1963 was the first Federal legislation regarding air pollution control. It established a federal program within the U.S. Public Health Service and authorized research into techniques for monitoring and controlling air pollution. In 1967, the Air Quality Act was enacted in order to expand Federal government activities. In accordance with this law, enforcement proceedings were initiated in areas subject to interstate air pollution transport. As part of these proceedings, the Federal government for the first time conducted extensive ambient monitoring studies and stationary source inspections.

The Air Quality Act of 1967 also authorized expanded studies of air pollutant emission inventories, ambient monitoring techniques, and control techniques.

1.4.1.2 Clean Water Act (33 United States Code Section 1251-1387)

Federal Water Pollution Control Act (33 United States Code [USC] §§1251-1387), otherwise known as the CWA, is a comprehensive statute aimed at restoring and maintaining the chemical, physical and biological integrity of the nation's waters. Enacted originally in 1948, the Act was amended numerous times until it was reorganized and expanded in 1972. It continues to be amended almost every year. Primary authority for the implementation and enforcement of the CWA rests with the U.S. Environmental Protection Agency (EPA). In addition to the measures authorized before 1972, the Act authorizes water quality programs, requires federal effluent limitations and state water quality standards, requires permits for the discharge of pollutants into navigable waters, provides enforcement mechanisms, and authorizes funding for wastewater treatment works construction grants and state revolving loan programs, as well as funding to states and tribes for their water quality programs. Provisions have also been added to address water quality problems in specific regions and specific waterways.

Important for wildlife protection purposes are the provisions requiring permits to dispose of dredged and fill materials into navigable waters. Permits are issued by the USACE under guidelines developed by EPA pursuant to Section 404 of the CWA.

1.4.1.3 Clean Water Act and California Porter-Cologne Water Quality Control Act

The Project is located within the North Lahontan RWQCB, Region 6. The CWA and the California Porter-Cologne Water Quality Control Act require that Water Quality Control Plans (more commonly referred

to as Basin Plans) be prepared for the nine state-designated hydrologic basins in California. The Basin Plan serves to guide and coordinate the management of water quality within the region.

1.4.1.4 Endangered Species Act

As part of granting a 404 permit, the USACE must contact the local offices of the US Fish & Wildlife Service and National Oceanic and Atmospheric Administration (NOAA) Fisheries (hereafter referred to as the "service agencies"). Staff at the local offices of the service agencies will provide lists of any special status species, and the USACE must make a "may affect" determination regarding those species. A "may affect" determination has two possible outcomes: (1) the Project is not likely to affect special status species; or (2) the Project is likely to affect special status species. If the USACE deems that the Project is not likely to affect special status species, and if the federal service agencies concur, then the agencies will provide written concurrence to the USACE, and no further consultation is required. If the USACE deems the Project likely to affect special status species or if the service agencies disagree with an USACE "no effect" determination, then formal consultation is required.

1.4.1.5 National Historic Preservation Act

Federal regulations (36 Code of Federal Regulations [CFR] Part 800.2) define historic properties as "any prehistoric or historic district, site, building, structure, or object included, or eligible for inclusion in, in the National Register of Historic Places (NRHP)." The term "cultural resource" is used to denote a historic or prehistoric district, site, building, structure, or object, regardless of whether it is eligible for the NRHP.

1.4.2 State

1.4.2.1 Renewables Portfolio Standard Program

Established in 2002 under Senate Bill (SB) 1078, California's Renewables Portfolio Standard (RPS) was accelerated in 2006 under SB 107 by requiring that 20 percent of electricity retail sales be served by RE resources by 2010. RE sources include wind, geothermal, and solar. Subsequent recommendations in California energy policy reports advocated a goal of 33 percent by 2020. On November 17, 2008, Governor Schwarzenegger signed Executive Order (EO) S-14-08 requiring that "... all retail sellers of electricity shall serve 33 percent of their load with RE by 2020." The following year, EO S-21-09 directed the California Air Resources Board (CARB), under its Assembly Bill (AB) 32 authority, to enact regulations to achieve the goal of 33 percent renewables by 2020.

In the ongoing effort to codify the ambitious 33 percent by 2020 goal, SB X 1-2 was signed by Governor Brown, in April 2011. This new RPS preempts the CARB's 33 percent Renewable Electricity Standard and applies to all electricity retailers in the state including publicly owned utilities, investor-owned utilities, electricity service providers, and community choice aggregators. All entities had to adopt the new RPS goals of 20 percent of retail sales from renewables by the end of 2013, 25 percent by the end of 2016, and the 33 percent requirement being met by the end of 2020.

Governor Brown signed into legislation SB 350 in October 2015, which requires retail sellers and publicly owned utilities to procure 50 percent of their electricity from eligible renewable resources by

2030. In 2018, SB 100 was signed by Governor Brown, codifying a goal of 60 percent renewable procurement by 2030 and 100 percent by 2045 Renewables Portfolio Standard.

1.4.2.2 Senate Bill 32

In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include § 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the State's continuing efforts to pursue the long-term target expressed in EOs S-3-05 and B-30-15 of 80 percent below 1990 emissions levels by 2050.

1.4.2.3 Title 17 California Code of Regulations, Subchapter 10, Article 2, Sections 95100 to 95158

These CARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006.

1.4.2.4 California Endangered Species Act

CESA is enacted through Government Code Section 2050. Section 2080 of the California Fish and Game Code (FGC) prohibits "take" of any species that the commission determines to be an endangered species or a threatened species. Take is defined in Section 86 of the FGC as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." CESA allows for take incidental to otherwise lawful development projects. CESA emphasizes early consultation to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate mitigation planning to offset project-caused losses of listed species populations and their essential habitats.

1.4.2.5 California Lake and Streambed Program (Fish and Game Code Section 1602)

CDFW is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the FGC (Section 1602) requires an entity to notify CDFW of any proposed activity that may substantially modify a river, stream, or lake.

1.4.3 County

1.4.3.1 Modoc County General Plan and Zoning Ordinance

The General Plan provides guidance on future growth in the Modoc County. Any development in Modoc County must be consistent with the General Plan and Zoning Ordinance (Title 18).

1.4.3.2 Modoc County Air Pollution Control District

The MCAPCD enforces rules and regulations regarding air emissions associated with various activities, including construction and farming, and operational activities associated with various land uses, in order to protect public health.

1.5 CEQA Document Organization

The following describes the organization of this CEQA checklist:

- **Section 1: Introduction.** This section discusses the proposed Project, the relationship of the Project to statutes, regulations, and other plans, the purpose of CEQA checklist, and public involvement in the CEQA process.
- **Section 2: Project Description.** This section describes the Project location, objectives, characteristics, construction, operations and maintenance, restoration of the site, and applicant proposed measures and Best Management Practices.
- **Section 3: Environmental Analysis, Impacts, and Mitigation.** This section provides an analysis of the Project impacts on the environment, regulatory setting pertaining to the Project, Project impacts and mitigation measures, and the decommissioning/restoration and residual impacts of the Project.
- **Section 4: Mandatory Findings of Significance.** This section describes the long-term effects of the Project and analyzes the potential for the proposed Program to have significant cumulative effects when combined with other past, present, and reasonably foreseeable future projects in each resource area's cumulative geographic scope.
- **Section 5: References.** This section provides a complete list of all references used to prepare this CEQA checklist.
- **Appendices -** The following appendices include key supporting Project information/plans and technical resource reports that substantiate and/or clarify some resource analyses in Section 3.
    - Appendix A - Air Quality and Greenhouse Gas Technical Report
    - Appendix B – Biological Study Report
    - Appendix C – Cultural Resources Inventory Report
    - Appendix D - Water Quality Management Plan
    - Appendix E - Noise Technical Report
    - Appendix F - Transportation Technical Report
    - Appendix G – Weed Control Plan

SECTION 2 Project Description

This section provides information on the Project location, objectives, proposed facilities, construction, resource testing, and required approvals. The Project would include the construction of up to eleven new geothermal test wells on nine well pads, development of 1.2 miles of new access roads, and 0.1 miles of improvements to existing access roads (Figure 2.1-1). The purpose of the Project is to characterize and evaluate the geothermal resource for potential commercial energy generation.

2.1 Project Location and Setting

The Applicant proposes to develop up to eleven geothermal test wells southwest of Upper Alkali Lake, and 1.85 miles north of Lake City within the Surprise Valley region of Modoc County (Figure 1). The proposed facilities would be located within the Lake City USGS quadrangle in sections 12, 13, and 24 Township 44 north Range 15 east; on APN 026-080-018; APN: 026-100-004; APN 026-100-014; APN 026-100-006; and APN 026-100-008. The proposed development areas are leased to the Applicant by various private landowners. The Project area is relatively flat and presently used for the production of alfalfa or associated agricultural facilities (Figure 2.1-2, Figure 2.1-3).

The well pads would occur in areas designated as Prime Farmland, Farmland of Statewide Importance, Farmland of local importance or Grazing land by the California Department of Conservation (CDOC; Figure 2.1-3). The Project parcels are zoned as Unclassified and general land use designation is Exclusive Agriculture or Exclusive Agriculture/ General Agriculture. APN 026-100-004-000, APN 026-080-009-000, APN 026-100-014, APN 026-100-008, and APN 032-030-001 are under Williamson Act contracts.

The Project area is located in a Known Geothermal Resource Area (KGRA) as Lake City-Surprise Valley 1 (California Energy Commision, 2020), and Surprise Valley is identified as a geothermal resource area in the County of Modoc 1998 General Plan (Update 2018). Geothermal prospecting in this area has taken place since 1951, and the region has been designated as a KGRA by USGS since 1974 (Warner Mountain Energy Corporation, 2023). While exploration has occurred in this region since its designation as a KGRA, no commercial development of geothermal energy resources has occurred.

Primary access to the general Project area is provided by Surprise Valley Road which travels north and south through or adjacent to Project parcels. Existing agricultural roads stemming from Surprise Valley Road provide access to individual well pad development sites and will be improved as necessary to accommodate the proposed development. Up to 1.2 miles of new access roads would be developed to provide direct access to the well pads (Figure 2.1-1).

2.2 Project Objectives

CEQA Guidelines Section 15124(b) require the Project description to include a statement of objectives for the Project, including the underlying purpose of the Project. The objectives of this Project are to:

- Evaluate commercial geothermal energy generation potential with minimal environmental impacts by conducting exploration in areas previously disturbed by extensive agricultural operations.

- Explore potential sources of clean, renewable geothermal energy in the Surprise Valley Geothermal Energy Resource Area pursuant to the Modoc County General Plan.
- Discover new sources of renewable energy to assist the State of California in meeting the objectives of Senate Bill 100 (100% Clean Energy Act of 2018) and the State's Renewables Portfolio Standard program.

2.3 Proposed Facilities

The Project involves the construction and operation of eleven new geothermal test wells, development of access roads and improvements to existing access roads. The Project components are described in detail below and depicted in Figure 2.1-1. The exploration phase would not require any local utilities, as all power would be provided via generators, water via water trucks, and discharges captured in Baker tanks for transport off-site.

2.3.1 Geothermal Test Wells

To evaluate the potential for a commercially viable geothermal resource, the Applicant proposes to develop up to 11 geothermal test wells on nine well pads. During well installation, each well pad would accommodate a drilling rig, support equipment, portable bathroom, baker tanks, and project vehicles (Figure 2.1-4). Each well pad would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Stormwater runoff from undisturbed areas around the constructed drill pads would be directed into ditches surrounding the drill pad and back onto undisturbed ground, consistent with BMPs for storm water identified in "Drilling and Operating Geothermal Wells in California" (CalGem PR7S). The site would be graded to prevent fugitive stormwater runoff off the well pad and has been designed to withstand a 100-year storm event.

Each well would be drilled with a rotary drill rig similar to those used to drill oil and gas wells. The test wells would each be drilled and cased to a design depth of approximately 3,000 to 5,000 feet. Following the cementing of the surface casing, blowout prevention equipment (BOPE) would be installed. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic barite (barium sulfate) would be stored at each well pad (as appropriate for the type of material) for use in preventing uncontrolled well flow, as necessary.

Once the well is completed, a well head will be installed, and pressure and flow testing will be conducted. Well testing will consist of flowing the well into baker tanks stationed on the well pad and monitoring geothermal fluid for temperatures, pressures, flow rates, chemistry and other parameters. Discharge from test wells will be captured in steal baker tanks and transported off site for disposal at an appropriate facility. No geothermal fluid would be discharged to the surrounding landscape. Total discharge from each well will be variable based on geothermal resources found and longevity of testing required. Successful test wells may be developed into commercial geothermal production wells in the future.

The test wells and associated facilities would be temporary, and the pads and access roads would be fully reclaimed at the conclusion of testing phase.

Figure 2.1-1: Site Map

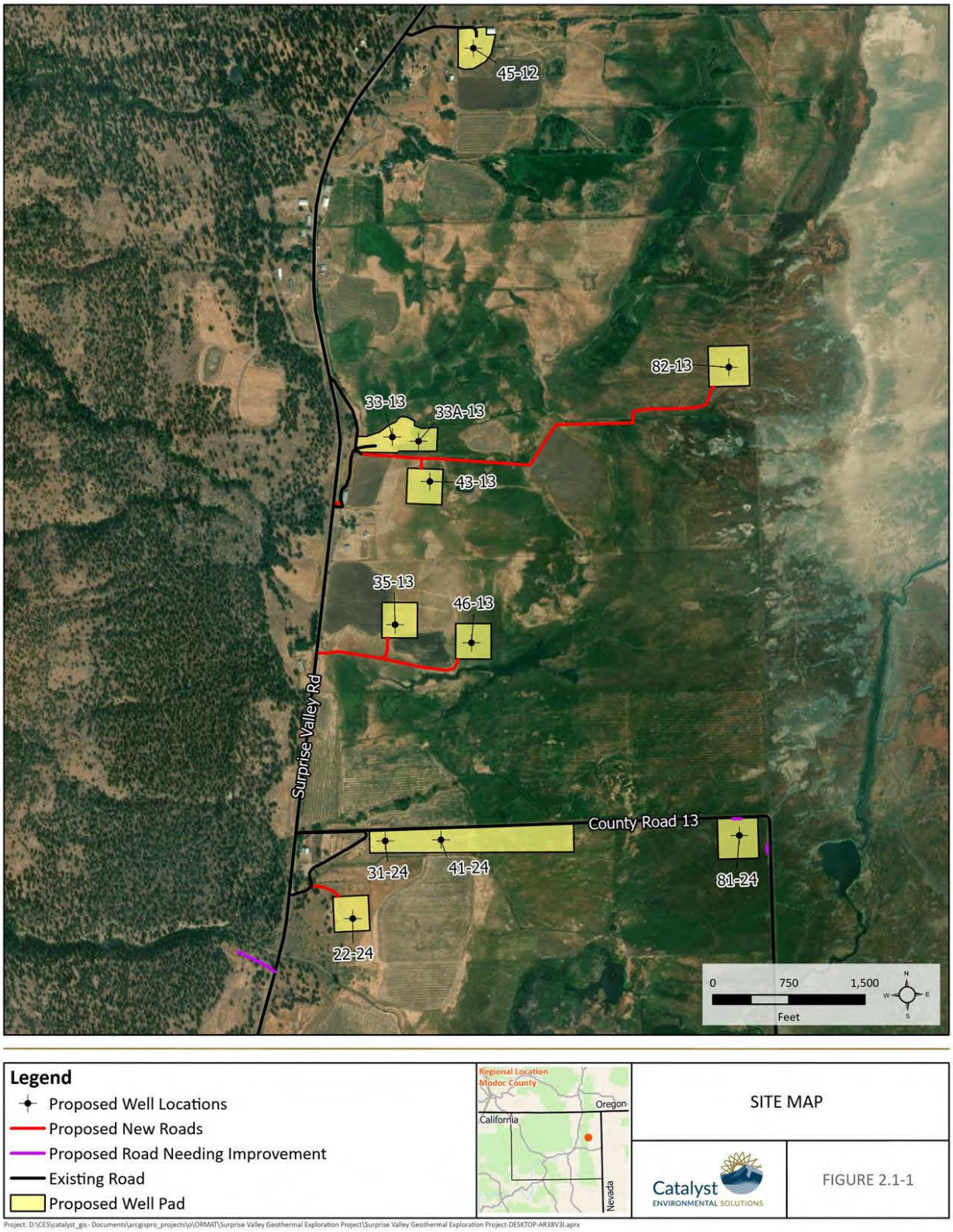


Figure 2.1-2: Topography

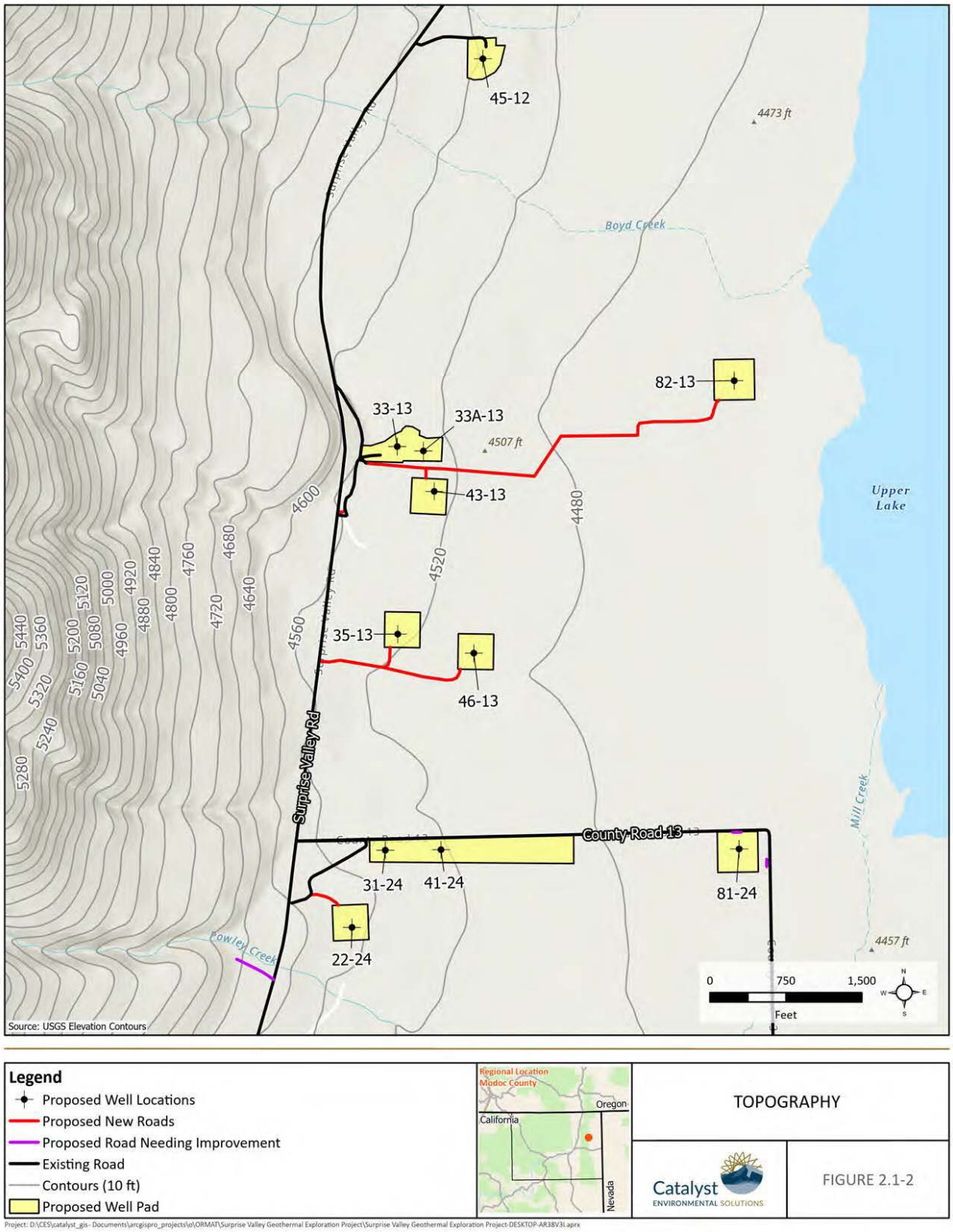


Figure 2.1-3: Zoning in Project Area

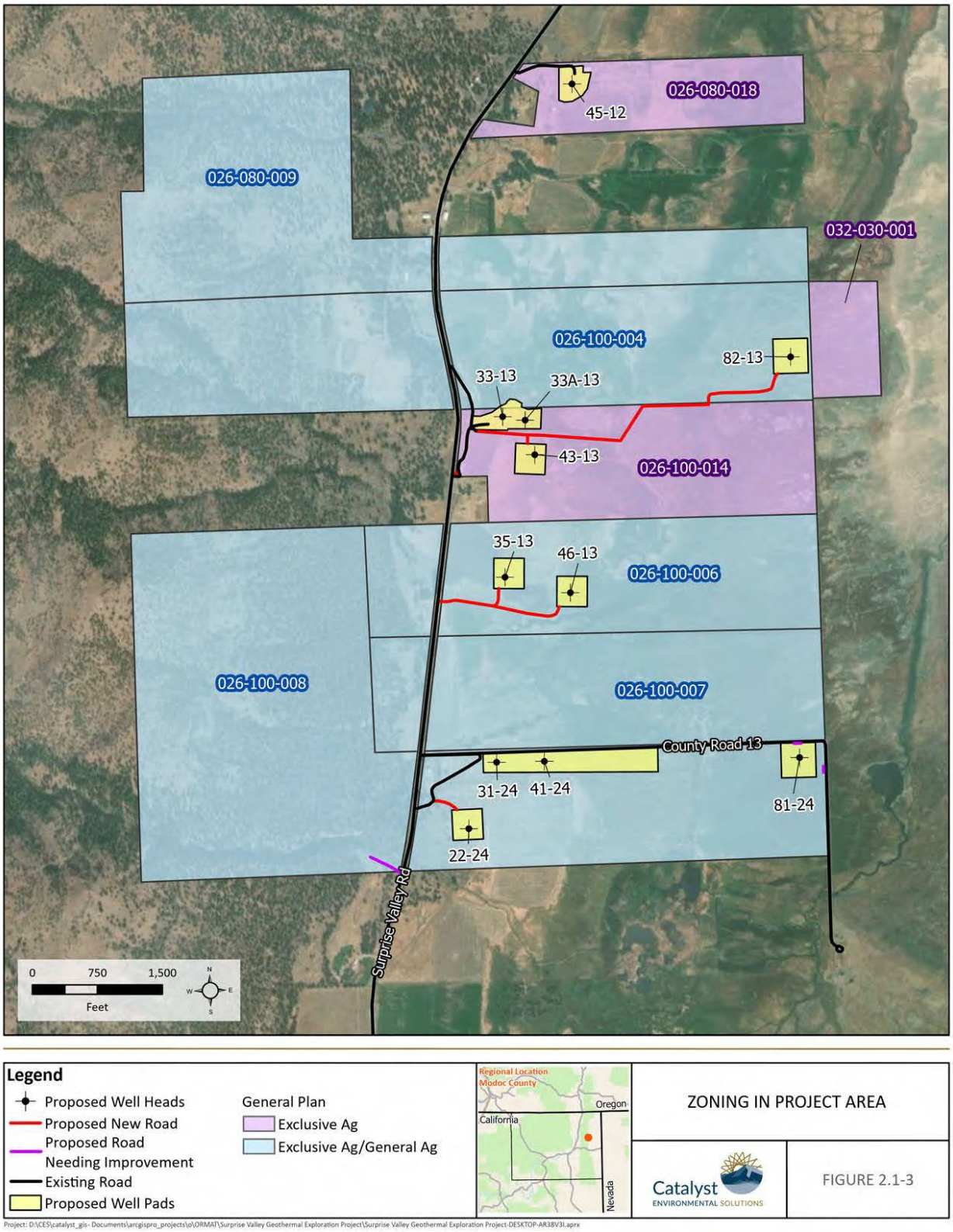
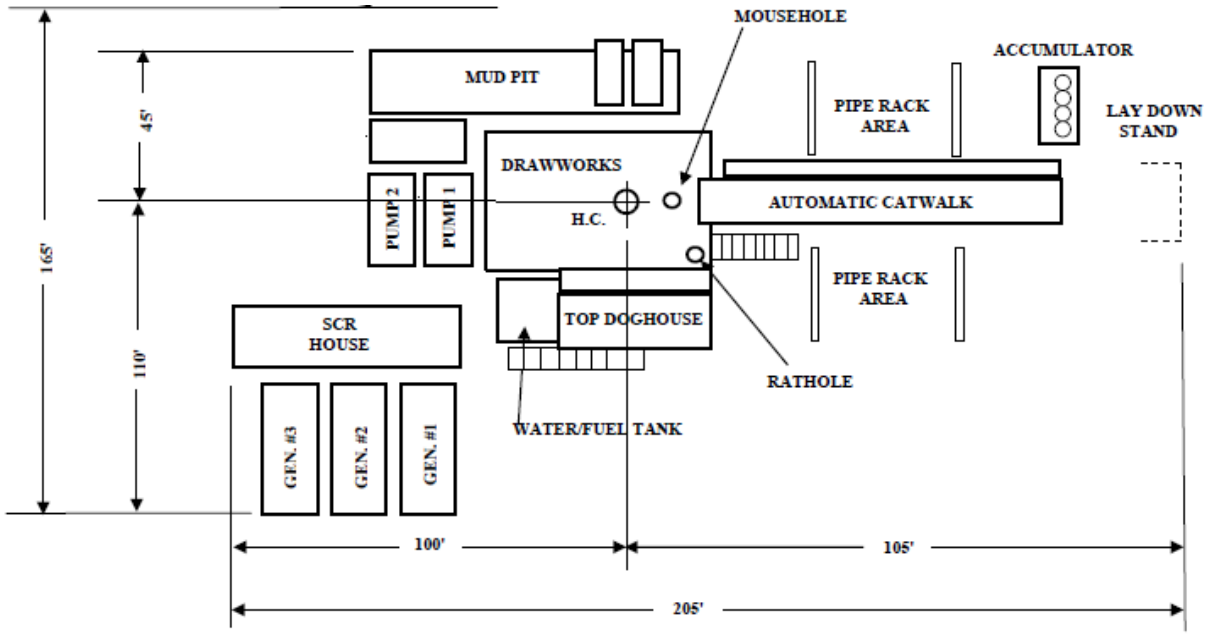


Figure 2.1-4: Well Pad Layout



2.3.2 Access Roads

Existing unimproved (gravel/dirt) roads would serve as the primary ingress and egress to the well pad sites. These existing access roads may require resurfacing to accommodate the import of drilling equipment. Three new access roads totaling 1.2 miles would be developed, stemming from Surprise Valley Road (Figure 2.1-1).

2.4 Project Construction

The Project would impact up to 39.5 acres, as provided in Table 2.4-1 below. As discussed in Section 2.6, the site would undergo interim reclamation after initial well pad development, and final reclamation at the conclusion of the testing phase to return the Project site to a similar state as present conditions (e.g., agricultural production for alfalfa/hay).

Table 2.4-1. Project Disturbance from Geothermal Exploration

Proposed Development	Disturbance Area (Acres)
New Access Road	2.1
Improvements to Existing Access Roads	0.2
Well Pads	37.2
Well Testing	0
TOTAL	**39.5 acres**

2.4.1 Site Preparation

The Suprise Valley geothermal exploration facilities would be developed on agricultural land currently dedicated to alfalfa production. Site preparation activities for the well pads would include clearing, earthwork, drainage and grading necessary for safe operations and for fire prevention. Clearing would include removal of organic material, stumps, brush and slash, which would either be removed and taken to an appropriate dump site or left onsite. Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas.

To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557). On-site soil that has been piled during excavation will be used as backfill material, as necessary. Only soil that is free of debris and deleterious matter would be used as backfill material. The proposed facilities would be placed on shallow-spread footers and wall footers to support the structures. All site preparation and fill placement activities will be monitored by a qualified geotechnical engineer to detect undesirable materials and/or site conditions that may arise during site preparation.

2.4.2 Well Installation

The test wells would be completed at depths between 1,000 and 4,000 feet, with an average of approximately 3,500 feet deep. Casing depth would vary depending on the total depth of the well but would comply with BLM Geothermal Resources Operational Order No. 2 and CalGem requirements (ORMAT 2020). After the well is completed, an industrial grate would be placed over the well to prevent people and/or wildlife from falling in, and the entire well pad would be enclosed with an eight-foot chain link security fence and personnel access gates. During normal well field operations, total geothermal fluid production rates are expected to be approximately 15,150 gallons per minute (gpm) at 280°F.

2.4.3 Access Roads

As shown in Figure 2.1-1, up to 1.2 miles of new access road are proposed for development to provide access to the well pads. The road corridors would be cleared of vegetation, bladed, graded, and gravel would be deposited and rolled to provide drivable roadways. The total estimated area of permanent surface disturbance associated with access road development would be approximately 2.1 acres (1.2 miles x 15-foot disturbance width).

Existing farm roads currently serve as access roads to the majority of proposed well pad development sites. These existing access roads will be the primary ingress and egress to the well pad sites. New access roads will be developed to access the well pads on APN 026-100-004, APN 026-100-014, APN 026-100-006, and APN 026-100-008. Existing access roads may require improvements to accommodate transportation of well and drilling equipment. New and improved access roads would be constructed using a dozer and/or road grader for the Project. Existing access roads may require resurfacing to

accommodate the import of drilling equipment. Access roads will be compacted with a roller-compactor and surfaced with gravel as needed. Improvements to existing access roads will be kept within the current road boundaries as feasible. Widening of access roads would only be done in areas where road width is less than 15 feet and is unable to accommodate drilling equipment.

Road construction techniques would vary depending on the specific site and existing road conditions. New roads are typically dozed or bladed following topography where possible. During rough grading the amount of cut and fill will be kept to a minimum while providing for drivability and maintenance. If the base material has adequate aggregate and composition to maintain a stable road surface only grading will be performed. Should additional aggregate/base be needed for stability, it would be laid in even lifts and compacted by grading and water equipment. All aggregate material needed for road construction or improvements will be sourced from local permitted aggregate mines. Constructed access roads crossing existing drainages may require installation of culverts. Culvert installation would follow BLM design criteria and would be constructed pursuant to standards established in the BLM Gold Book.

2.4.4 Water Use and Source

Water required for site preparation and dust control would typically average 10,000 gallons per day (gpd), or two trips with a 5,000-gallon water truck per day. Over a five-month period, water use for the site preparation phase would be up to 4.6 acre-feet per year. This water would be trucked in daily from an existing local and permitted source, such as a nearby industrial water supplied under contract to an operating mine; or municipal or commercially available water from the Cedarville Water District, or another legally permitted public water provider.

Additionally, approximately 100,000 gpd would be needed for flow testing the exploration wells. Only one well would be drilled/tested at a time. Over a 17-month period, water use for the drilling and testing phase would be up to 110.5 acre-feet per year. This water would also be trucked in from an established source, such as those listed above. All test fluids would be captured in baker tanks, removed from the site, and disposed of at the appropriate waste disposal facility. Disposal site selection will be based on the findings and characterization of the test fluids and be dictated by any disposal requirements.

2.4.5 Construction Equipment

Heavy construction equipment, including drill rigs, drilling equipment, semi-truck trailers, flatbed trucks, forklifts, excavators/bulldozers, roller, and cranes would be used to deliver and place the drilling/testing equipment on the Project site. Smaller powered hand tools, such as drills, compressors, and welding equipment would also be used. Employee vehicles would be used to transport workers to the site and parked at the designated parking locations.

During construction, noise emissions will be periodic and temporary, depending on the use of heavy equipment. Smaller hand tools will be used consistently during the construction phase. Construction noise from Project development will not exceed the County exterior noise standard of 60 decibels (dBA) day-night average (L_{dn}) at the nearest sensitive receptor. There are no sensitive receptors (i.e., schools, churches, hospitals, parks, etc.) in close proximity (i.e., within 1 mile radius) to the site. The closest residence is located approximately 650 feet to the northwest of the southern-most well site

(Well 22-24). One other residence is within 1,000 feet of a test well site, located approximately 850 feet southwest from Well 43-13. No other sensitive receptors are located within 1,000 feet of Project components.

The Applicant has estimated construction equipment and usage for the Project based on experience with similar projects as provided in Table 2.4-2. Similarly, based on construction activities associated with similar projects, the Applicant anticipates that up to 15 workers would be required for construction of the well pads, wells, and access roads. Vehicle and truck trip generation rates for the Project provided in Table 2.4-3 are estimated assuming roughly 2 trips/worker (to/from site) for a total of 30 trips, and 2 trips/vehicle (in/out) for vendor and haul trips. Trip lengths consist of default CalEEMod values.

Table 2.4-2. Project Construction Equipment List by Project Activity

Construction Phase	Equipment	Quantity	Engine Horsepower	No. Days Used	No. Hours Operated Per Day
Site Preparation (5 Months)	Heavy Duty Trucks	3	402	60	5
	Excavator	1	97	60	8
	Roller	2	200	60	8
	Light-Duty Truck	8	350	60	4
	Backhoe	1	97	60	8
	Rubber Tired Loader	1	203	60	8
	Grader	1	187	60	8
Well Drilling and (17 Months)	Light tower	2	27	105	12
	Drill Rig	1	500	210	24
	Rig Mud Pump	1	500	210	24
	Rig Generator	1	415	210	24
	Heavy Duty Trucks (Mob/Demob)	8	450	28	8
	Crane	2	231	28	5
	Backhoe	1	97	28	6
	Forklift	1	89	28	6
	Vacuum Truck	1	385	28	10
	Concrete Truck	1	428	4	4
	Concrete Pumper	1	100	4	4
	Light Duty Truck	4	350	28	4
Testing (3 Months)	Generator	1	671	90	24
	Light Tower (27 hp)	2	27	90	12
	Light Tower (9 hp)	2	9	90	12
	Pump (115 hp)	1	115	90	24
	Pump (415 hp)	1	415	90	24
	Light Duty Truck	1	350	90	4
Reclamation (3 Months)	Backhoe	1	97	35	8
	Grader	1	187	35	8

Table 2.4-3. Construction Vehicle Trips

Construction Phase	Trip Type	Number of One-Way Trips per Day[1]	One-Way Trip Length (miles)[2]
Site Preparation	Workers	30	11.9
	Vendor	104	9.0
	Haul	6	20
Well Drilling	Workers	30	11.9
	Vendor	10	9.0
	Haul	26	20
Testing	Workers	30	11.9
	Vendor	4	9.0
	Haul	4	20
Reclamation	Workers	6	11.9
	Vendor	4	9.0
	Haul	4	20

Notes:

1 All truck trips delivering construction materials are assigned to vendor deliveries. Truck trips associated with water deliveries are assigned to haul trips.

2 Trip lengths consist of default CalEEMod values with exception of vendors for delivery of Project equipment during construction.

2.4.6 Workforce

Up to 15 construction workers are anticipated to be on-site to develop the well pads and access roads. Additionally, up to 15 workers are also expected to be on the site during flow testing. These workers will likely stay on-site in a work camp that includes mobile trailers to provide accommodations.

2.4.7 Construction and Testing Schedule

Construction and testing of the proposed facilities is anticipated to occur over an approximate 28-month period, beginning in late 2026 or when permitting is completed. Project construction would include site preparation activities, but no demolition of existing structures/buildings is needed. Table 2.4-4 below provides a breakdown of the proposed construction schedule by phase and duration.

Table 2.4-4. Project Construction Process/Phasing

Construction Phase	Construction Activity	Activity Duration	Phase Duration
Site Preparation	Construction Kick-off/Staging	1 week	5 months
	Site Clearing	1 week	
	Site Preparation/Rough Grading	2 weeks	
	Fine/Pad Grading	1 month	
	Well Pad Construction	3 months	
Well Drilling	Well Drilling and Completion	17 months	17 months
Flow Testing	Testing Phase	3 months	3 months

Reclamation	Well Head Removal/Well Abandonment/Site Restoration	3 months	3 months

2.5 Well Testing

One or more short-term flow test(s) of each well drilled would likely be conducted to estimate geothermal reservoir productivity. Each test, lasting approximately three to five days, would consist of flowing the well into portable steel (Baker) tanks while monitoring geothermal fluid temperatures, pressures, flow rates, chemistry, and other parameters. Each short-term flow test is expected to discharge approximately 1.5 million gallons of geothermal fluid per well. No uncontained surface discharges would occur. If a well merits further testing, a temporary (up to 3 months) pipeline may be constructed between well pads, with one serving as the test well and the other being a temporary injection well to return the test fluid/brine back to the geothermal reservoir.

2.6 Interim and Final Reclamation

Testing would determine if future geothermal energy development is feasible. If exploratory testing is successful, the exploration/test wells may be developed in full-size production wells for commercial geothermal energy generation. Any future action would be subject to CEQA review and permitting, as the scale of future development cannot be reasonably assumed prior to successful test well development.

Interim reclamation would be conducted at the close of construction work of each well pad location and would be maintained throughout the testing period prior to final reclamation. Interim reclamation will maintain the sites' integrity for final reclamation and prevent degradation from the proposed project to the surrounding landscape.

Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas. Prior to final reclamation soil will be seeded and stabilized with an approved erosion control mix to prevent erosion. Disturbed well pad areas not required for use during testing will be stabilized similarly stabilized with an erosion control seed mixture. Temporary BMPs may be used at the Site to prevent soil erosion include the use of sandbags, crushed rock, and silt fence. These BMPs are used as and where needed, especially in areas that are undeveloped or in the process of being developed.

At the end of the permitted or useful life of the test well facilities and if testing yields negative results, no future geothermal energy developments would occur. The Applicant would prepare a Site Reclamation and Restoration Plan that establishes the plan and protocol for dismantling, removing, abandoning, transporting, and disposing of wells and associated equipment, as well as the plan for performing site restoration activities after the facilities are removed. Further, within three years of the cessation of testing, all equipment will be dismantled, all wells capped or abandoned as required by the County and CalGEM and the land involved be made compatible with the surrounding uses or as requested by the County Planning Director. A Bond, Letter of Credit, or other forms of security acceptable to Modoc County in addition to that of the amount set by CalGEM, would be filed with the

County that guarantees restoration of the land to its condition prior to the permitted well pad development.

The general objective of the final reclamation phase is to return the site as close as possible to the conditions prior to geothermal development. Reclamation activities would be planned and conducted in accordance with County requirements.

2.7 Applicant Proposed Measures and Best Management Practices

All Project and contractor personnel will be informed of the Applicant's policy regarding environmental protection, safety plans, and emergency response protocols. Collectively, these measures minimize unintended impacts and events as result of facility construction and operation.

2.7.1 Surface and Ground Water Quality

- A Water Quality Management Plan (WQMP) will be prepared for both the construction and testing phases of the Project. The WQMP will include numerous "good housekeeping" and preventative maintenance, employee training, safe handling/storage, and spill response measures to prevent and minimize any unintended releases.
- The site will be designed and prepared to provide adequate stormwater conveyance and/or infiltration.
- Any spills or unintended releases of chemicals used during Project construction and/or operation will be cleaned up with the appropriate materials (i.e., absorbent pads, foams/gels) and the affected area remediated to prevent contact with groundwater resources.
- No vehicle fueling or maintenance will take place on exposed soil.

2.7.2 Wildlife

- Speed limits of 10 mph will be observed on the site in order to minimize dust, avoid collision, and incidental mortality of local wildlife.
- Cap any pipes and small gaps to prevent wildlife from becoming trapped inside. Inspect pipes or other similar spaces for signs of wildlife activity before permanently closing any space.
- Provide ramps or jump outs for wildlife or cover trenches and pits greater than 6 inches deep to prevent wildlife from becoming trapped. Inspect any pits or trenches daily.
- Secure all waste materials. Seal any trash cans or dumpsters to prevent wildlife from entering these containers. Do not leave food or other trash on the Project Site that may attract wildlife.
- Use of chemicals, fuels, lubricants, or biocides shall be in compliance with all local, state, and federal regulations. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other state and federal legislation.
- Use only native, insecticide-free plants for habitat restoration and enhancement actions. If plants are grown via contract, use grow specifications that limit harmful pesticide residues.

- Protect pollinators and their habitats from pesticides, including insecticides, fungicides, and herbicides. If pesticides are used in areas with flowering plants, lessen their potential harm by adhering to the following guidance:
    - Avoid the use of neonicotinoids or other systemic insecticides, including coated seeds due to their ecosystem persistence, systemic nature, and toxicity to pollinators (Xerces Systemic Insecticides List [Xerces Society 2026]).
    - Avoid the use of insecticides that target lepidopterans (e.g., moths and butterflies), including biological pesticides (IRAC 2011).
    - Use targeted application methods, avoid large-scale broadcast applications, and take precautions to limit off-site movement (e.g., wind drift, discharge from surface water flows).
    - If pesticides are used for vector control treatments (e.g., mosquitoes), avoid treatment unless monitoring indicates that the species and numbers exceed a public health threshold. For any mosquito treatments, first employ prevention steps such as reducing standing water. Where possible, draw mosquitoes away from sensitive sites (e.g., using dry ice traps) to limit treatment effects in sensitive habitat areas.

2.7.3 Vegetation

- Vegetation control, including invasive species eradication, will be implemented to prevent growth under or near the proposed facilities.

2.7.4 Air Quality

- The Applicant shall submit a Construction Dust Control Plan and notify the MCAPCD 10 days prior to the start of any construction activities.
- Any equipment breakdown resulting in air emissions shall be reported to MCAPCD and promptly corrected (within 24 hours when possible).
- To minimize unnecessary emissions, Project equipment and worker vehicles shall be turned off when not in use and not left idling.
- Water shall be applied to the development site and during preparation and construction to control fugitive dust.
- Earth moving work shall be completed in phases (as necessary) to minimize the amount of disturbed area at one time.
- Construction vehicles and heavy equipment that use non-surfaced facility roads and areas will be restricted to 10 mph to control fugitive dust.
- During windy conditions, barriers shall be constructed and/or additional watering will occur to minimize fugitive dust.
- Vehicle access shall be restricted to the disturbance area via signage and/or fencing.
- Equipment shall be operated according to best practices and maintained according to design specifications.

- Construction equipment shall be equipped with an engine designation of EPA Tier 3 (Tier 3) if commercially available and feasible. If a Tier 3 engine is not certified for a particular piece of equipment or not commercially available, then the equipment shall be either equipped with a Tier 2 engine or equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 levels. Prior to the issuance of a grading permit, the Applicant will submit a list of all construction equipment, including off road equipment, by make, model, year, horsepower, expected/actual hours of use, and EPA to the County Planning Department.

2.7.5 Cultural Resources

- The Project site is entirely disturbed from cultivation and the probability of encountering an unanticipated cultural resource is low. As a safeguard, project construction personnel will monitor areas during surface disturbing activities. In the event any potential cultural or archaeological resources (e.g., bones, ceramics) are discovered, all construction affecting the discovery site will be suspended immediately until a qualified archaeologist has reviewed the findings. An Unanticipated Discoveries Plan will be prepared prior to resuming construction.

2.7.6 Waste Management

- Workers will be required to properly dispose of all refuse and trash to prevent any litter on the Project site.
- During construction, portable chemical sanitary facilities will be used by all construction personnel. These facilities will be serviced by a local contractor.
- All construction wastes, liquid and solid, will be disposed of in compliance with all appropriate local, state, and federal disposal regulations.
- Solid wastes will be disposed of in an approved solid waste disposal site in accordance with Modoc County Environmental Health requirements. Waste will be routinely collected and disposed of at an authorized landfill by a licensed disposal contractor.

2.7.7 Fire Prevention

An Emergency Response Plan covering possible emergencies (e.g. blow-outs, major fluid spills, impacts due to earthquakes, and other emergencies) shall be maintained. At least one Emergency Coordinator, responsible for coordinating all emergency response measures, will be on call and able to quickly reach the Project at all times. The Emergency Coordinator shall be thoroughly familiar with all aspects of the Emergency Response Plan and have the authority to commit the resources needed to carry out the contingency plan. Adequate personnel and equipment shall be available to respond to emergencies and to ensure compliance with use permit conditions, including appropriate first aid employee training and other provisions during Project construction and operation. All construction equipment will be equipped with exhaust spark arresters.

In addition, Safety Data Sheets for all known chemicals of concern will be maintained and available to workers and first responders. Personnel will not be allowed to smoke outside of designated areas and a

list of emergency phone numbers will be available onsite. In addition to the above-described actions, the following standards will also be applied:

- Adequate firefighting equipment (i.e., a shovel, a pulaski, standard fire extinguisher[s], and an ample water supply) will be kept readily available at each active construction site.
- Vehicle catalytic converters (on vehicles that enter and leave the construction site on a regular basis) will be inspected often and cleaned of all flammable debris.
- All cutting/welding torch use, electric-arc welding, and grinding operations will be conducted in an area free from vegetation. An ample water supply and shovel will be on hand to extinguish any fires created from sparks. At least one person in addition to the cutter/welder/grinder will be at the work site to promptly detect fires created by sparks.
- A survey and analysis of the proposed fire suppression and detection equipment will be performed by a certified fire protection engineer to evaluate the proposed fire response system's performance. An evaluation of the proposed fire suppression and detection equipment in conjunction with existing equipment will also occur. A full report of findings will be provided to Lake City Fire Protection District for review.
- An approved automatic fire detection system shall be installed as per the California Fire Code as adopted by the Modoc County Code §15.01.020. All fire detection systems shall be installed and maintained to the current fire code and regulations adopted by Modoc County.
- Fire Department access roads and gates will be in accordance with the current fire code adopted by Modoc County and the facility will maintain a Knox Box or a similar, Department-approved device for Site access.

2.7.8 Noise

- Diesel equipment used for drilling within 1,000 feet of any residence shall have hospital-type mufflers. Well venting and testing at these wells shall be accompanied by the use of an effective muffling device or "silencer".

2.7.9 Geotechnical and Geologic Hazards

- A formal geotechnical investigation of the Site's soil characteristics, seismic conditions, stormwater infiltration, site stability, and potential for liquefaction will be developed.

2.7.10 Public Health and Safety

- The Project site is fenced to prevent unauthorized people from accessing and tampering with the geothermal facilities, and to prevent wildlife from entering the facility.
- Signage, such as "No Trespassing" warnings, will continue to be posted at the Site to provide notice to unauthorized people to keep out.
- The Applicant will designate an employee to serve as the on-call Emergency Coordinator who fully comprehends the ERP and would be prepared to enact the ERP in the event of an emergency.

- Minor leaks or spills of fluids from construction equipment will be quickly contained and cleaned up.
- All hazardous materials will be used, transported, and disposed of in accordance with applicable safe handling and disposal regulations.

2.7.11 Traffic and Transportation

- Project personnel will coordinate that movement of any required oversized load on Modoc County roads with the Modoc County Department of Roads and/or on State highways with the California Department of Transportation (CalTrans) and the Alturas California Highway Patrol office. Transportation of oversized equipment will be minimized to the greatest extent feasible. Oversized equipment and/or large vehicles which impose greater than legal roads on riding surfaces, including bridges, shall require a transportation permit.
- The Project shall consider traffic safety in transporting equipment and materials to the permitted facilities to include temporary signs warning motorists on adjacent roadways and flagmen shall be used when equipment is being brought to and from the well sites.
- The Project shall coordinate with Modoc County Roads Department for any requested dedication of rights-of-way needed for Surprise Valley Road for the consideration of existing and any future road needs.
- The Project shall file for an encroachment permit for any work or proposed work in the affected County or CalTrans road rights-of-way and for any and all new, altered or unauthorized existing driveway(s) to access the lot or lots and for any proposed road crossings.

SECTION 3 Environmental Analysis, Impacts, and Mitigation

3.1 Introduction to Environmental Analysis

This section provides explanation and findings of the environmental analyses performed on the Project, including discussions on the potential environmental impacts and recommended mitigation measures. Potential impacts to the following resource areas were reviewed in this CEQA document:

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

Each environmental resource section provides background information and describes the environmental setting (baseline condition) to help the reader understand the conditions that could be impacted by the Project. An overview of applicable regulations, laws, and policies for each environmental resource category is also provided to help the reader understand potential regulatory limits and permitting thresholds. Next, environmental impacts of the Project are evaluated in conformance with CEQA (PRC Section 21000 et seq.) and the CEQA Guidelines (Title 14, California Code of Regulations, Section 15000 et seq.) including the CEQA Checklist included as Appendix G to the Guidelines. Mitigation measures are provided where necessary and residual impacts analysis is also discussed.

Significance criteria are identified for each environmental resource category. The significance criteria serve as benchmarks for determining if components of the Project would result in a significant effect when evaluated against the environmental baseline conditions. A significant effect on the environment means "…a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the Project…" (CEQA Guidelines Section 15382).

3.1.1 Organization of Issue and Impact Analysis

Section 3 provides the impact analysis for all resource areas and determines the potential significance of an impact from the approval of the Project. Each resource section contains a description of the baseline environmental conditions, pertinent regulations for the resource, the significance criteria for the resource based on the CEQA checklist, an analysis of project impacts, mitigation measures where necessary to bring project impacts to a level less than significant and plans for project decommissioning and restoration where applicable.

Each resource evaluated contains the following sections:

- Description of baseline environmental conditions at the site;
- The regulatory setting that pertains to that resource;
- The threshold of significance (from Appendix G of the CEQA Guidelines);
- The Project impacts analysis;
- Mitigation measures found to reduce significance to levels less than significant;
- The decommissioning and restoration of the Project were applicable;
- And any residual impacts that may come as a result of Mitigation Measures.

For evaluation of environmental impacts, each question from the Environmental Checklist is summarized and responses are provided according to the analysis undertaken as part of the Initial Study. Impacts and effects will be evaluated and quantified, when appropriate. To each question, there are four possible responses, including:

No Impact: A "No Impact" response is adequately supported if the impact simply does not apply to the proposed applications.

Less Than Significant Impact: The proposed applications will have the potential to impact the environment. These impacts, however, will be less than significant; no additional analysis is required.

Potentially Significant Unless Mitigated: This applies where incorporation of Mitigation Measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact".

Potentially Significant Impact: The proposed applications could have impacts that are considered significant. May require Mitigation Measures to reduce these impacts to less than significant levels.

3.2 Aesthetics

This section describes the existing aesthetics and visual characteristics of the Project site and surrounding area; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project and mitigation measures to reduce Project impacts on aesthetics to levels less than significant. Table 3.2-1 summarizes impacts on aesthetics that could result from implementation of the Project or mitigation measures.

Table 3.2-1. Summary of Aesthetics Impacts

Would the Project:	*Project*	*Mitigation Measure(s)*
a) Have a substantial adverse effect on a scenic vista or scenic highway?	No Impact	None Required
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	No Impact	None Required
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?	Less Than Significant	None Required
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	Less Than Significant	None Required

3.2.1 Existing Conditions

Modoc County encompasses 3,948 square miles in the northeastern corner of California (United States Census Bureau, 2020). The County is bordered by the state of Oregon to the north, the State of Nevada to the east, Siskiyou County to the west, Lassen County to the south, and Shasta County to the southwest. The rural and undeveloped nature of the county and unique geographic location provides high value scenic resources important to residents and tourists alike (Modoc County, 2018).

The Project area is located in the Surprise Valley region of Modoc County. This area is surrounded by views of the Warner Mountain range and Modoc National Forest directly to the west, Upper Alkali Lake to the east, Middle Alkali Lake to the south and rural agricultural landscapes throughout the valley. Views from the work areas will be dominated by the warner Mountains to the west, Upper Alkali Lake to the east and the surrounding agricultural lands.

The Project area is located 1.85 miles north of Lake City, 11.5 miles south of Fort Bidwell, and 10.25 miles west of the Nevada and California border. Land use surrounding the Project area is primarily agricultural including irrigated fields for the production of alfalfa, grazing lands in the foothills to the west and open space around Upper Alkali Lake to the east. The Project area is in the flat valley bottom, surrounding topography is flat except to the west which transitions into the foothills of the Warner Mountains.

3.2.1.1 Visual Character

Existing conditions of the Project site were determined using aerial and ground level imagery in conjunction with aerial topography. The Project area is predominantly flat agricultural lands which have been cleared for the production of alfalfa. To the west the view is dominated by the Warner Mountain foothills which are comprised of sagebrush and juniper plant communities. Views to the east are of Upper Alkali Lake and Surprise Valley which provide wide flat views broken in the distance by the start of the Hays Canyon Mountain Range in Nevada.

3.2.1.2 Scenic Vista

Scenic vistas are typically expansive views from elevated areas. They may or may not be part of a designated scenic overlook or other area providing a vista view of a landscape. The Project site is not located within an area containing a scenic vista designated by the State or the County's General Plan.

3.2.1.3 Scenic Highways

According to the Conservation and Open Space Element, all highways in Modoc County are scenic but none have officially been designated by the State or the County. The County General Plan designated the State Routes 139 and 299 between Tulelake and Adein as eligible to be scenic highways (Modoc County, 2018). CalTrans currently lists these highways as eligible for listing on the California State Scenic Highway System Map (CalTrans, n.d.).

The Project site is not located within a state scenic highway corridor, nor are there any state scenic highways located in proximity to the Project site. The nearest road segment considered eligible for a State scenic highway designation is the portion of the 139/299 near Canby, approximately 38 miles to the west and on the far side of the Warner Mountain range. Therefore, the Project site would not be visible from any portion of an eligible scenic highway.

3.2.1.4 Light, Glare, and Glint

Glare is considered a continuous source of brightness, relative to diffused light, whereas glint is a direct redirection of the sun beam. Glint is highly directional, since its origin is purely reflective, whereas glare is the reflection of diffuse irradiance; it is not a direct reflection of the sun.

Because of the nature of the existing agricultural land uses and few residences, limited light is generated from within the Project area. The majority of the light and glare in the Project area is a result of motor vehicles traveling on Surprise Valley Road, and farm equipment. Local roadways generate glare both during the night hours when cars travel with lights on, and during daytime hours because of the sun's reflection from cars and pavement surfaces.

3.2.2 Regulatory Setting

3.2.2.1 State

California Department of Transportation – SB 1467

CalTrans manages the California Scenic Highway Program and the goal of the program is to protect and enhance California's natural scenic beauty by identifying those portions of the State highway system which, together with adjacent scenic corridors, require special conservation treatment (CalTrans, n.d.).

3.2.2.2 Local

Modoc County General Plan

The Modoc County General Plan Conservation and Open Space Element identifies the County's soil, water, agriculture and forest land, fish and wildlife and associated habitats, mineral and energy sources essential to the economic wellbeing of the County. These resources are also identified as being high value scenic resources to both residents and tourists from more developed population centers in northern California (Modoc County, 2018). The Conservation and Open Space Element recognizes that it is important to identify and respond to non-economic values such as scenic values when considering development. The Conservation and Open Space Element does not directly provide any goals, policies or action Items for the preservation of scenic resources which would be applicable to the proposed Project. The Circulation Element does contain goals, policies and action items directly related to aesthetics.

3.2.3 Impacts Analysis

3.2.3.1 Impact Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to aesthetic resources. The criteria listed below considers if the Project would:

Have a substantial adverse effect on a scenic vista or scenic highway?

Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?

Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

3.2.3.2 Analytical Approach

This impacts analysis evaluates the potential for the Project and its varying components (described in Section 2) to impact the aesthetic resources within the Project vicinity.

The methods used to determine the Project site's existing conditions and the subsequent change with the implementation of the Project was determined using aerial and ground level imagery in conjunction with aerial topography. Assessments of existing visual conditions were made based on professional judgment that considered sensitive receptors and sensitive viewing areas in the Project areas.

3.2.3.3 Analysis of Checklist Questions

Would the Project have a substantial adverse effect on a scenic vista or scenic highway?

As described above in Section 3.2.1, there are no scenic vistas or scenic highways within the vicinity of the Project. The nearest road segment considered eligible for a State scenic highway designation is the portion of the SR 139/299 near Canby, approximately 38 miles to the west and on the far side of the Warner Mountain range; therefore, **no impacts** would occur to a scenic vista or scenic highway.

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 3.2.1, there are no designated or eligible state scenic highways in the Project vicinity. The Project site is approximately 38 miles east of SR 139/299, the closest designated scenic resource area. Therefore, **no impacts** to scenic resources within any state scenic highways would occur.

In non-urbanized areas, would the Project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?

The Project area is predominantly flat agricultural land which have been cleared for the production of alfalfa. Surrounded by the Warner Mountain foothills Upper Alkali Lake and Surprise Valley which provide wide flat views broken in the distance by the start of the Hays Canyon Mountain Range in Nevada. The work sites within the Project area will be visible from travelers on Surprise Valley Road, and nearby rural residences.

During the construction phase, drilling operations may be visible to travelers on Surprise Valley Road or in the vicinity of the Project site. However, drill rig use is anticipated to be temporary (less than 17 months) and would be removed from the Project site after construction of the proposed facilities is complete. Therefore, impacts associated with degrading the existing visual character or quality of the Project site during construction are considered **less than significant**.

Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

The proposed Project does not include any facilities which would create new daytime sources of light or glare. The Project would have a weak source of nighttime light which would be emitted from the work lights needed for twenty-four-hour testing operations. There are very limited existing light

sources in the Project area, such as vehicles traveling on Surprise Valley Road, agricultural equipment, and nearby residence. New sources of light may be noticeable to nearby residents and nighttime travelers on Surprise Valley Road. Lighting would be used as needed for 24-hour operations and would likely occur only during the well drilling and testing phases (approximately 17 months). New sources of light will temporary and would be removed from the Project site during the reclamation phase of the Project, resulting in a **less than significant** impact on nighttime views

3.2.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. All abandonment and decommissioning activities would be short-term and any visual impacts due to decommissioning equipment (e.g., cranes) would not be significant. Through abandonment procedures the visual character of the Project site would return to its original land use (Agriculture and/or Open Space). Therefore, potential residual impacts will be **less than significant**.

3.3 Agricultural and Forestry Resources

This section describes the existing agriculture resources within the Project site; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project and mitigation measures on agriculture resources at the Project site. Table 3.3-1 summarizes impacts on agricultural resources that could result from implementation of the Project or Mitigation Measures.

Table 3.3-1. Summary of Agricultural Resource Impacts

Would the Project:	*Project*	*Mitigation Measure(s)*
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non- agricultural use?	Less Than Significant	None Required
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	Less Than Significant	None Required
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	No Impact	None Required
d) Result in the loss of forest land or conversion of forest land to non-forest use?	No Impact	None Required
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	Less Than Significant With Mitigation	AG-1a through AG-1c

3.3.1 Existing Conditions

Agriculture is one of Modoc County key industries, generating a total of $296,296,000 in 2022 according to the Modoc County Crop Report (2022). Total GDP for the County in 2022 was $625,452,000 (Bureau of Economic Analysis, 2023). Alfalfa/hay is the most valuable crop in Modoc County, generating over $85 million dollars in 2022, with over 36,000 acres planted within the County. Other significant crops in the county include forage/grain hay with a 2022 value of $36.7 million, and potatoes with a 2022 value of $19.3 million. Livestock production accounted for $116.8-million value in 2022. Livestock in the County is predominantly from the raising of cow/calf pairs with over 59,000 pairs raised (County of Modoc Department of Agriculture , 2022).

3.3.1.1 Important Farmland

The CDOC's Important Farmland Finder database shows that some parts of the well pads are proposed in areas designated for Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Grazing Land (Figure 3.3-1). There is Prime Farmland and Farmland of Statewide Importance throughout the vicinity of the Project area. Table 3.3-2 details the farmland types associated with the Project and the approximate acres impacted.

Table 3.3-2. California Important Farmland Types at the Project site and Acres Impacted

California Important Farmland Type	*Acres*
Farmland of Statewide Importance	4.7
Prime Farmland	5.1
Unique Farmland	0.0
Farmland of Local Importance	26.48
Grazing Land	3.2
***Total**	**39.48**

* Total refers to the total farmland acreage and does not include Urban and Built-Up lands.

3.3.1.2 Williamson Act Contract Land

A review of CDOC's Williamson Act enrollment database shows that Modoc County is a non-reporting participating county (California Department of Conservation, 2023). The following parcels are identified as being under Williamson Act Contracts: APN: 026-100-004-000, APN 026-080-009-000, APN 026-100-014, APN 026-100-008, and APN 032-030-001 (Figure 3.3-2). However, *Commercial energy exploration* is listed as compatible land use for Williamson Act Contract lands with a Use Permit issued by the Modoc County Planning Department.

Figure 3.3-1: Important Farmland

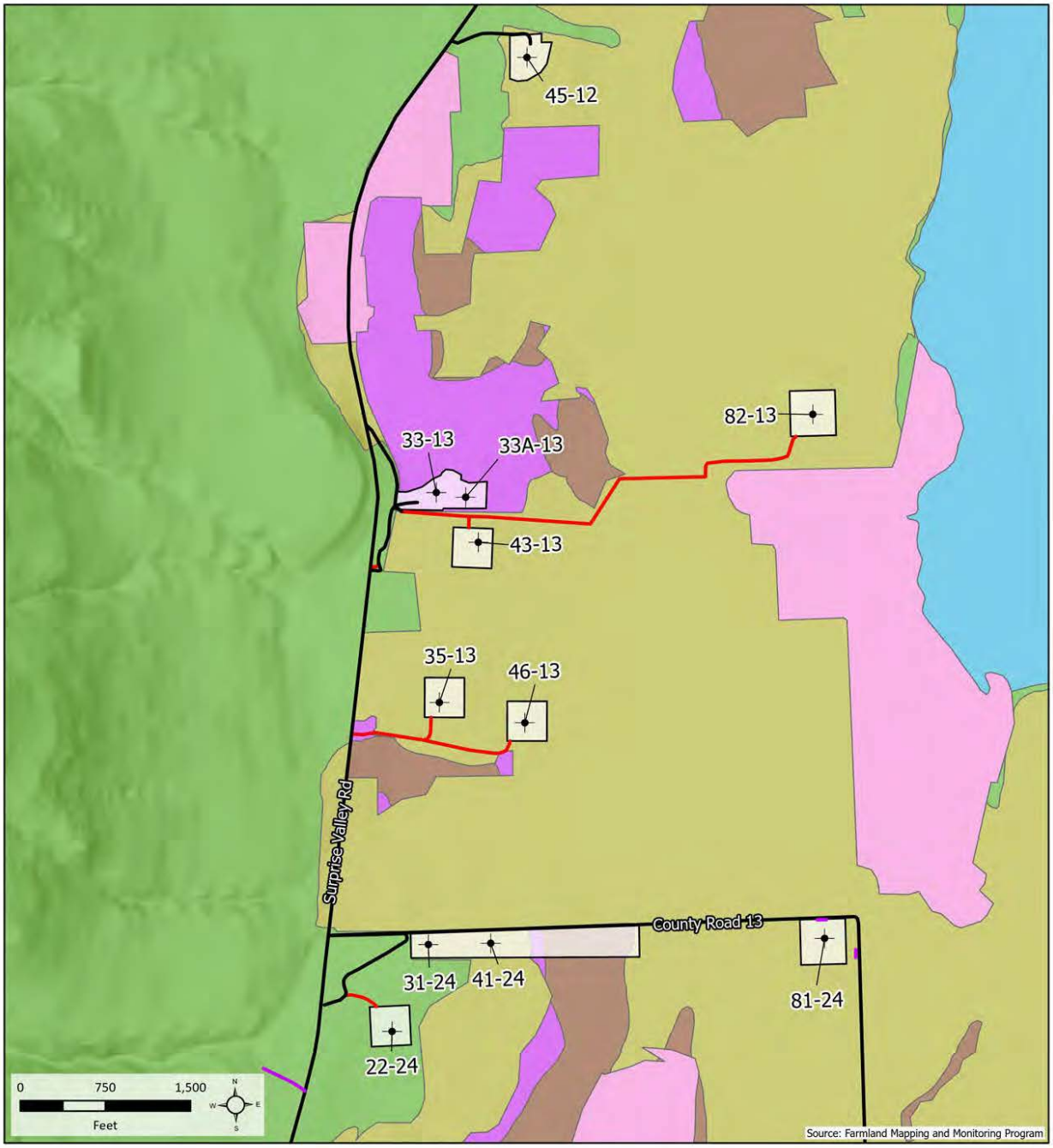
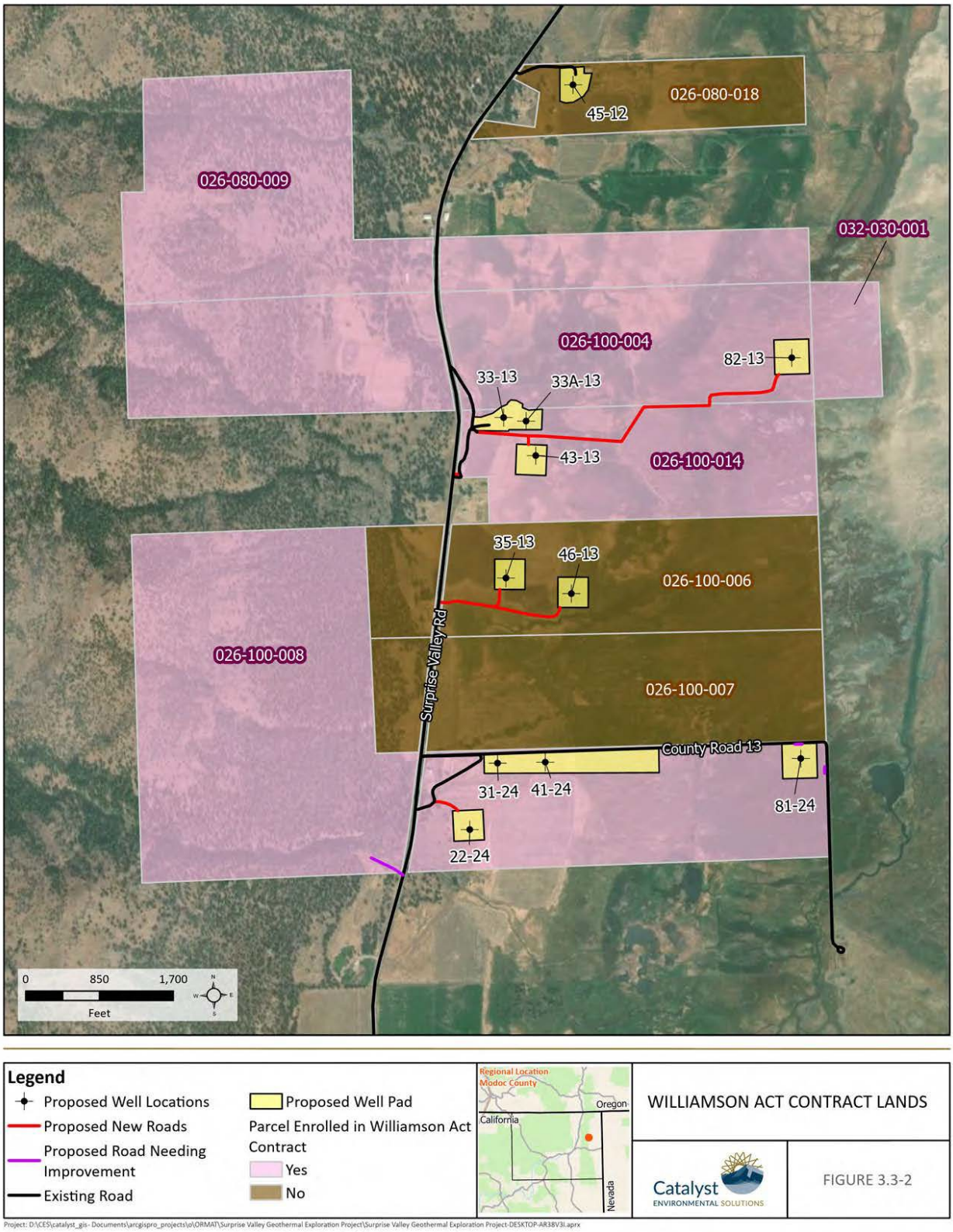


Figure 3.3-2: Williamson Act Contract Lands



3.3.1.3 Forest and Timberlands

The Project is not near or in the vicinity of areas containing or zoned for forest or timberlands.

3.3.2 Regulatory Setting

3.3.2.1 State

California Land Conservation Act

The Williamson Act (California Land Conservation Act, California Government Code, Section 51200 et seq.) is a statewide mechanism for the preservation of agricultural land and open space land. The Act provides a comprehensive method for local governments to protect farmland and open space by allowing land in agricultural use to be placed under contract (agricultural preserve) between a local government and a landowner.

Under the provisions of the Williamson Act (California Land Conservation Act 1965, Section 51200), landowners contract with the County to maintain agricultural or open space use of their lands in return for reduced property tax assessment. The contract is self-renewing, and the landowner may notify the County at any time of intent to withdraw the land from its preserve status. Withdrawal involves a 10-year period of tax adjustment to full market value before protected open space can be converted to urban uses. Consequently, land under a Williamson Act contract can be in either a renewal status or a nonrenewable status. Lands with a nonrenewable status indicate the farmer has withdrawn from the Williamson Act contract and is waiting for a period of tax adjustment for the land to reach its full market value. Nonrenewable and cancellation lands are candidates for potential urbanization within a period of 10 years.

The requirements necessary for cancellation of land conservation contracts are outlined in Government Code Section 51282. The County must document the justification for the cancellation through a set of findings. Unless the land is covered by a farmland security zone contract, the Williamson Act requires that local agencies make both the consistency with the Williamson Act and public interest findings.

California Farmland Mapping and Monitoring Program

CDOC, under the Division of Land Resource Protection, administers the Farmland Mapping and Monitoring Program (FMMP), a non-regulatory program which monitors the conversion of the State's farmland to and from agricultural use. The map series identifies eight classifications, as defined below, and uses a minimum mapping unit size of 10 acres unless specified.

Prime Farmland. Farmland with the best combination of physical and chemical features to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

Farmland of Statewide Importance. Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

Unique Farmland. Farmland of lesser quality soils than Prime Farmland or Farmland of Statewide Importance, used to produce the state's leading agricultural crops. This land is usually irrigated but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.

Farmland of Local Importance. Farmland that is of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee.

Grazing Land. Land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities.

Urban and Built-up Land. Land occupied by structures with a building density of at least one unit to 1.5 acre, or approximately six structures to a 10-acre parcel. Common examples include residential, industrial, commercial, institutional facilities, prisons, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, and water control structures.

Water. Defined as perennial water bodies with an extent of at least 40 acres.

Other Land. Land not included in any other mapping category. Common examples include low density rural developments, vegetative and riparian areas not suitable for livestock grazing, confined animal agriculture facilities, strip mines, borrow pits, and water bodies smaller than 40 acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land. More detailed data on these uses is available in counties containing the Rural Land Use Mapping categories.

The FMMP considers the categories of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, and Grazing Land to constitute 'agricultural land', for environmental review purposes under CEQA (Public Resources Code Section 21060.1).

3.3.2.2 Local

Modoc County General Plan Land Use Element

The Land Use Element provides the informational basis for policies and objectives related to Modoc County agriculture. The preservation of agricultural land in the County provides direct economic benefits as one of the primary economic resources in the region (Modoc County, 2018). Protection and preservation of agricultural lands also provide indirect benefits to wildlife, recreation, and helps address concerns about the loss of other ecosystems.

Goals and objectives that pertain to this Project include:

Goal LUE 4: Protect and support the agricultural economy of Modoc County.

Policy LUE U: Preserve and protect valuable agricultural lands in the County.

Policy LUE W: Support compatible, mixed, or alternative uses of agricultural land, including hunting and fishing clubs and recreational ranches.

Policy LUE AA: Coordinate the review of any development proposals on production of agricultural land with all concerned public agencies.

Modoc County "Right to Farm" Ordinance

Adopted by the County in 1989, as ordinance 291, the Right to Farm Ordinance enhances and encourages residents' right to farm in Modoc County. Where farmland or agricultural lands exists adjacent to non-farmland or non-agricultural lands complaints are common due to the inherent nature of agricultural activities. The ordinance defines when an agricultural operation is a nuisance and requires mandatory disclosure of agricultural property adjacent to properties for sale. The goal of the ordinance is to promote good neighbor policies and ensure the continued economic viability of the County's agricultural industry.

Modoc County Zoning Ordinance

The goals of the Modoc County Zoning Ordinance adopted in 1991, by ordinance 236-73, are to promote public welfare; implement General Plan and specific plan land use designations; and to protect the economic and social stability of the county. The project parcels are zoned Unclassified (U). Unclassified zoning designation includes uses found the General Agriculture Zone (AG); permitted uses as found in §18.24.030 and uses with administrative permit in §18.40.040(c). Commercial energy exploration is allowable with an administrative use permit within U zoning per §18.40.040(c).

Commercial energy exploration is defined by the Modoc Zoning as "the evaluation of an area to determine the presence and characteristics of oil, gas, geothermal, or other resources, including exploratory wells or observation wells. "Commercial energy exploration" is excluded from the meaning of private energy development" the Proposed Project include the development of exploratory wells for geothermal resources.

3.3.3 Impacts Analysis

3.3.3.1 Impact Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to agricultural resources. The criteria listed below considers if the Project would:

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non- agricultural use?

b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?

c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

d. Result in the loss of forest land or conversion of forest land to non-forest use?

e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

3.3.3.2 Analytical Approach

This impacts analysis evaluates the potential for the Project and its varying components (described in Section 2) to impact the agricultural resources within and surrounding the Project site. The analysis prepared for this CEQA Initial Study relied on Important Farmland and Williamson Act maps for Modoc County produced by CDOC's Division of Land Resource Protection. These sources were used to determine the agricultural significance of the land in the Project site and determine whether Project activities would surpass the threshold of the significance criteria listed above.

3.3.3.3 Analysis of Checklist Questions

Would the Project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non- agricultural use?

As described in Section 3.3.1, approximately 39.5 acres of agricultural land would be temporarily converted to non-agricultural uses for commercial geothermal energy explorations purposes. The Project site contains approximately 5.1 acres of Prime Farmland, approximately 4.7 acres of Farmland of Statewide Importance, and no acres of Unique Farmland as defined by the Farmland Mapping and Monitoring Program. The remainder of the agricultural land is Farmland of Local Importance or Grazing land. The primary use of these agricultural lands is the production of alfalfa and/or hay.

Despite the proposed Project being an allowable use under the Modoc County General Plan, the loss of agricultural land classified as Prime Farmland, Unique, and Farmland of Statewide Importance is considered a significant impact under CEQA. However, as discussed in Section 2.4.3, any conversion of agricultural lands would be temporary, and all impacted farmlands would be reclaimed to their current state. Therefore, there will be no permanent loss of protected agricultural land and impacts will be **less than significant.**

Would the Project conflict with existing zoning for agricultural use, or a Williamson Act Contract?

The proposed Project parcels are zoned unclassified (U), and within Exclusive Agriculture and General Agriculture land use areas (Figure 2.1-3). The proposed Project would be defined as commercial energy exploration by the Modoc County Zoning code and is allowable with a Use Permit (UP) within an unclassified zoning area, per §18.40.040(c). As provided in Figure 3.3-2, several of the Project work areas are located on parcels currently under Williamson Act contracts. Commercial energy exploration is an allowable use on Williamson Act parcels through the application of a Use Permit, per the Modoc County Williamson Act Rules (County Code Title 19.06). Therefore, the proposed Project would not conflict with the existing zoning or a Williamson Act contract, if a Use permit is issued by Modoc County and result in **less than significant** impacts to existing zoning for agriculture and Williamson Act contracts.

Would the Project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(9)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(9))?

As described above, the Project is not zoned for, nor does it contain, forest land or timber land. As such, the Project would have **no impact** on forest or timberlands.

Would the Project result in the loss of forest land or conversion of forest land to non-forest use?

As described above, the Project is not zoned for, nor does it contain, forest land or timber land. As such, the Project would have **no impact** on forest or timberlands.

Would the Project involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use?

The Project could cause indirect impacts to adjacent farmland associated with its construction, operation, and/or decommissioning/reclamation. These impacts may come in the form of fugitive dust as a result of construction, decommissioning, and/or reclamation activities, or land deformation from the operation of the proposed geothermal well-pads. In addition, construction/decommissioning activities could also introduce invasive insects, weeds, and pests to the Project site, whereby they infest adjacent farmland, resulting in indirect impacts to nearby farmland.

Fugitive Dust

Construction/decommissioning/reclamation activities may cause fugitive dust through driving on unpaved surfaces (e.g., dirt, gravel), earthmoving, or grading activities. Fugitive dust can coat plants in adjacent agricultural lands reducing their productivity. Thus, if not managed fugitive dust would cause potentially significant indirect impacts. As discussed in Section 2.5.4, the Applicant proposes to implement Best Available Control Measures (BACM) to reduce fugitive dust during construction and earthmoving activities, including but not limited to:

- Water shall be applied to the development site and during preparation and construction to control fugitive dust.
- Earth moving work shall be completed in phases (as necessary) to minimize the amount of disturbed area at one time.
- Construction vehicles and heavy equipment that use non-surfaced facility roads and areas will be restricted to 10 mph to control fugitive dust.
- During windy conditions, barriers shall be constructed and/or additional watering will occur to minimize fugitive dust.
- Vehicle access shall be restricted to the disturbance area via signage and/or fencing.
- Equipment shall be operated according to best practices and maintained according to design specifications.

The Project would manage fugitive dust attributed to construction and decommissioning/reclamation activities to County standards. Project associated fugitive dust would have **less than significant** impacts to the existing environment and not result in the conversion of farmland to non-agricultural use.

Invasive Species

Construction/decommissioning activities attributed to the Project could introduce invasive insects, weeds, and pests. Invasives may be transported through material shipments to the Project site or through vehicle traffic coming from outside of the county. The introduction of invasive insects, weeds, and pests would be considered a significant indirect impact as it can have deleterious effects on the County's agricultural sector. In order to reduce the potential for the Project to introduce invasives, whereby infestation could occur to adjacent lands used for agriculture, the Applicant will implement **MM AG-1**, Pest Management Plan (PMP). A PMP approved by the Agricultural Commissioner would be established to control and monitor potentially harmful invasives to surrounding farmland. Implementation of **MM AG-1** would reduce the Project's indirect impacts on surrounding farmland to **less than significant**.

Mitigation Measure(s)

Because Project construction/reclamation and operation have potential to significantly impact other changes in the existing environment which, due to their location or nature could result in conversion of important farmland in the County to non-agricultural use, the Applicant would implement **MM GS-1** (Section 3.8.3) and **MM AG-1**. As described below, **MM AG-1** would establish a PMP to monitor and control the introduction of invasives to the Project site, thereby, reducing project impacts to a level less than significant. Further, **MM GS-1 (Prepare a Stormwater Pollution Prevention Plan)** would ensure the construction/reclamation of the proposed geothermal well pads and all associated impacts were mitigated during the design phase.

MM AG-1. Pest Management Plan. A pest management plan shall be established to monitor and control the introduction of insects, weeds, or other organisms that may be harmful to surrounding farmland and to prevent injury to the agricultural industry in the County. This plan shall be in place for the duration of the Project, including during restoration of the Project site to pre-project conditions. The plan shall be approved by the Planning Department and the Agricultural Commissioner. Should the population of unwanted species threaten to damage the area, the Project operator shall implement controls that are consistent with applicable pest management requirements.

Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. Because the Project will require the temporary conversion of Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance and Grazing Land the proper storage of topsoil removed from the site is paramount to site restoration to pre-project conditions.

The Project would require the Applicant to administer a comprehensive reclamation plan that returns the site to farmable land. The Applicant must adhere to all requirements under **MM AG-1**, and MCAPCD Fugitive Dust Rules would reduce indirect Project impacts to surrounding farmlands associated with the decommissioning/restoration of the Project to a level less than significant. Implementation of **MM GS-1** would identify hazards at the design phase and establish methods to reduce Project impacts to a level of **less than significant**.

3.4 Air Quality

This section describes the existing air quality of the Project area; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on air quality in the Project area. Table 3.4-1 summarizes impacts on air quality that could result from implementation of the Project.

Table 3.4-1. Summary of Air Quality Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Conflict with or obstruct implementation of the applicable air quality plan?	No Impact	None Required
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?	Less than Significant	None Required
c) Expose sensitive receptors to substantial pollutant concentrations?	Less than Significant	None Required
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Less than Significant	None Required

3.4.1 Existing Conditions

The Project is located in the Modoc County within the Northeast Plateau Air Basin (NEPAB). The Modoc County portion of the NEPAB is under the jurisdiction of the Modoc County Air Pollution Control District (MCAPCD). The NEPAB encompasses the entirety of Modoc County, Siskiyou County, and Lassen County and is characterized by a high plateau landscape. Modoc County experiences a semi-arid climate with significant seasonal variation. Winters are cold, with temperatures often dropping below freezing, and snow is common, especially in higher elevations. Summers are typically warm to hot, with daytime temperatures frequently exceeding 90°F (32°C), although evenings can cool down considerably. The county's weather is influenced by its mountainous terrain and proximity to the Great Basin, leading to relatively dry conditions, with occasional rainfall in the spring and fall. The area's elevation, ranging from about 4,000 to over 7,000 feet, also contributes to temperature extremes and variable weather patterns. Emission sources in Modoc County are primarily associated with agriculture, transportation, and land management activities. Agricultural operations, including livestock farming and crop cultivation, contribute to methane and nitrous oxide (N_2O) emissions. Additionally, vehicles and machinery used in farming and transportation produce particulate matter (PM), nitrogen oxides (NO_X), and carbon dioxide (CO_2). Wildfires, which are common in the region during dry summer months, also contribute significantly to air pollution, releasing smoke and particulate matter into the atmosphere. The county's relatively low population density means that industrial emissions are minimal, but these natural and agricultural sources remain the primary contributors to air quality concerns.

The federal Clean Air Act (CAA), as amended, and the California Clean Air Act (CCAA) contain the primary provisions relating to air quality that apply to the Project. The U.S. Environmental Protection

Agency (USEPA), California Air Resources Board (CARB), and regional air districts have issued rules to implement the federal and state Clean Air Acts. The USEPA uses “criteria pollutants" as indicators of air quality and has established for each of them a maximum concentration above which adverse effects on human health and the environment may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS). One set of limits (primary standard) protects health; another set of limits (secondary standard) is intended to prevent environmental and property damage. Under the CAA, the EPA has established NAAQS for seven criteria pollutants: ozone (O_3), respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), and sulfur dioxide (SO_2). California has established State Ambient Air Quality Standards for the same criteria pollutants, plus an additional three pollutants (visibility reducing particulates, sulfates, and hydrogen sulfide [H_2S]). States may have standards that are more restrictive than the federal thresholds, but they cannot be less restrictive. Although more stringent, the California standards have no specific dates for attainment, unlike federal standards. Under California law, designations are made by pollutant, rather than by averaging time. A geographic area that meets or exceeds the primary standard is called an attainment area; areas that do not meet the primary standard are called nonattainment areas.

Table 3.4-2 shows the state and federal ambient air quality standards while Table 3.4-3 presents the attainment status of the NEPAB for the state and federal standards. As shown, the Modoc County portion of the NEPAB is currently designated as attainment or unclassified for all criteria pollutants at the state and federal level.

Table 3.4-2. State and Federal Ambient Air Quality Standards

Pollutant	Averaging Period	California Standard	Federal Standard
Ozone (O_3)	1 hour	0.09 ppm (177 µg/m^3)	Revoked
	8 hour	0.070 ppm (137 µg/m^3)	0.07 ppm (137 µg/m^3)
Respirable Particulate Matter (PM_{10})	24 hour	50 µg/m^3	150 µg/m^3
	Annual	20 µg/m^3	Revoked
Fine Particulate Matter ($PM_{2.5}$)	24 hour	--	35 µg/m^3
	Annual	12 µg/m^3	9 µg/m^3
Carbon Monoxide (CO)	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)
	8 hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3)
	Annual	0.030 ppm (56 µg/m^3)	0.053 ppm (100 µg/m^3)
Lead (Pb)	30 Day Average	1.5 µg/m^3	--
	Calendar Average	--	1.5 µg/m^3 (for certain areas)
	3-Month (Rolling Average)	--	1.5
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3)
	3 hour	--	0.5 ppm (1300 µg/m^3)
	24 hour	0.04 ppm (105 µg/m^3)	0.14 ppm (for certain areas)
	Annual	--	0.03 ppm (for certain areas)
Hydrogen Sulfide (H_2S)	1 Hour	0.03 ppm (42 µg/m^3)	--
Sulfates	24 hour	25 µg/m^3	--
Vinyl Chloride	24 hour	0.010 ppm (26 µg/m^3)	--
Visibility-Reducing Particles	8 hour	Extinction coefficient of 0.23 per kilometer (visibility of ten miles or more due to particles when relative humidity is less than 70 percent)	--

Notes: ppm = parts per million; ppb = parts per billion; mg/m³ = milligram per cubic meter; µg/m³ = micrograms per cubic meter; "--" = no standard.

Table 3.4-3. Attainment Status – Modoc Valley Portion of the SSAB

Pollutant	California Designation	Federal Designation
Ozone (O_3)	Attainment	Unclassified/Attainment
Respirable Particulate Matter (PM_{10})	Unclassified	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Attainment	Unclassified/Attainment
Carbon Monoxide (CO)	Unclassified	Unclassified/Attainment
Nitrogen Dioxide (NO_2)	Attainment	Unclassified/Attainment
Lead (Pb)	Attainment	Unclassified/Attainment
Sulfur Dioxide (SO_2)	Attainment	Unclassified/Attainment
Hydrogen Sulfide (H_2S)	Unclassified	No Federal Standards
Sulfates	Attainment	No Federal Standards
Visibility Reducing Particles	Unclassified	No Federal Standards

Source: (Californa Air Resorces Board, 2023)

3.4.1.1 Sensitive Receptors

Some population groups, such as children, the elderly, and acutely and chronically ill persons are considered more sensitive to air pollution than others. Sensitive receptor locations typically include residential areas, hospitals, elder-care facilities, rehabilitation centers, daycare centers, and parks. The Project site is in a rural area surrounded by agricultural fields and open space.

There are no sensitive receptors (i.e., schools, hospitals, etc.) in close proximity (i.e., within 1 mile radius) of the Site. The closest residence is located approximately 650 feet to the northwest of the southern-most well site (Well 22-24). One other residence is within 1,000 feet of a test well site, located approximately 850 feet southwest from Well 43-13. No other sensitive receptors are located within 1,000 feet of Project components.

3.4.2 Regulatory Setting

3.4.2.1 Federal

Clean Air Act

The Federal Clean Air Act (CAA), passed in 1970 and last amended in 1990, is the primary federal law that governs air quality. The Federal CAA delegates primary responsibility for clean air to the U.S. EPA. The U.S. EPA develops rules and regulations to preserve and improve air quality and delegates specific responsibilities to state and local agencies. Under the act, the U.S. EPA has established the NAAQS for six criteria air pollutants that are pervasive in urban environments and for which state and national health-based ambient air quality standards have been established. Ozone, CO, NO_2, SO_2, Pb, and PM (Including both PM_{10}, and $PM_{2.5}$) are the six criteria air pollutants. Ozone is a secondary pollutant, nitrogen oxides (NO_X) and volatile organic compounds (VOCs) are of particular interest as they are

precursors to ozone formation. In addition, national standards exist for Pb. The NAAQS standards are set at levels that protect public health with a margin of safety and are subject to periodic review and revision.

The federal CAA requires U.S EPA to designate areas as attainment, nonattainment, or maintenance (previously nonattainment and currently attainment) for each criteria pollutant based on whether the NAAQS have been achieved. The federal standards are summarized above in Table 3.4-2.

3.4.2.2 State

California Clean Air Act

The California Clean Air Act (CCAA) was adopted by CARB in 1988. The CCAA is responsible for meeting the state requirements of the Federal CAA and for establishing the CAAQS. CARB oversees the functions of local air pollution control districts and air quality management districts, which, in turn, administer air quality activities at the regional and county levels. The CCAA, as amended in 1992, requires all air districts of the state to achieve and maintain the CAAQS by the earliest practical date.

The CCAA requires CARB to designate areas within California as either attainment or nonattainment for each criteria pollutant based on whether the CAAQS have been achieved. Under the CCAA, areas are designated as nonattainment for a pollutant if air quality data shows that a state standard for the pollutant was violated at least once during the previous 3 calendar years. As shown in Table 3.4-2, the CAAQS are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

Exceedances that are affected by highly irregular or infrequent events are not considered violations of a state standard and are not used as a basis for designating areas as nonattainment.

California State Implementation Plan

The CAA mandates that the state submit and implement a State Implementation Plan (SIP) for areas not meeting the NAAQS. These plans must include pollution control measures that demonstrate how the standards will be met. State law makes CARB the lead agency for all purposes related to the SIP.

Local air districts and other agencies prepare SIP elements and submit them to CARB for review and approval. CARB then forwards SIP revisions to the U.S. EPA for approval and publication in the Federal Register. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items which are included in the California SIP.

Toxic Air Contaminants Regulation

Toxic Air Contaminant (TAC) sources include industrial processes, dry cleaners, gasoline stations, paint and solvent operations, and fossil fuel combustion sources (i.e., Diesel Particulate Matter [DPM]). In August 1998, ARB identified DPM emissions from diesel-fueled engines as a TAC. In September 2000, ARB approved a comprehensive diesel risk reduction plan to reduce emissions from both new and existing diesel fueled engines and vehicles. The goal of the plan is to reduce diesel PM_{10} (inhalable particulate matter) emissions and the associated health risk by 75 percent in 2010 and by 85 percent by 2020. The plan identified 14 measures that target new and existing on-road vehicles (e.g., heavy duty

trucks and buses, etc.), off-road equipment (e.g., graders, tractors, forklifts, sweepers, and boats), portable equipment (e.g., pumps, etc.), and stationary engines (e.g., stand-by power generators, etc.).

3.4.2.3 Local

Modoc County Air Pollution Control District

The MCAPCD is the agency responsible for monitoring air quality, as well as planning, implementing, and enforcing programs designed to attain and maintain state and federal ambient air quality standards in the district MCAPCD is responsible for regulating stationary sources of air emissions in Modoc County. Stationary sources that have the potential to emit air pollutants into the ambient air are subject to the Rules and Regulations adopted by MCAPCD. MCAPCD is responsible for establishing stationary source permitting requirements and for ensuring that new, modified, or relocated stationary sources do not create net emission increases. Ambient air quality monitoring for the NPAB is exclusively conducted at the Yreka monitoring Station in Siskiyou County (United States Enviromental Protection Agency, 2024). All other CARB or EPA monitoring stations within the air basin are inactive.

As listed below, MCAPCD has the authority to adopt and enforce regulations dealing with controls for specific types of sources, emissions or hazardous air pollutants, and New Source Review. The MCAPCD Rules and Regulations are part of the SIP and are separately enforceable by the USEPA.

Rule 2.0 – Permits Required. The construction, installation, modification, replacement, and operation of any equipment which may emit or control air contaminants require MCAPCD permits.

Rule 207 – New and Modified Stationary Source Review. Establishes preconstruction review

Rule 4.1 – Visible Emissions. Sets limits for release or discharge of emissions into the atmosphere, other than uncombined water vapor, that are dark or darker in shade as designated as No. 2 on the Ringelmann Chart (i.e., scale for measuring the apparent density or opacity of smoke) or obscure an observer's view to a degree equal to or greater than smoke does as compared to No. 2 on the Ringelmann Chart, for a period or aggregated period of more than three minutes in any hour.

Rule S3 – Significance Level. Rule S3 of Regulation I sets forth limitations on emissions of pollutants from new or modified stationary sources.

Modoc County General Plan

The Modoc County General Plan serves as the overall guiding policy for the County and contains goals, objectives, policies and/or programs to conserve the natural environment of Modoc County, including air quality and GHGs. However, the Modoc County General Plan does not contain any goals, objectives, policies or programs that directly pertain to air quality at the Project-level.

Modoc County Code of Ordinances

The Modoc County code of ordinances Health and Safety title contains codifies the County's duty and authority to enforce the Modoc County Air Pollution Control District Rules and Regulations. The County code does not contain any other Air Pollution standards or requirements.

8.16.010 - Air pollution rules and regulations—Enforcement authority. The county air pollution control officer, or any of his duly qualified and acting deputies, are designated, pursuant to California

Penal Code Section 836.5, as public officers and/or employees authorized by ordinance to arrest persons for violations of the Modoc County Air Pollution Rules and Regulations heretofore adopted, effective January 17, 1972, and amendments thereto.

3.4.3 Impacts Analysis

3.4.3.1 Impact Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to air quality resources. The criteria listed below considers if the Project would:

a. Conflict with or obstruct implementation of the applicable air quality plan?

b. Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?

c. Expose sensitive receptors to substantial pollutant concentrations?

d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

3.4.3.2 Analytical Approach

This impacts analysis evaluates the potential for the Project and its varying components (described in Section 2) to impact the air quality resources within the Project area.

Construction of the Project was assumed to commence in the fourth quarter of 2026 and was estimated to take up to approximately 28 months to complete. The Project would result in short-term emissions of air pollutants associated with construction and testing operations. Construction emissions would include exhaust from the operation of conventional construction equipment, on-road emissions from employee vehicle trips and haul truck trips, fugitive dust as a result of grading and vehicle travel on paved and unpaved surfaces.

Construction emissions were estimated using the latest version of California Emissions Estimator Model (CalEEMod), version 2022.1. CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operation of a variety of land use projects. The model utilizes widely accepted federal and state models for emission estimates and default data from sources such as U.S. EPA AP-42 emission factors, CARB vehicle emission models, and studies from California agencies such as the California Energy Commission (CEC). CalEEMod inputs for construction and testing activities consist of the data provided for the construction schedule, offroad equipment operations and vehicle miles traveled detailed. Default CalEEMod inputs were used for modeling where Project-specific details were not readily ascertainable (e.g., fleet mix and trip length).

3.4.3.3 Thresholds of Significance

As noted above, Modoc County is in attainment or unclassified for all criteria air pollutants and the MCAPCD has not adopted CEQA significance thresholds for project-level review. The MDAPCD has not established formal quantitative or qualitative CEQA thresholds for criteria pollutants or GHG emissions through a public rulemaking process, but CEQA permits the lead agency to establish a project-specific threshold of significance if backed by substantial evidence, until such time as a formal threshold is approved.

However, for the purposes of assessing air quality impacts in CEQA documents, MCAPCD Rule 2.8e (Standards for Permits to Construct), which contains thresholds for operational emissions from new stationary sources, is commonly used as a significance threshold for project-level review. Although these stationary source emissions thresholds do not directly apply to land use and infrastructure projects, they provide a reference point for levels of emissions that would trigger MCAPCD requirements for best available control technology and/or mitigation off-sets. Per Rule 2.8e, criteria air pollutants from the operation of stationary sources are considered significant if they exceed the following thresholds:

- 250 pounds per day for NO_X, reactive organic gases (ROG), PM_{10}, $PM_{2.5}$, SO_X
- 2,500 pounds per day for carbon monoxide (CO)

In using MCAPCD Rule 2.8e as a threshold in this document, the Lead Agency is exercising its discretion to formulate CEQA significance criteria based in part on the MCAPCD rules, as they reflect the best available expert judgment regarding what constitutes significant levels of air pollution within the NEPAB and Modoc County

3.4.3.4 Analysis of Checklist Questions

Would the Project conflict with or obstruct implementation of the applicable air quality plan?

As noted in Table 3.4-3 above, the NEPAB, including Modoc County, is listed as "attainment" or "unclassified" for all the federal and state ambient air quality standards. Due to the excellent air quality in the NEPAB, the MCAPCD has not prepared any non-attainment air quality plans for the purpose of ensuring compliance with federal and State AAQS. As such, the proposed Project would not conflict or obstruct implementation of an applicable air quality plan. Therefore, the proposed Project would result in **no impact** with respect to any applicable air plans.

Would the Project result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?

The Project would emit criteria pollutants from the use of combustion sources such as diesel off-road equipment (e.g., tractors, cranes, generators, etc.), and on-road mobile sources associated with construction-related vehicle travel. Impacts to air quality would also occur during Project construction as a result of soil disturbance and fugitive dust emissions. Construction emissions vary from day-to-day depending on the number of workers, number, and types of active heavy-duty vehicles and equipment, level of activity, the prevailing meteorological conditions, and the length over which these activities occur.

Project construction is anticipated to take up to 28 months. For the purposes of this analysis, short-term construction emissions were determined utilizing the latest version of the CalEEMod model (version 2022.1) based on the assumptions described above and utilizing CalEEMod defaults for calendar year average equipment emission factors as opposed to tier-specific rates (e.g., Tier 3) (refer to Appendix A for emission model results). The total unmitigated emissions generated during Project construction are shown in Table 3.4-4.

Table 3.4-4. Unmitigated Project Construction-Generated Emissions

Criteria Pollutants	Emissions (lbs/day)[1]					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	20.17	174.1	200.6	0.54	106.0	11.69
Threshold	***250***	***250***	***2500***	***250***	***250***	***250***
Exceed Threshold?	No	No	No	No	No	No

Source: CalEEMod Results in Appendix A

Notes:

[1] Emissions are representative of the maximum daily output (i.e., maximum of summer or winter results).

The MCAPCD's application of significance levels for criteria air pollutants is relevant to the determination of whether a project's individual emissions would have a cumulatively significant impact on air quality. As summarized in Table 3.4-4, the Project's unmitigated daily mitigated construction emissions would not exceed the MCAPCD thresholds. Therefore, the Project's potential to result in a cumulatively considerable net increase of any criteria pollutant during construction is considered **less than significant**.

Would the Project expose sensitive receptors to substantial pollutant concentrations?

As summarized in Section 3.4.1.1 above, the nearest sensitive land use to the Project area is a single-family residence located approximately 650 feet from the nearest Project well. Construction of the Project would result in temporary, short-term project-generated emissions of DPM, ROG, NO_X, CO, PM_{10}, and $PM_{2.5}$ from the exhaust of offroad, heavy-duty diesel equipment and construction-related truck traffic The NEPAB is designated as attainment or unclassified for all state and federal air quality standards. As summarized above and shown in Table 3.4-4, the Project would not exceed the MCAPCD significance thresholds for construction emissions. The health effects associated with O_3 are generally associated with reduced lung function. Because the Project would not involve construction activities that would result in O_3 precursor emissions (ROG or NO_X) in excess of the MCAPCD thresholds, the Project is not anticipated to substantially contribute to regional O_3 concentrations and the associated health impacts.

CO tends to be a localized impact associated with congested intersections. In terms of adverse health effects, CO competes with oxygen, often replacing it in the blood, reducing the blood's ability to transport oxygen to vital organs. The results of excess CO exposure can include dizziness, fatigue, and impairment of central nervous system functions. The Project would not involve activities that would result in CO emissions in excess of the MCAPCD thresholds. Thus, the Project CO emissions during construction would not contribute to the health effects associated with this pollutant.

Particulate matter (PM_{10} and $PM_{2.5}$) contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Particulate matter exposure has been linked to a variety of problems, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing. Particulate exhaust emissions from diesel-fueled engines (i.e., DPM) were identified as a TAC by CARB in 1998. For construction-type activity, DPM is the primary TAC of concern. PM_{10} exhaust is considered a surrogate for DPM as all diesel exhaust is considered to be DPM. The Project would not generate emissions of PM_{10} or $PM_{2.5}$ that would exceed the MCAPCD's thresholds, and thus are not expected to cause any increase in related health effects for these pollutants.

Additionally, fugitive dust can lead to the spread of Valley Fever (Valley Fever), a potential health hazard caused by a fungus that lives in certain soil types throughout California. However, no cases of Valley Fever were reported in 2024 and the overall risk of exposure remains low (CDPH 2025). The California Department of Public Health- Occupational Health Branch and the Division of Occupational Safety and Health of the Department of Industrial Relations (Cal/OSHA) provides recommendations to limit risk from Valley Fever. Applicant-proposed BMPs to reduce fugitive dust, including development and implementation of a Dust Control Plan, water applied to the development site and during preparation and construction to control fugitive dust, and minimizing disturbance areas are consistent with those recommended to limit risk to Valley Fever. For example, Cal/OSHA recommends the adoption of site plans and work practices that reduce worker exposure. Cal/OSHA further provides that measures that may be implemented include, but are not limited to, the following: minimize the area of soil disturbed; use of water or other soil stabilizer to reduce airborne dust; stabilize all spoils piles by tarping or other methods; cleaning tools, equipment, and vehicles before transporting offsite. These measures and work practices will be implemented at the Project site pursuant to compliance with measures included in the Project Dust Control Plan. As such, construction activities associated with the Project are not expected to cause any increase in Valley Fever to workers or sensitive receptors in the area.

In summary, Project construction would not result in a potentially significant contribution to regional concentrations of pollutants and would not result in a significant contribution to the adverse health impacts associated with those pollutants. Therefore, impacts to sensitive receptors would be **less than significant**.

Would the Project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Geothermal fluid can release various non-condensable gases such as H_2S. Hot water, steam, particulate, and/or gases that could emanate from a typical geothermal well during drilling, testing, and cleanout in the KGRA could contain several minerals and other naturally occurring chemicals. However, most of these chemicals are present only in trace amounts and would not pose a health hazard to the surrounding environment. H_2S emissions would be the most important non-condensable gas from a health-risk and odor nuisance standpoint. The potential exists that this gas and other non-condensable gases may be emitted intermittently on a short-term and temporary basis during drilling. During well cleanout and flow testing, geothermal fluids would likely be pumped into large tanks. H_2S may temporarily be released from the geothermal fluid for several hours to up to 30 days during these

activities. The local H_2S emissions during these activities could produce an objectionable "rotten egg" odor in the immediate vicinity of each well. However, these concentrations would not be expected to pose a health hazard and would not reach far beyond the vicinity of the wells under normal conditions. In addition, potential H_2S emissions resulting from these activities would be temporary at each well development site and would occur for a relatively short period of several hours to up to 45 days at each well site.

Construction of the Project components would also result in short-term diesel exhaust emissions from on-site heavy-duty equipment and from material deliveries and debris removal, which could result in the creation of objectionable odors. These activities would be temporary or periodic, and spatially dispersed, and any associated odors would dissipate quickly from the sources.

The closest sensitive receptor to the Project site is a resident located approximately 650 feet from the nearest well site. Therefore, given the temporary nature of construction and testing activities and the lack of sensitive receptors in the immediate vicinity of Project components, odor nuisances that would be associated with the Project construction and testing activities are expected to be negligible and impacts would be **less than significant**.

3.4.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. The site will be reclaimed to farmable land. All abandonment and decommissioning activities would be short-term and any emissions from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.4.3.4 above and would be **less than significant**.

3.5 Biological Resources

This section describes the existing biological resources within the Project site; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project and Mitigation Measures on biological resources in the Project site. The biological resource information provided herein was gathered from desktop review of sensitive natural resources and field reconnaissance as documented in the *Biological Study Report (BCR): Surprise Valley Geothermal Exploration Project* prepared by Catalyst Environmental Solutions (Appendix B).

For the purposes of this project, special-status species are defined as those species listed as endangered, threatened, proposed for listing or candidates for listing under the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA); and/or classified by CDFW as species of special concern (SSC), watch list (WL), or fully protected (FP). Special-status plant species are those listed under the ESA, CESA, or assigned a California Rare Plant Rank (CRPR).

Desktop review for this evaluation included:

- California Natural Diversity Data Base (CNDDB) records for special-status plants, animals, and natural communities (CDFW 2025)
- CDFW "essential connectivity area" data from the California Essential Habitat Connectivity Project (CDFW 2025)
- CDFW mule deer range for Region 1 (CDFW 2024).

- California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants
- U.S. Fish and Wildlife Service (USFWS) records for federally listed, proposed, and Candidate plant and animal species under jurisdiction of the USFWS
- National Marine Fisheries Service (NMFS) records
- Soils records maintained by the U.S. Department of Agriculture's Natural Resources Conservation Service (USDA 2026),
- National Wetlands Inventory (NWI) maps (USFWS 2026)

The CNDDB records search covered a five-mile radius around the project site. This entailed review of records for portions of the Lake City, Davis Creek, Fort Bidwell, Cedarville, Sugar Hill, Payne Peak, and Boyd Hot Springs quadrangles. CNPS and USFWS records were searched for the Lake City quadrangle, in which all project facilities will be located. Surveys for biological resources occurred on May 29-30 and July 8-10, 2025.

Table 3.5-1 summarizes impacts on biological resources that could result from implementation of the Project.

Table 3.5-1. Summary of Biological Resource Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	Less Than Significant With Mitigation	BIO-1: Worker Environmental Awareness Program (WEAP) BIO-2: Supplemental Aquatic Resources Delineation BIO-3: Avoid Indirect Impacts to Wetlands BIO-4: Wetland Restoration Plan BIO-5. Supplemental Botanical Survey and Evaluation BIO-6. Mitigation Plan Addressing the Loss of Special-Status Plant Species BIO-7. Supplemental Milkweed Survey BIO-8: Monarch Butterfly Breeding Habitat Loss Offset if Warranted BIO-9: Greater Sandhill Crane Activity Period Work Timing Restrictions BIO-11. Northwestern Pond Turtle and Northern Leopard Frog Surveys and Avoidance

		BIO-10: Swainson's Hawk Breeding Period Work Timing Restrictions BIO-12: Nesting Bird Surveys and Avoidance BIO-13: Minimize Impacts due to Night Lighting BIO-14: Avoid/Minimize the Potential for Introduction and Spread of Noxious Weeds
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	Less Than Significant with Mitigation	BIO-2: Supplemental Aquatic Resources Delineation BIO-3: Avoid Indirect Impacts to Wetlands BIO-4. Prepare a Wetland Restoration Plan BIO-5: Supplemental Botanical Survey and Evaluation BIO-6: Mitigation Plan Addressing the Loss of Special-Status Plant Species
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	Less Than Significant with Mitigation	BIO-2: Supplemental Aquatic Resources Delineation BIO-3: Avoid Indirect Impacts to Wetlands BIO-4. Prepare a Wetland Restoration Plan
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	Less Than Significant with Mitigation	BIO-1: Worker Environmental Awareness Program (WEAP) BIO-3: Avoid Indirect Impacts to Wetlands BIO-4: Wetland Restoration Plan BIO-8: Monarch Butterfly Breeding Habitat Loss Offset if Warranted BIO-9: Greater Sandhill Crane Activity Period Work Timing Restrictions BIO-10: Swainson's Hawk Breeding Period Work Timing Restrictions

		BIO-12: Nesting Bird Surveys and Avoidance BIO-13: Minimize Impacts due to Night Lighting BIO-14: Avoid/Minimize the Potential for Introduction and Spread of Noxious Weeds
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	No Impact	None Required
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No Impact	None Required

3.5.1 Existing Conditions

3.5.1.1 Vegetation Communities

When possible, vegetation communities were classified into alliances described in the MCV (Sawyer et al. 2009). Most communities did not fit into established alliances are described qualitatively in the BCR (Appendix B). Natural terrestrial communities identified in the study area during the field surveys include western juniper woodland and wet meadow. Other terrestrial communities (semi-natural or non-natural) observed during the field study consist of cropland and pasture. Modified streams are also present in and adjacent to the study areas. For the purposes of this analysis, wet meadows and streams are considered sensitive natural communities while juniper woodland and cropland are not considered sensitive. These areas are also likely to be Waters of the State.

Wet Meadow

The wet meadows in the study area are supported by a high water table as well as surface runoff from snowmelt, which is spread over the landscape through irrigation ditches. Characteristic plant species in the on-site wet meadows include Baltic rush (*Juncus balticus*), Nebraska sedge (*Carex nebrascensis*), Olney's bulrush (*Schoenoplectus americanus*), meadow foxtail (*Alopecurus pratensis*), and arrowgrass (*Triglochin maritima*). The lowermost wet meadows tend to support species adapted for alkaline conditions. Alkaline depressions are present adjacent to well pad 82-13; the dominant plants in these unique habitats are saltgrass (*Distichlis spicata*), salt-marsh bird's-beak (*Cordylanthus maritimus*), and horned sea blite (*Suaeda calceoliformis*).

Generally speaking, wet meadow habitat in the project area receives irrigation in the early season. Once the vegetation reaches maturity, the irrigation water is diverted to allow the site to dry out. The grass is then cut, dried, and baled as hay. Irrigation is then restored and continues until the end of snowmelt. After the hay has been removed, cattle are introduced and are allowed to graze until the end of the season.

The wet meadow community is abundant in the project vicinity and covers nearly the entirety of three proposed well pads (82-13, 81-24, and 46-13). Additionally, as further discussed below, potential wet

meadow wetlands are present on other well pad sites (43-13, 35-13) but the wetland assessment could not be completed because the vegetation had been mowed prior to the site visit.

Streams

Riverine/stream habitat is characterized by intermittent or perennially flowing water. Riverine habitat includes rivers and streams (creeks). In the study area, riverine habitat is represented by small intermittent streams. The streams are fed primarily be snowmelt in the Warner Mountains. The streams are diverted for irrigation when they reach the western edge of the Surprise Valley. The streams dry shortly after the last of the snow melts.

3.5.1.2 Special-Status Plants

Review of the U.S. Fish and Wildlife Service species lists (see the BCR, Appendix B) for the study area identified one federally listed plant species, Greene's tuctoria (*Tuctoria greenei*), as potentially being affected by the proposed project. The study area does not contain designated critical habitat for any federally listed plant species. No suitable habitat is present for Greene's tuctoria in the study area.

A review of CNDDB records showed that two special-status plants, desert popcornflower (*Plagiobothrys salsus*; CRPR 2B.2), and hairy marsh hedge-nettle (*Stachys pilosa*; CRPR 2B.3), have been reported in or adjacent to the study area and 26 other special-status plant species have been reported within 5 miles of the study area.

Rationale for the potential for special-status plant species to occur in the study area is provided in the BCR, Appendix B. These findings are based on the general habitat requirements of the species and the results of the botanical survey. Of these, the following species are present or have potential to be present:

- Aleppo avens (*Geum aleppicum*; CRPR 2B.2), potentially present
- Desert popcornflower, present
- Hairy marsh hedge-nettle, potentially present
- Rosy orthocarpus (*Orthocarpus bracteosus*; CRPR 2B.2), potentially present

Additionally, another special-status plant, Great Basin downingia (*Downingia laeta*; CRPR 2B.2), was detected in the study area during the botanical survey. Species descriptions are included in the BCR (Appendix B).

Desert popcornflower was observed at four locations in the general study area. Two of the locations are adjacent to the proposed pad for Well 82-13. About 75 plants were observed south of the pad location as currently proposed, with approximately 25 plants also detected immediately east of the proposed pad. These plants were observed in short-grass habitat along the upper fringes of alkaline depressions. Additional plants are expected to occur to the east, but the surveyor did not have access to the area.

Desert popcornflower was also observed immediately east of the proposed pad for Well 81-24. This occurrence is in a depression that supports sustained ponding. Over 50 plants were observed in and around the depression. The species was also observed immediately south of County Road 13 between Well Sites 41-24 and 81-24. This population is outside the project study area and was observed only

from the fenceline. The population is in an area with active steam vents and is the largest of the four populations observed, with an estimated 500 to 1,000 individuals visible from County Road 13.

Great Basin downingia was observed at two locations in the general study area. A small population was observed south of the proposed pad for Well 82-13, where it co-occurs with desert popcornflower in short-grass habitat surrounding alkaline depressions. Another population was observed immediately east of the proposed pad for Well 81-24, where it also co-occurs with desert popcornflower. Both populations consist of roughly 100 individuals.

3.5.1.3 Special-Status Wildlife

Review of the USFWS species list for the study area (Appendix B) identified the following animal species as potentially being affected by the proposed project: California condor (*Gymnogyps californianus*), yellow-billed cuckoo (*Coccyzus americanus*), northwestern pond turtle *(Actinemys marmorata*), monarch butterfly (*Danaus plexippus*), and Suckley's cuckoo bumble bee (*Bombus suckleyi*). These species are either federally listed or proposed for federal listing. The USFWS species list does not identify designated critical habitat in the study area for any federally listed animal species. The nearest Of these, monarch butterfly was determined to have the potential to occur in the study area based on the presence of suitable habitat including larval host plants (showy milkweed [*Asclepias speciosa*]) adjacent to a planned road corridor. Given the presence of milkweed, the monarch butterfly may be present. Northwestern pond turtle may occur based on the presence of suitable pond habitat nearby. Rationale for the potential for special-status animal species to occur in the study area is provided in the BCR (Appendix B). These findings are based on the general habitat requirements of the species and the results of the biological survey.

Review of CNDDB records showed that four special-status animal species, American badger (CDFW SSSC [1]; *Taxidea taxus*), greater sandhill crane (CESA [2] Threatened, CDFW FP [3]; *Antigone canadensis tabida*), northern leopard frog (CDFW SSSC; *Lithobates pipiens*), and prairie falcon (CDFW WL [4]; *Falco mexicanus*) have been reported in the study area (Appendix B). No suitable nesting habitat is present to support prairie falcons in the study area and the species is not expected to occur. Records for American badger are historical (1916) and suitable habitat is no longer present. Records for northern leopard frog are also historic (1926), but suitable habitat remains present. Greater sandhill cranes were observed during the biological survey. Two additional special-status animals have been reported within a five-mile radius of the project site: American goshawk (CDFW SSSC; *Astur atricapillus*), and Swainson's hawk (CESA Threatened; *Buteo swainsoni*). Rationale for the potential for special-status animal species to occur in the study area is provided in the BCR (Appendix B). Species life histories and occurrence information are provided in the BCR (Appendix B).

Greater Sandhill Crane

The Surprise Valley is an important breeding site for greater sandhill cranes (Littlefield 1989). Non-breeding subadults also rely on this area for foraging. Greater sandhill cranes were detected during

[1] SSSC = CDFW Species of Special Concernt
[2] CESA = California Endangered Species Act
[3] FP = CDFW Fully Protected
[4] WL = CDFW Watch List

both field visits. During the May survey, cranes were heard but rarely seen. The adults may have been on nests incubating eggs nearby as the survey was conducted during the breeding season. During the July visit, several pairs of cranes were observed foraging on and near the study sites. No nests were observed on the study sites, but the nests are expected to be located within 0.5 miles or closer to most or all of the well sites based on field observations.

Greater sandhill cranes were observed or heard on or near numerous well sites, including Well Sites 45-12, 82-13, 33-13, 33A-13, 43-13, 35-13, and 46-13. Suitability for nesting is low at Well Sites 31-24, 41-24 and 81-24 due to disturbance from road proximity; however, these sites could support foraging. Greater sandhill cranes are unlikely to occur at Well Site 22-24 and the existing wellhead access route due to habitat unsuitability; however, these sites are within the nesting buffer for the species.

Swainson's Hawk

As the study vicinity contains groves of trees adjacent to extensive meadows and pastures, suitable nesting and foraging habitat for Swainson's hawks is present. Swainson's hawks are known to be active in the Surprise Valley area. Swainson's hawks were not observed during surveys; however, individuals have been recorded nearby (GBIF 2026). Nesting likely occurs in scattered trees along the western edge of the Surprise Valley bottomlands. Well sites 45-12 and 22-24 contain scattered trees that could support nesting and extensive nesting habitat is present along Surprise Valley Road. Given the known presence of Swainson's hawks in the general area and the presence of suitable nest trees, Swainson's hawks could potentially nest in or near the study area in future years and likely forage throughout the study site.

Northwestern Pond Turtle

Review of CNDDB and iNaturalist records show that the northwestern pond turtle has not previously been reported in the Surprise Valley but has been observed within 10 miles of the project site (iNaturalist 2026c). Northwestern pond turtles were not observed during the field surveys but could be present, with the most suitable habitat being the permanent pond just east of Well Site 43-13.

Northern Leopard Frog

Northern leopard frog has been collected once in the Surprise Valley, in 1926. The collection site is thought to be in the immediate vicinity of the current project. Although leopard frogs were not observed, the study area includes a pond near Well Site 43-13 that could support the species.

Monarch Butterfly

The USFWS proposed to list the monarch butterfly as a threatened species and designate critical habitat under the Endangered Species Act of 1973, as amended (ESA) on December 12, 2024 (USFWS 2024). Monarch butterflies are reliant on milkweed species (*Asclepias* sp.) for breeding. Adults migrate from their overwintering sites in coastal California in February and March and reach the northern limit of their North American range in California, Oregon, Washington, Idaho, and Nevada, in early to mid-June. A patch consisting of 50 to 100 stems of showy milkweed (*Asclepias speciosa*) was observed during the July survey in an unmown vegetative strip adjacent to the planned access road to Well 82-13. The plants extend to about 40 feet from the proposed road corridor. Milkweeds are an herbaceous

perennial species and the plants emerge late in the season. Milkweeds were not observed during the May survey and may not have been identifiable that early in the season. Because some of the proposed well sites and access roads were identified after the May survey and had been mowed before the July survey, it is possible that other populations of the plant are present but were not detected. Given the documented presence of milkweeds in at least one location, it is possible that the monarch butterfly could utilize the project site as summer breeding habitat.

3.5.1.4 Nesting Migratory Birds

The USFWS identified three migratory Birds of Conservation Concern as potentially being affected by the proposed project: Cassin's finch (*Haemorhous cassinii*), evening grosbeak (*Coccothraustes vespertinus*), and willet (*Tringa semipalmata*). Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), which are protected under the Bald and Golden Eagle Protection Act, are also identified as warranting conservation action. Willets were observed in the project study area during the survey. Cassin's finch, evening grosbeak, bald eagles, and golden eagles have been observed in the vicinity according to eBird and iNaturalist records (GBIF 2026).

During the May field surveys, several ground nests with eggs were observed in the wet meadows (BCR, Appendix B), including a willet nest. Other species are also very likely to nest on or adjacent to the study sites.

3.5.1.5 Wildlife Movement Corridors and Nursery Sites

While the study area is not within designated critical habitat for listed species, it is within an area mapped as "essential connectivity area" (ECA) for wildlife by the California Essential Habitat Connectivity Project (CDFW 2025c). ECAs represent large, relatively natural habitat blocks and areas important to maintaining ecological integrity at the broadest scale. The study area is within the Warner Mountains – Mount Bidwell/Larkspur Hills ECA in the Modoc Plateau Ecoregion (BCR, Appendix B). The ECA covers 595,069.75 acres and extends from the northern end of Upper Alkali Lake south along the Warner Mountains to south of Dunn Reservoir. The study area overlaps approximately 39.5 acres (0.007 percent) of the ECA.

The alkali lakes and playas and their associated wet meadows are a significant component of the Modoc Plateau aquatic ecosystem and also provide valuable ecological service to terrestrial species (Padgett 2020). The Surprise Valley area provides important migration, foraging, and breeding habitat for many species of birds, including the fully protected greater sandhill crane. Cranes were observed in the study area during the nesting season and numerous other bird nests were encountered during the site visits to the study area.

The west side of Surprise Valley Road is mapped by CDFW as critical mule deer winter range (BCR, Appendix B). The nearest mapped fawning grounds are located over 40 miles south of the study area, near Little Hat Mountain. Critical deer winter range can include corridors essential for movement, staging areas where deer temporarily congregate, habitats containing high quality winter forage, or other elements important to the survival of deer in winter. Winter ranges are generally at lower elevations and are far less abundant than summer ranges making them vulnerable to human impacts and often a limiting factor in populations. Deer from different summer ranges may share a common winter range where breeding typically occurs. This mixing of genes on winter ranges contributes to

genetically diverse and healthy populations (CDFW 2024a). The existing wellhead at the southern end of the study area west of Surprise Valley Road intersects mule deer critical winter range. No other well sites or roads intersect mule deer range.

3.5.1.6 Wetlands and Other Waters of the State or United States

"Waters of the U.S." (WOTUS) include traditional navigable waters, territorial seas, and interstate waters; impoundments of and tributaries to such waters; and wetlands adjacent to and with a continuous surface connection to these waters or their tributaries. These waters must meet the "relatively permanent" standard. Qualifying waters are regulated by the US Environmental Protection Agency and US Army Corps of Engineers under the federal Clean Water Act. The federal definition of WOTUS is subject to change due to political action and legal interpretations. Most recently, in November 2025, the Trump administration published in the Federal Register proposed revisions to the current regulations to delete the interstate waters category and define terms such as "continuous surface connection" and "relatively permanent."

"Waters of the State" are broadly defined to include "any surface water or groundwater, including saline waters, within the boundaries of the state." In 2019, the State adopted a definition of wetlands based on the USACE's 1987 Wetlands Delineation Manual and the 2008/2010 Regional Supplements to the 1987 Manual.

Although the extent of regulated waters is routinely revised, the technical definition of wetlands has remained relatively constant. At both the state and federal level, a wetland must meet specific criteria with respect to hydrology, soils, and vegetation.

The Surprise Valley is in a closed basin with no connection to traditional navigable waters or interstate waters. When assessing the regulatory status of other waters in the basin, the USACE has determined that the waters are not subject to federal jurisdiction (e.g., in 2020, the Corps evaluated Soldier Creek, which flows into Upper Alkali Lake, and determined that the creek is not subject to federal regulation because Upper Alkali Lake is a closed basin with no connection to a regulated water). The revised definition of WOTUS as currently under review would more clearly establish that Upper Alkali Lake, its tributaries, and adjoining wetlands are not subject to federal jurisdiction. Nonetheless, all wetlands and other waters in the basin remain subject to State jurisdiction. NWI-mapped wetlands are shown in Figure 3.5-3.

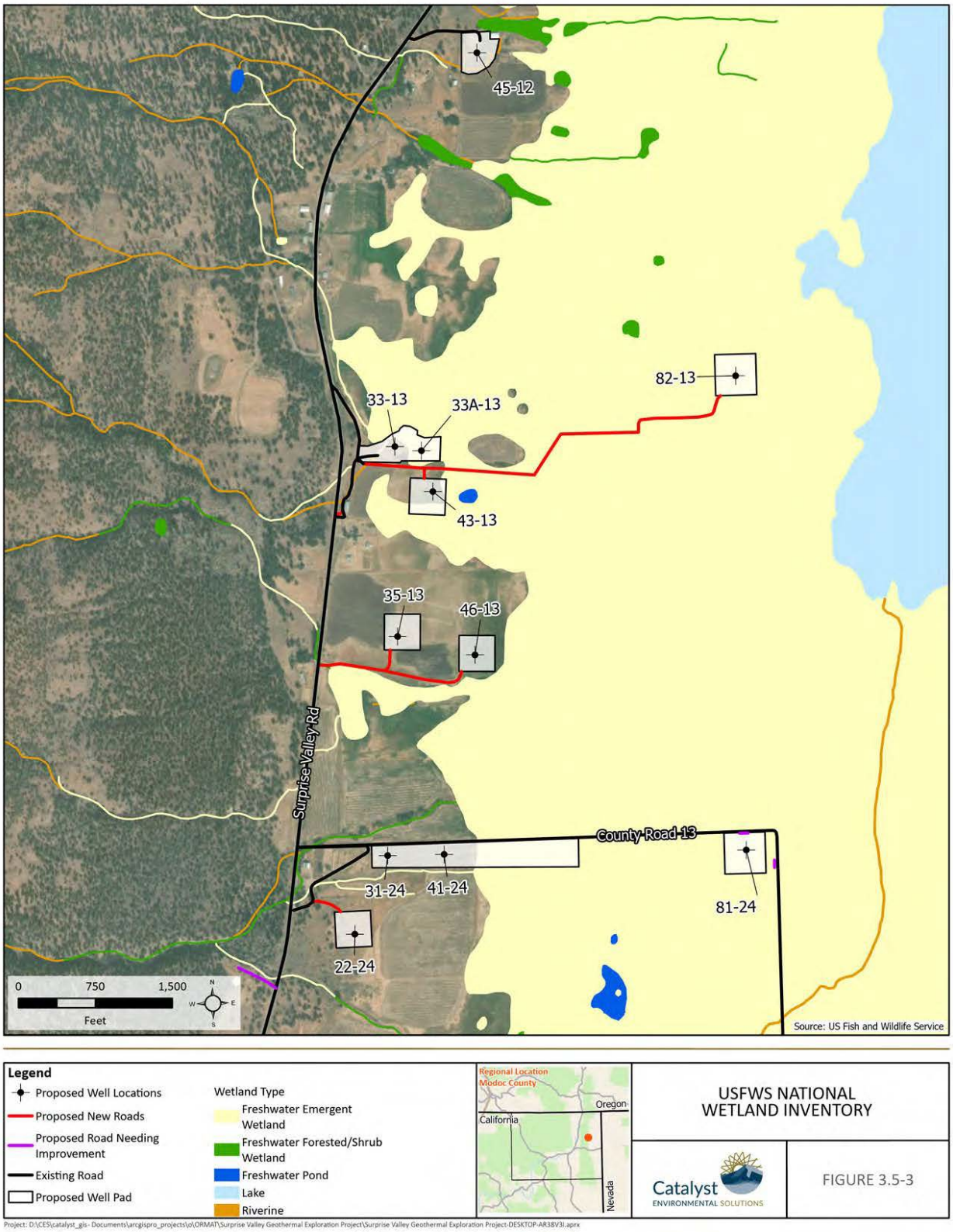
The presence of wetlands and other waters of the State or United States was investigated in the study area. All three wetland parameters were found to be problematic.

- Wetland hydrology was problematic because the natural flow patterns have been altered by irrigation practices.
- Soils were problematic because of the presence of volcanic ash and moderate to high alkalinity. As noted in the Arid West Supplement, wetland indicators may be very faint or absent in such soils.
- Vegetation was problematic because several of the study sites were mowed prior to the field evaluation and the dominant plant species could not be identified.

Despite the difficult field conditions, certain portions of the study area could be confidently identified as wetlands or uplands; however, boundaries could not be assigned in certain transition areas and

additional field evaluation will be needed if work is proposed in these areas. Preliminary findings are presented in a series of Figures and described for each well site in the BCR (Appendix B). Wetlands or other waters are present on the following well sites: 82-13, 33-13, 33A-13, 43-13, 35-13, 46-13, 31-24, and 41-24. Follow-up investigations will be needed to fully delineate these features.

Figure 3.5-3: USFWS National Wetland Inventory



3.5.2 Regulatory Setting

3.5.2.1 Federal

Federal Endangered Species Act

The Federal Endangered Species Act (ESA) protects federally listed threatened and endangered species and their habitats from unlawful take and ensures that federal actions do not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Under the ESA, "take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The U.S. Fish and Wildlife Service (USFWS) regulations define harm to mean "an act which actually kills or injures wildlife" (50 CFR 17.3).

Bald and Golden Eagle Protection Act of 1940

The Bald Eagle Protection Act of 1940 protects bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) by prohibiting the taking, possession, and commerce of such birds and establishes civil penalties for violation of this Act. "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (72 Federal Register [FR] 31132; 50 CFR 22.3). All activities that may disturb or incidentally take an eagle or its nest as a result of an otherwise legal activity must be permitted by the USFWS under this Act.

Migratory Bird Treaty Act

Congress passed the Migratory Bird Treaty Act (MBTA) in 1918 to prohibit the kill or transport of native migratory birds, or any part, nest, or egg of any such bird unless allowed by another regulation adopted in accordance with the MBTA. The prohibition applies to birds included in the respective international conventions between the United States and Great Britain, the United States and Mexico, the United States and Japan, and the United States and Russia.

Section 404 Permit (Clean Water Act)

The purpose of the Clean Water Act (CWA) is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." Section 404 of the CWA prohibits the discharge of dredge and fill material into waters of the U.S., including wetlands, without a permit from the U.S. Army Corps of Engineers (USACE). Activities regulated under this program include fills for development, water resource projects (e.g., dams and levees), infrastructure development (e.g., highways and airports), and conversion of wetlands to uplands for farming and forestry. Either an individual 404b permit or authorization to use an existing USACE Nationwide Permit will need to be obtained if any portion of the construction requires fill into a river, stream, or stream bed that has been determined to be a jurisdictional waterway.

Section 401 (Clean Water Act)

Under Section 401 of the CWA, any person applying for a federal permit or license, which may discharge pollutants into WoUS, must obtain a State Water Quality Certification. This certification is required to ensure the activity complies with all applicable water quality standards, limitations, and restrictions. No license or permit may be issued by a federal agency until after Section 401 certification has been granted, and no license or permit may be issued if certification has been denied. Prior to the USACE issuing a Section 404 permit, Applicant must apply for and receive a Section 401 Water Quality Certification from the RWQCB. Applications sent to the RWQCB must include a complete CEQA checklist.

3.5.2.2 State

California Endangered Species Act

The California Endangered Species Act (CESA) (California Fish and Wildlife Code, Section 2050 et seq.) is administered by the California Department of Fish and Wildlife (CDFW). CESA includes threatened, endangered, and candidate species. Under Section 2062 of the California Fish and Wildlife Code, the term "endangered species" refers to "…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease..." Under Section 2067, the term "threatened species" refers to "…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts..." Under Section 2068, the term "candidate species" refers to "…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list…"(CDFW 2023).

CESA prohibits the take of listed species except as otherwise provided in State law. Unlike its federal counterpart, CESA applies the take prohibitions to species that are candidates for State listing. The California Fish and Game (CFG) Code defines "take" as "…hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill…"

CDFW may authorize the incidental take of listed species under CESA through issuance of an incidental take permit pursuant to CFG Code, Section 2081, subdivisions (b) and (c). These provisions of the code, coupled with CDFW's "CESA Implementing Regulations" (14 CCR 783.0 et seq.), authorize CDFW to issue an incidental take permit for a project as proposed if (1) the take is incidental to an otherwise lawful activity; (2) the impacts of the taking are minimized and fully mitigated by measures that are roughly proportional in extent to the Project-related impact to the species, maintain the Applicant's objectives to the maximum extent possible and are capable of successful implementation; (3) the Applicant ensures adequate funding to implement the measures and for monitoring compliance with and effectiveness of those measures; and (4) the issuance of the permit would not jeopardize the continued existence of the species.

California Environmental Quality Act

Title 14 California Code of Regulations (CCR) 15380 requires that endangered, rare, or threatened species or subspecies of animals or plants be identified within the influence of the Project. If any such species are found, appropriate measures should be identified to avoid, minimize, or mitigate to the extent possible the effects of the Project.

California Department of Fish and Game Code, Section 1600-1616 (as amended)

Under Section 1602 of the CFG Code, CDFW requires formal notification for activities that divert or obstruct the natural flow or substantially change or use materials from the bed, channel, or bank of any river, stream, or lake. Desert washes, distributary networks, and riparian habitats (e.g., microphyll woodland) associated with watercourses are included in this requirement as they are part of the bed, channel, or bank. If CDFW determines that the Project may substantially adversely affect existing fish and wildlife resources, the Project proponent must enter into a streambed alteration agreement (SAA) with CDFW before the Project can proceed. The SAA includes measures developed by CDFW necessary to protect the fish and wildlife resources present at the site, which must be followed during the Project activity. Often, projects that require an SAA also require a permit from the USACE under Section 404 of the CWA. In these instances, the conditions of the Section 404 permit and the SAA may overlap.

California Department of Fish and Game Code, Sections 3503, 3503.5, and 3513

CFG Code, Sections 3503, 3503.5, and 3513 protect migratory birds, bird nests and eggs including raptors (birds of prey) and raptor nests from take unless authorized by CDFW. Additionally, the State further protects certain species of fish, mammals, amphibians and reptiles, birds, and mammals through CDFW's Fully Protected Animals designation, which prohibits any take or possession of classified species. No licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock. Most Fully Protected Species have also been listed as threatened or endangered species under the more recent endangered species laws and regulations.

California Department of Fish and Game Code, Sections 1900-1913 (Native Plant Protection Act)

The Native Plant Protection Act (NPPA) prohibits the taking, possessing, or sale within the State of any plant listed by CDFW as rare, threatened, or endangered. An exception to this prohibition in the Act allows landowners, under specified circumstances, to take listed plant species, provided that the owners first notify CDFW at least 10 days prior to the initiation of activities that would destroy them. The NPPA exempts from "take" prohibition "…the removal of endangered or rare native plants from a canal, lateral ditch, building site, or road, or other right of way…"

California Department of Fish and Game Code, Sections 1600-1616

The CDFW asserts jurisdiction over the bed and bank of a stream and associated wildlife and habitats as established in California Fish and Game Code §§ 1600–1616. Fish and Game Code section 1602 requires any person, state or local governmental agency, or public utility to notify CDFW prior to beginning any project that may "substantially divert or obstruct the natural flow of any river, stream, or lake; substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or

deposit or dispose of debris, waste, or other materials containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake."

Generally, notification to CDFW is required for any project that will take place in or in the vicinity of a river, stream, lake, or their tributaries. In CDFW's definition, "any river, stream, or lake" includes those that are dry for periods of time (ephemeral or episodic) as well as those that flow year-round (perennial). This includes rivers or streams that flow at least periodically (e.g., may be dry for periods of time) or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses that have a surface or subsurface flow which supports or has supported riparian vegetation. This includes ephemeral streams, desert washes, and watercourses with a subsurface flow. Permits may also apply to work undertaken within the flood plain of a body of water.

If CDFW determines that a Project may substantially adversely affect existing fish or wildlife resources, a Lake or Streambed Alteration Agreement (SAA) will be required (§ 1603). Prior to issuance of an SAA, CEQA checklist must be submitted to CDFW.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act, all projects proposing to discharge waste that could affect waters of the State must file a waste discharge report with the appropriate regional board. The Project falls under the jurisdiction of the Colorado River RWQCB.

3.5.2.3 Local

Modoc County General Plan

The Conservation and Open Space Element provides detailed plans and measures for agricultural land, forests, natural resources, wildlife, lakes, rivers, streams, recreation areas and historic preservation. Modoc County's natural resources are essential for its economic vitality and central to the quality of life for the residents. In addition to providing support for valuable timber, agricultural and mineral production, these resources provide for a wide range of recreational opportunities, including hunting, fishing and hiking. The high scenic values of these resources are important to both residents and visitors. Sustainable economic use of natural resources requires wise and thoughtful conservation and management. The County seek to ensure these resources will not be degraded or lost to the public and to future generations of residents and visitors

3.5.3 Impacts Analysis

3.5.3.1 Impact Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to biological resources. The criteria listed below considers if the Project would:

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

d. Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

e. Conflict with any local policies or ordinance protecting biological resource, such as a tree preservation policy or ordinance?

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

3.5.3.2 Analytical Approach

This impacts analysis evaluates the potential for the Project and its varying components (described in Section 2) to impact the biological resources within the Project site. The analysis prepared for this CEQA document relied on the technical report prepared by Catalyst Environmental Solutions: *Biological Study Report: Surprise Valley Geothermal Exploration Project* (BCR, Appendix B). This source was used to determine the biological resources located within and around the Project site and determine whether project activities would surpass the threshold of the significance criteria listed above.

3.5.3.3 Analysis of Checklist Questions

Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Special-Status Plants

Special-status plant populations are present immediately east and south of Well Site 82-13 and immediately east of Well Site 81-24. Development of the well pads would include installation of ditches to divert water around the pads. The changes in hydrology are likely to adversely affect the special-status plant populations even if direct impacts are avoided. The plant populations could also potentially be affected by changes in water quality, increased sedimentation, increased particulate matter, and inadvertent entry into the plant populations by workers. In a worst-case scenario, the desert popcornflower and Great Basin downingia populations adjacent to the two well pads would be eliminated. This would be a significant adverse environmental impact.

Re-establishment of the special-status plant populations at offsite locations could mitigate the loss associated with project implementation. However, re-establishment may be difficult; as relatively little is known about these special-status species and their specific habitat requirements, which makes habitat creation a difficult mitigation option. Alternatively, mitigation could be achieved by protecting

other known populations of these species through either direct purchase of land or establishment of a conservation easement. Under this approach, CDFW would likely require preservation of at least three times the area/size of the affected plant populations. An appropriate buffer zone would also need to be established around the protected populations and activities allowed in the mitigation site would need to be detailed in a management plan approved by CDFW.

If subsequent botanical surveys identify the presence of special-status plant populations at sites not fully surveyed in 2025, modification of project activities to avoid impacts on the populations is recommended. If full avoidance is not possible, then mitigation would be required, as outlined above.

Implementation of mitigation measures **BIO-1 through BIO-6** would reduce impacts to special-status plants and their habitat. Impacts to special-status plants would be **less than significant with mitigation**.

Special-Status Wildlife

General Impacts

Project duration is anticipated to be 28 months, with well drilling and testing occurring 24 hours per day for a period of 20 months. Primary impacts to wildlife from these activities are typically due to noise and vibration, night lighting, habitat loss or fragmentation, and disturbance from the presence of human activity and heavy machinery.

Habitat Alteration - Proposed construction activities would include the loss, degradation, and fragmentation of habitat for wildlife and special-status wildlife species during ground-clearing activities. Ground-clearing activities include construction of access roads and clearing of well pad areas. Large or highly mobile wildlife, such as deer, elk, and birds would be disturbed by construction activities and would be expected to avoid the area and disperse to adjacent habitat outside of the immediate construction disturbance. Smaller or less mobile wildlife (e.g., amphibians, reptiles, small mammals, invertebrates) in the construction area would be more affected by ground disturbance, creation of edge habitat, loss of vegetation, erosion, noise and vibration, and construction vehicle traffic. At the end of the permitted or useful life of the test well facilities and if testing yields negative results, no future geothermal energy developments would occur. The general objective of the final reclamation phase is to return the site as close as possible to the conditions prior to geothermal development. Reclamation activities would be planned and conducted in accordance with County requirements.

Noise and Vibration - Construction activities would include noise- and vibration-producing activities. Noise levels would primarily be from the use of heavy machinery. Anthropogenic (human-caused) noise and vibration can have a variety of effects on wildlife, including special-status wildlife. Terrestrial wildlife responses such as altered behavior to noise begin at levels of approximately 40 A-weighted decibels, similar to the levels at which humans report annoyance (Shannon et al. 2016).

For the purposes of this analysis, 40 dBA is considered the threshold for disturbance impacts to wildlife, with birds likely to be the most sensitive receptors. Noise is also more disturbing the closer a receptor is to the source; noise levels generally decrease by 6 dB as the distance from its source doubles (FHWA 2011).

Anthropogenic noise has a variety of effects on species reliant on acoustic communication, such as birds. Mule deer, elk, and small mammals also rely on their sensitive hearing to receive predation cues

(Kleist et al. 2020). Noise can disrupt breeding, sheltering, and foraging activities and change patterns of habitat use for some species. Birds nearest the source of noise may alter their behavior to include increased alertness, turning toward the disturbance, fleeing the disturbance, changes in activity patterns, and nest abandonment. Habitat use and breeding success of grassland birds is more impacted by shorter duration noise such as drilling compared to operating noises such as those generated by continuous generators or pumping (Rosa and Koper 2020). Rosa and Kroper (2020) suggest that acute drilling noises have greater negative impacts on breeding migratory birds when compared to chronic oil well noises because of the unpredictability of drilling noises and recommend mitigation strategies such as mufflers, sound dampening walls or curtains, or shifting the timing of drilling activities away from the breeding period to reduce impacts to some species of birds.

Frogs and toads rely heavily on acoustic communication for mating because males must call to females and females must be able to hear males and approach them (Erbe et al. 2022). Some species of frogs, including leopard frogs, have been reported to adjust their dominant frequencies in site with high traffic noise compared to those without (Cunnington and Fahrig 2010; Libramento de los Santos et al. 2025). Cunnington and Fahrig (2012) investigated whether traffic noise resulted in reduced mate attraction success but found that negative effects of traffic were mainly related to road mortality as opposed to noise.

Little is known about the hearing capabilities of turtles. Research on airborne and underwater sound sensitivity of red-eared sliders (*Trachemys scripta elegans*) has demonstrated that the ear is adapted for underwater hearing and that the turtles' sensitivity to airborne sound is poor (Christensen-Dalsgaard et al. 2012). At present, little is known regarding hearing sensitivity for northwestern pond turtle; however, underwater noise and vibration from activities such as pile driving are likely to cause stress or acoustic trauma (Salas et al. 2023; Caltrans 2024).

Anthropogenic noise masks biological sounds and may cause prey animals to respond with heightened vigilance at the expense of foraging or prevent effective communication (Shannon et al. 2014; Erbe et al. 2022). Noise and vibration may increase stress on individuals and disrupt breeding, sheltering, and foraging activities. Stress is a physiological response and can affect numerous life functions, including immune response, communication, reproductive success, and predation risk (Erbe et al. 2022).

During site preparation, noise emissions will be periodic and temporary, depending on the use of heavy equipment. During the drilling phase (17 months) and testing phase (3 months), some components (e.g., drills, pumps, and generators) would run continuously (24-hrs per day). These activities may generate noise levels exceeding 40 dBA over a distance of a half mile or more from the active well pads. Existing ambient noise in the vicinity of the Project sites is consistent with a rural agricultural landscape with the dominant noise sources consisting of vehicular traffic on local roads, occasional aircraft overflights, and the operation of agricultural equipment. The major source of vehicular noise in the Project area is traffic along Surprise Valley Road; however, the traffic volume on Surprise Valley Road is very low. Typical rural and agricultural ambient noise levels are between 30 and 50 dBA day-night average sound level (L_{dn}) (USEPA 1974).

Greater Sandhill Cranes

Project implementation would result in the temporary loss of greater sandhill crane foraging habitat during the 28 months of proposed project activity and would result in habitat fragmentation due to site

preparation at well sites that are within suitable sandhill crane foraging or nesting habitat. Much of the study area and surrounding areas provides suitable habitat for greater sandhill cranes. While the potential for direct effects on nesting sandhill cranes is low, there is a moderate to high potential that noise and human activity could affect nesting behavior of sandhill cranes or cause abandonment of active nests. As discussed above, Beedy (n.d.) has found that sandhill cranes may be sensitive to human disturbance within a mile of a nest site. Cranes also have a high fidelity to their nest sites; if the nest sites are not viable due to increased noise or human activity, then the cranes may not successfully breed. Additionally, flushing of sandhill cranes due to noise or human activity could increase the potential for collision with vehicles or power lines, resulting in injury or death. As described above, noise minimization using timing restrictions and sound dampening measures may greatly reduce noise impacts to birds. Night lighting associated with the proposed project could also adversely affect greater sandhill cranes (**BIO-13)**.

Given the high sensitivity of nesting sandhill cranes and the regulatory restrictions associated with the cranes' "fully protected" status, the most effective approach to ensure that there is no take of sandhill cranes is to limit the work season to the period when sandhill cranes are not present (**BIO-9**). Generally speaking, greater sandhill cranes migrate into the Surprise Valley as early as mid-March and depart by mid-September after young fledge. If work were to occur only when cranes are absent, no additional avoidance or mitigation measures would be needed.

If a blanket restriction on work during the crane activity period is not feasible, then the project applicant could consult with CDFW to identify measures that could be implemented to ensure that there is no take of the cranes. This could involve completion of pre-construction nesting surveys, establishment of suitable nest buffers based on site-specific conditions, biological monitoring during work period, acoustical evaluation and/or monitoring, limiting the types of work or periods of operation, and/or other measures.

Impacts to greater sandhill cranes would be **less than significant** with implementation of appropriate APMs, BMPs, and mitigation measures **BIO-1, BIO-9, BIO-12, and BIO-13**.

Swainson's Hawks

Project implementation would result in the temporary loss and fragmentation of Swainson's hawk foraging habitat. Additionally, although the potential for direct effects on nesting Swainson's hawks is quite low, there is a moderate potential that noise and human activity could preclude nesting by hawks or cause abandonment of active nests. As described above, noise minimization using timing restrictions and sound dampening measures may greatly reduce noise impacts to birds. If work were to occur between late August and late March (i.e., outside the Swainson's hawk breeding period), no additional avoidance or mitigation measures would be needed. If work would occur during the Swainson's hawk breeding period (generally late March to late August), it may be possible to conduct Swainson's hawk nest surveys each year in which project activities would occur and then schedule well site development activities to preclude work within an approved buffer zone (¼ to ½ mile depending on site-specific conditions) from the active nest. If work must occur during the breeding period and within the prescribed nest buffer zone, the project proponent would need to obtain an ITP from CDFW.

Night lighting associated with the proposed project could also adversely affect Swainson's hawks. Night lighting can affect bird communication, foraging, thermoregulation behavior, and migration (**BIO-13**).

Use of downward-directed, fully shielded night lighting can minimize the potential effects on Swainson's hawk.

Impacts to Swainson's hawks would be **less than significant** with implementation of appropriate APMs, BMPs, and mitigation measures **BIO-1, BIO-10, BIO-12, and BIO-13**.

Northwestern Pond Turtles and Northern Leopard Frogs

Potentially suitable habitat for northwestern pond turtles and/or northern leopard frogs could be present in the pond east of Well Site 43-13. Subsequent surveys could be undertaken to document the presence/absence of northern leopard frogs in the pond (**BIO-11**). If northwestern pond turtles [5] or northern leopard frogs are present or if it is not practicable to conduct such surveys and the applicant assumes presence of the species, implementation of avoidance and minimization measures would be appropriate (**BIO-11**). Likely avoidance and mitigation measures would consist of establishing and maintaining exclusionary fencing between the pond and nearby work areas (Well Sites 33-13, 33A-13, and 43-13), monitoring for turtle nesting activity, protecting confirmed nests, monitoring for frog presence, and having a qualified biologist relocate any northwestern pond turtles or northern leopard frogs that may enter the work area.

Compliance with the conditions of the Waste Discharge Requirements and General Construction Stormwater Permit to be obtained for the project would be protective of northwestern pond turtles and northern leopard frogs by preventing water quality impairment in waters and wetlands that may serve as habitat. Impacts to northwestern pond turtle and northern leopard frogs would be **less than significant** with implementation of appropriate APMs, BMPs, and mitigation measures **BIO-1, BIO-3 and BIO-11**.

Monarch Butterflies

One population of milkweed was identified about 40 feet outside the proposed access road corridor. These milkweeds would not be directly affected by project implementation. If monarch butterfly larvae are present on the plants during the summer breeding season, there is a slight possibility that they could be adversely affected by increased dust, which could clog the pores in the butterfly's body that are used to obtain oxygen. However, implementation of standard dust control practices would ensure that the butterfly and its larvae are not adversely affected.

Monarch butterflies may also be indirectly affected by night lighting associated with the proposed project, in which test well drilling would occur 24 hours per day. Monarchs migrate during daytime hours. Their sense of direction is based on an internal circadian clock and use of the sun as a compass. A recent study by researchers at the University of Cincinnati showed that night lighting disrupts the monarchs' circadian clock function, which in turn can disrupt migratory behavior (Parlin et al., 2022). Use of downward-directed, fully shielded night lighting can minimize the potential effects on the butterfly (**BIO-13**).

[5] Proposed threatened species are not protected by the take prohibitions of section 9, consistent with any protective regulations finalized under section 4(d) of the ESA, until the rule to list is finalized. Under section 7(a)(4) of the ESA, Federal agencies must confer with the Service if their action will jeopardize the continued existence of a proposed species.

If subsequent botanical surveys (**BIO-5, BIO-7**) identify the presence of milkweed populations in the study area, removal of the plants may be necessary. If removal of the plants occurs before the monarchs migrate into the area (which could occur as early as May 15), then there would be no direct adverse effects on the butterfly. If the butterflies are present at the time plant removal would occur, then a survey would be needed to determine if monarch eggs or larvae are present on the plants to be removed; work could proceed only if monarch eggs and larvae are absent. If milkweeds are removed at any time of the year, it would reduce the extent of breeding habitat for the monarchs. This impact could be offset by planting milkweeds in the project vicinity (**BIO-8**).

Impacts to monarch butterfly would be **less than significant** with implementation of appropriate APMs, BMPs, and mitigation measures **BIO-1, BIO-3, BIO-5 through BIO-8, BIO-13, and BIO-14.**

Nesting Migratory Birds

As discussed above, several active bird nests were observed in the project work area during the field surveys, and most of the proposed well sites have a moderate to high potential to support nesting migratory birds. If ground-disturbing construction activities are initiated during the nesting season, nesting migratory birds could be directly impacted through loss of nests, eggs, and/or young. With respect to indirect effects, a Caltrans study (2016) has shown that:

> *"…construction or traffic noise that adds significantly to natural ambient noise has the possibility of producing a suite of significant short- and long-term behavioral and physiological changes in birds. These may include changes in foraging location and behavior; interference with acoustic communicate [sic] between conspecifics; failure to recognize other important biological signals, such as sounds of predators and/or prey; decreasing hearing sensitivity temporarily or permanently; and/or increasing stress and altering steroid hormone levels. Any of these effects could have long-term consequences and enduring impacts that include interference with breeding by individuals and populations, thereby threatening the survival of individuals or species."*

Given the observation of active bird nests in the study area, nesting birds could be directly or indirectly affected by construction activities. Direct effects could include mortality resulting from construction equipment operating in an area containing an active nest with eggs or chicks. Indirect effects could include nest abandonment by adults in response to loud noise levels or human encroachment, or a reduction in the amount of food available to young birds due to changes in feeding behavior by adults. High noise levels generated by the proposed project activities, such as drilling 24 hours per day, may also discourage birds from nesting in the project vicinity.

Most birds in the study area nest between February 1 and August 31. The potential for adversely affecting nesting birds can be greatly minimized by conducting site preparation and construction activities either before February 1 or after August 31. If this is not possible, a nesting bird survey should be conducted prior to commencement of construction. If active nests are found, construction activities would need to be postponed until after the young birds have fledged.

The proposed project would increase noise levels above natural ambient noise levels and could thus adversely affect nesting migratory birds by reducing the potential that birds will nest in the proximity of ongoing noise sources and by increasing the potential for nest abandonment due to increased noise levels.

Implementation of APMs, BMPs, and mitigation measures **BIO-1, BIO-3, BIO-12, and BIO-13** would reduce potential impacts on nesting birds to **less than significant**.

Mitigation Measure(s)

BIO-1. Worker Environmental Awareness Program (WEAP)

Prior to commencement of any earth disturbance (e.g., clearing, grading, trenching, etc.), all contractors, work crews, and any onsite personnel shall receive training from a qualified biologist regarding protective measures for special-status animal species and sensitive habitats that could exist in the Project area. If new personnel are added to the Project, the Applicant shall ensure that they receive the mandatory training before starting work. At a minimum, the training shall include the following:

- A review of the special-status species that could occur in the project study area, the life history and habitat requirements for each species, the locations where the species could occur, the laws and regulations that protect these species, procedures to be implemented in the event that these species are encountered during construction, and the consequences of noncompliance with those laws and regulations.
- A review of sensitive natural communities such as wetlands and other waters of the State that occur in the study area.
- A review of applicable mitigation measures, standard construction measures, best management practices, and resource-agency permit conditions that apply to the protection of special-status species and sensitive habitats.

BIO-2. Supplemental Aquatic Resources Delineation

Prior to Project implementation, the Applicant shall conduct a supplemental field evaluation to evaluate the presence/absence of wetlands and other waters of the state. The evaluation shall address any lands in the final project footprint that were not sufficiently addressed in the 2025 study (as described in this report). Upon completion of the evaluation, an aquatic resources delineation map and report meeting State Water Board standards shall be prepared and submitted for agency review and approval.

BIO-3. Avoid Indirect Impacts to Wetlands

High-visibility fencing, flagging, or other markers shall be installed along the outer edges of the construction zone adjacent to wetlands and other waters designated for avoidance. The fencing location shall be determined by a qualified biologist in consultation with the project manager. No construction activities (e.g., clearing, grading, trenching, etc.), including vehicle parking and materials stockpiling, shall occur within the avoidance area. The exclusionary fencing shall be periodically inspected during construction activities to ensure the fencing is properly maintained. The fencing shall be removed upon completion of work.

BIO-4. Wetland Restoration Plan

Prior to implementation of any work in wetlands or other waters of the State, the Applicant shall prepare a wetland restoration plan. At a minimum, the plan shall address the removal and storage of

topsoil (which will be stockpiled for the duration of the test well development and evaluation); post-project removal of the constructed well pads, access roads, equipment, fencing, and other imported materials and equipment; restoration of pre-existing topography and site drainage; soil decompaction and other pre-planting site preparation activities, redistribution of the stockpiled topsoil; use of locally sourced native species for revegetation; sourcing of propagules, density of planting, and planting techniques and timing; post-planting monitoring activities and revegetation success criteria; maintenance activities such as weed control; annual reporting requirements; and adaptive management measures to ensure that the established success criteria are met. Plan implementation, monitoring, and reporting shall then be conducted by the Applicant as prescribed in the approved plan.

BIO-5. Supplemental Botanical Survey and Evaluation

Prior to project implementation, the Applicant shall conduct a supplemental field evaluation to evaluate the presence/absence of special-status plant species as well as noxious weed populations. The evaluation shall address any lands in the final project footprint that were not sufficiently addressed in the 2025 study (as described in this report). Upon completion of the evaluation, a botanical survey report meeting California Department of Fish and Wildlife standards shall be prepared and submitted for agency review and approval.

BIO-6. Mitigation Plan Addressing the Loss of Special-Status Plant Species

Prior to Project implementation, a qualified biologist shall review the final project design to determine if work could directly or indirectly affect the special-status plant populations identified in the 2025 study or in subsequent botanical field surveys. If the project could directly or indirectly affect special-status plant species, a mitigation plan acceptable to the California Department of Fish and Wildlife shall be prepared and submitted to the agency for review and approval. Mitigation could potentially be achieved through reestablishment or enhancement of the existing populations on or adjacent to the work site, creation of new self-sustaining populations, preservation of offsite populations and surrounding buffer zones, or a combination of these approaches. Plan implementation, monitoring, and reporting shall then be conducted by the Applicant as prescribed in the approved plan. All reporting shall be concurrently submitted to the Modoc County Planning Director.

BIO-7. Supplemental Milkweed Survey

Prior to Project implementation, the Applicant shall conduct a supplemental field evaluation to evaluate the presence/absence of milkweeds (*Asclepias* spp.). The evaluation shall address any lands in the final project footprint that were not sufficiently addressed in the 2025 study (as described in this report). Upon completion of the evaluation, botanical survey report meeting CDFW standards shall be prepared and submitted for agency review and approval.

BIO-8. Monarch Butterfly Breeding Habitat Loss Offset if Warranted

The monarch butterfly is currently proposed for federal listing as threatened under the Endangered Species Act. Because no federal permits or funding would be needed for the proposed Project, no mitigation is currently required at the federal level. If the western migratory population of the monarch butterfly is listed or is a Candidate for state listing at the time project construction is initiated, mitigation may be required. If mitigation is required, it shall consist of the following:

- If milkweeds are present in or adjacent to the work area, and can be avoided during construction, temporary marking such as fencing or flagging shall be established to protect the plants; the marking shall be maintained in good condition throughout the duration of construction.
- If the milkweeds cannot be avoided, then they shall be removed outside of the monarch summer breeding season, if possible. If milkweeds must be removed during the monarch breeding season, a biologist shall inspect each milkweed for the presence of monarch butterfly eggs, larvae, and pupae prior to its removal. If monarch butterfly eggs, larvae, or pupae are present, the milkweed shall not be removed until the biologist determines that the milkweed is no longer hosting the monarch butterfly. This may require rescheduling of construction in those areas supporting milkweeds.
- If removal of milkweeds is required at any time during the pre-construction or construction periods, one of the following options shall be implemented:
  - If, prior to project initiation, the US Fish and Wildlife Service (USFWS) or California Department of Fish and Wildlife approves a mitigation banking or in-lieu fee program to offset impacts to the monarch butterfly, the project applicant shall purchase credits or pay fees at an amount/ratio acceptable to the agency.
  - If no mitigation banking or in-lieu fee program is available prior to project initiation, the project applicant shall re-establish milkweeds in the immediate area in the fall or spring following completion of construction. This shall be accomplished by planting seeds or rooted milkweed seedlings/cuttings. The planted milkweeds shall be locally sources and of the same species as those removed. Planting shall be conducted at a sufficiently high ratio to ensure success, which is defined as establishing at least one milkweed plant per milkweed plant removed as determined through field monitoring one year after the milkweed planting is undertaken. If the minimum success ratio is not met, milkweed seeding/planting shall continue in successive years until the success criterion is met.

Documentation regarding milkweed re-establishment and success shall be provided to the lead agency on an annual basis until the success criterion is met. The planting program may be undertaken by the applicant, its contractors, or a third-party conservation-oriented entity such as a Resource Conservation District.

BIO-9. Greater Sandhill Crane Activity Period Work Timing Restrictions

To the greatest extent possible, ground-disturbing work (e.g., site preparation, well development, reclamation) shall be performed between September 1 and March 30 to avoid the greater sandhill crane breeding season.

When work within the greater sandhill crane breeding season (April 1-August 30) cannot be avoided, preconstruction nesting greater sandhill crane surveys shall be completed within 0.5 miles of the proposed work area no more than 30 days prior to construction initiation. If no occupied nests are found, construction would proceed. If active nests or flightless young are identified within the survey area, a no-disturbance buffer shall be established at a distance of no less than 500 feet to minimize disturbance. The buffer may be increased at the discretion of a qualified biologist based on the nest

location, topography, and cover. No ground-disturbing activities would occur within the 500-foot buffer around active nest sites.

If active nests or flightless young are found within the survey area but outside of the 500-foot no-disturbance buffer, a qualified biologist shall be on site to monitor the nest/flightless young for signs of disturbance (e.g., agitated behavior or modified foraging or feeding behavior). If it is determined by the biologist that construction activities are resulting in disturbance, work shall cease immediately and CDFW shall be contacted to determine adequate protective measures.

To the greatest extent possible, initiation of well drilling would be scheduled to begin during the non-breeding season to minimize noise disturbance as drilling is the project activity that would generate the most noise. Once drilling begins, noise generation would be sustained for up to 17 months, and therefore, constitute baseline conditions at the beginning of the subsequent nesting season. Additionally, an Applicant Proposed Measure is included in the Project to install mufflers/silencers on drilling equipment, further reducing noise impacts during drilling.

BIO-10. Protection of Swainson's Hawk Nests

To the greatest extent possible, ground-disturbing work (e.g., site preparation, well development, reclamation) shall be performed between September 1 and March 30 to avoid the Swainson's hawk nesting season. No potentially suitable nesting trees for Swainson's hawk shall be removed as part of the Project.

When work within the Swainson's hawk nesting season (April 1-August 30) cannot be avoided, preconstruction nesting Swainson's hawk surveys shall be completed within 0.25 miles (1,320 ft) to 0.5 miles (2,640 feet) of the proposed work area no more than 15 days prior to any ground-disturbing project work. The survey area shall be determined at the discretion of a qualified biologist based on influencing factors such as topography or landcover. If active construction lapses for more than 15 days during the nesting season, another preconstruction survey for nesting Swainson's hawks shall be required. If active nests are identified within the survey area, a no-disturbance buffer shall be established at a distance of no less than 1,320 feet to minimize disturbance from noise and construction activity until the young have been confirmed to have fledged by a qualified biologist. A larger no-disturbance buffer may be implemented at the discretion of the qualified biologist.

To the greatest extent possible, initiation of well drilling shall be scheduled to begin either during the non-breeding season or after nestlings within 1,320 feet of the well have been confirmed to have fledged by a qualified biologist to avoid potential sudden noise disturbance to nesting adults. Once drilling begins, noise generation shall be sustained for up to 17 months, and therefore, constitute baseline conditions at the beginning of the subsequent nesting season.

BIO-11. Northwestern Pond Turtle and Northern Leopard Frog Surveys and Avoidance

Prior to commencement of construction activities within 500 feet of the pond east of well site 43-13, a qualified biologist shall conduct a pre-construction survey for northwestern pond turtles and northern leopard frogs at an appropriate time(s) of year. Alternatively, presence of these species could be presumed rather than conducting surveys. If the biologist can document that northwestern pond turtles and northern leopard frogs are not present in the pond, no additional work is needed.

If northwestern pond turtles are confirmed present or presumed present:

- Construction during the breeding season for northwestern pond turtles (April through August) shall be avoided if feasible.
- Within one week prior to initiation of construction at work sites within 500 feet of the pond, preconstruction surveys shall be performed by a qualified biologist within the work site, including a 50-foot buffer, to determine whether northwestern pond turtles or active nests are present.
- If active nests are present, they shall be flagged and avoided until the eggs have hatched or the nests are no longer active, as determined by the qualified biologist. To avoid impacts to northwestern pond turtles, construction shall not occur within 50 feet of an active nest site.
- Prior to Project activities within 500 feet of the pond, exclusionary fencing shall be erected to ensure northwestern pond turtles are kept out of the construction area. This fencing will be maintained until the permanent chain link fencing around the well pad is in place. The integrity of the exclusion fencing will be checked daily.
- The work site will be checked every morning before construction begins to ensure that no turtles are within the exclusion area.
- If a northwestern pond turtle individual or nest is observed in the impact area, construction activities will stop until a qualified biologist establishes an appropriate buffer, or the turtle is no longer in the impact area.
- A qualified biologist may relocate northwestern pond turtles to an appropriate nearby location if necessary. Relocation areas shall be approved by CDFW prior to relocation of any turtles.

If northern leopard frogs are confirmed present or presumed present:

- Exclusionary fencing shall be erected between the pond and work areas within 50 feet of the pond to prevent access to the site by migrating frogs.
- The exclusionary fencing shall be inspected and maintained throughout the duration of construction.
- If northern leopard frogs are encountered on site access roads or within the exclusionary fencing at any time during construction, construction personnel shall contact a qualified biologist and halt construction activities within 50 feet of the animal until it has left the area or is relocated by the qualified biologist.

BIO-12. Nesting Bird Surveys and Avoidance

In order to avoid impacts to nesting birds, including raptors, protected under the federal Migratory Bird Treaty Act and California Fish and Game Code §3503 and §3503.5, including their nests and eggs, one of the following shall be implemented:

- Vegetation removal and other ground-disturbance activities associated with construction shall occur between September 1 and March 1 when birds are not nesting; or
- If vegetation removal or ground disturbance activities occur during the nesting season, a pre-construction nesting survey shall be conducted by a qualified biologist to identify active nests in and adjacent to the work area.

Surveys shall begin prior to sunrise and continue until vegetation and nests have been sufficiently observed. The survey shall take into account acoustic impacts and line-of-sight disturbances occurring as a result of the Project in order to determine a sufficient survey radius to avoid nesting birds.

At a minimum, the survey report shall include a description of the area surveyed, date and time of the survey, ambient conditions, bird species observed in the area, a description of any active nests observed, any evidence of breeding behaviors (e.g., courtship, carrying nest materials or food, etc.), and a description of any outstanding conditions that may have impacted the survey results (e.g., weather conditions, excess noise, the presence of predators, etc.).

The results of the survey shall be submitted to the California Department of Fish and Wildlife upon completion. The survey shall be conducted no more than one week prior to the initiation of construction. If construction activities are delayed or suspended for more than one week after the pre-construction survey, the site shall be resurveyed.

If active nests are found, the project biologist shall contact the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service regarding appropriate action to comply with the Migratory Bird Treaty Act and California Fish and Game Code §3503. Compliance measures may include, but are not limited to, exclusion buffers, sound-attenuation measures, seasonal work closures based on the known biology and life history of the species identified in the survey, as well as ongoing monitoring by biologists.

BIO-13. Minimize Impacts due to Night Lighting

Project activities shall be designed to minimize the use of artificial light during the hours of dawn and dusk, as these times are when many wildlife species are most active. When night lighting must be used, it shall be motion-activated to decrease wildlife exposure to artificial light. The lighting shall also be shielded and directed downward and “warm” lighting shall be used to minimize wildlife disruption, i.e., LED lighting with a correlated color temperature at or under 2,700 Kelvin.

BIO-14. Avoid/Minimize the Potential for Introduction and Spread of Noxious Weeds

A Weed Control Plan has been prepared and is included as Appendix G. The potential for introduction and spread of noxious weeds shall be avoided/minimized by:

- Using only certified weed-free erosion control materials, mulch, and seed,
- Limiting any import or export of fill material to material that is known to be weed free,
- Requiring the construction contractor to thoroughly wash all equipment at the nearest commercial wash facility prior to entering and upon leaving the job site.

Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

The western juniper woodland, dryland grain crops, and dry pasture are not sensitive communities, but the wet meadow and riverine communities are sensitive and are likely regulated as waters of the State and/or United States. The Project study area includes approximately 19.98 acres of wetlands, 5.60 acres of transitional lands (additional field evaluation is needed to determine the wetland/upland classification of these lands), and approximately 103 linear feet of intermittent stream. The intermittent stream is on the southern boundary of well site 45-12; it is anticipated that a minor change in the Project footprint would fully exclude the stream from the work area.

The Applicant must file an application with the Water Boards for any activity that could result in the discharge of dredged or fill material to waters of the state in accordance with California Code of Regulations, Title 23, Section 3855 and the State Policy for Water Quality Control: State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. The Water Boards may approve the proposed temporary fill of waters through issuance of Waste Discharge Requirements (WDRs). Compliance with the conditions of the WDRs would ensure that impacts on waters of the state are not significant. Implementation of mitigation measures **BIO-2 through BIO-6** would ensure that impacts to sensitive natural communities are **less than significant**.

Mitigation Measure(s)

BIO-2. Supplemental Aquatic Resources Delineation
BIO-3. Avoid Indirect Impacts to Wetlands
BIO-4. Prepare a Wetland Restoration Plan
BIO-5. Supplemental Botanical Survey and Evaluation
BIO-6. Mitigation Plan Addressing the Loss of Special-Status Plant Species
BIO-14. Avoid/Minimize the Potential for Introduction and Spread of Noxious Weeds

Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Project implementation would result in the temporary fill of 20 to 25 acres of wetland and minor temporary fill of streams/constructed ditches. Rerouting of flow around the well pads could result in the temporary dewatering of additional wetlands; the extent of indirect impacts cannot be estimated but is likely to be relatively minor. Fill in the wetlands would be present for approximately two years. The project proposal calls for removal of fill and restoration of the wetlands upon completion of the geothermal testing project. A detailed restoration plan (**BIO-4**) will be prepared prior to project implementation. The plan will address the removal of fill, redistribution of salvaged topsoil (which will be stockpiled for the duration of the test well development and evaluation), site preparation including treatment of any compacted soils, species proposed for use in revegetation, methods for obtaining a sufficient quantity of plant propagules, planting methods, timing, maintenance activities such as weed control, revegetation success criteria, post-planting monitoring and reporting requirements, and adaptive management measures to ensure that the established success criteria are met.

As discussed above, the proposed project does not contain “Waters of the United States” as currently defined but does include “Waters of the State.” Accordingly, the project proponent must file an application with the Water Boards for any activity that could result in the discharge of dredged or fill material to waters of the state in accordance with California Code of Regulations, Title 23, Section 3855 and the State Policy for Water Quality Control: State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. The Water Boards may approve the proposed temporary fill of wetlands and other waters through issuance of Waste Discharge Requirements (WDRs).

Compliance with the conditions of the WDRs and would ensure that impacts on waters of the state are not significant. In additional to Implementation of mitigation measures **BIO-2 through BIO-4** and

compliance with conditions of the WDRs would ensure that impacts to sensitive natural communities are **less than significant**.

Mitigation Measure(s)

BIO-2. Supplemental Aquatic Resources Delineation
BIO-3. Avoid Indirect Impacts to Wetlands
BIO-4. Prepare a Wetland Restoration Plan

Would the Project interfere substantially with the movement of any resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The study area is not within designated critical habitat for listed species; however, it is within an area mapped as "essential connectivity area" for wildlife by the California Essential Habitat Connectivity Project (CDFW 2025c). Greater sandhill cranes and other birds use the study area and adjacent areas to nest and raise young (Pacific Flyway Council 1997). Project activities could impact up to 0.007 percent (39.5 acres) of the 595,069.75-acre Warner Mountains-Mount Bidwell/Larkspur Hills ECA (Appendix B). The existing wellhead at the southern end of the study area west of Surprise Valley Road intersects mule deer critical winter range (Appendix B). No other well sites or roads intersect mule deer range.

While the study area is mapped within ECA, it is also subject to annual alteration via agricultural practices, with meadows mowed and baled for hay production seasonally, including during the breeding season for greater sandhill cranes and other nesting birds. Therefore, wildlife in the study area are acclimated to seasonal disruptions to meadow habitat.

Habitat fragmentation would occur where geothermal testing well sites and access roads are developed. These areas of alteration would be small in relation to the available habitat and would not be expected to result in exclusion of wildlife when appropriate APMs, BMPs, and mitigation measures are implemented. The general objective of the final reclamation phase (Section 2.4) is to return the site as close as possible to the conditions prior to geothermal development; therefore, effects to wildlife movement corridors and nursery sites from habitat fragmentation would be temporary.

Impacts to wildlife movement corridors and nursery sites would be reduced to **less than significant** by implementation of APMs, BMPs, and mitigation measures **BIO-1, BIO-3 through BIO-4, BIO-8 through BIO-10, and BIO-12 through BIO-14.** These mitigation measures provide avoidance, minimization, and mitigation for effects to sensitive habitats that provide nursery sites for wildlife as well as for effects to specific species of wildlife known to use the area for movement or reproduction.

Mitigation Measure(s)

BIO-1. Worker Environmental Awareness Program (WEAP)
BIO-3. Avoid Indirect Impacts to Wetlands
BIO-4. Wetland Restoration Plan
BIO-8. Monarch Butterfly Breeding Habitat Loss Offset if Warranted
BIO-9. Greater Sandhill Crane Activity Period Work Timing Restrictions
BIO-10. Swainson's Hawk Breeding Period Work Timing Restrictions
BIO-12. Nesting Bird Surveys and Avoidance

BIO-13. Minimize Impacts due to Night Lighting
BIO-14. Avoid/Minimize the Potential for Introduction and Spread of Noxious Weeds

Would the Project conflict with any local policies or ordinance protecting biological resources, such as a tree preservation policy or ordinance?

The proposed project does not conflict with the wildlife policies presented in the Modoc County General Plan. The General Plan states that specific requirements for mitigating adverse impacts on critical or sensitive wildlife habitats shall be on a case-by-case basis. Timber/Vegetation policies in the General Plan include protection of rare or endangered plants in Modoc County. Numerous mitigation measures have been developed to protect wildlife and vegetation in the Project Area and these do not conflict with the policies of the General Plan. There would be **no impact**.

Would the Project Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan?

The Proposed Project is not located within the bounds of any regional or local Habitat Conservation Plans or Natural Community Conservation Plans. There would be **no Impact.**

3.5.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. Because the Project will require the conversion of important farmland to the County to non-agricultural uses, the proper storage of topsoil removed from the site is paramount to site restoration to pre-project conditions. Implementation of **MM BIO-1** through **BIO-14** would reduce impacts attributed to reclamation activities that might result in erosion or increased stormwater runoff. Adherence to these mitigation measures would reduce Project impacts to biological resources to **less than significant**.

3.6 Cultural Resources

This section describes the existing cultural resources of the Project; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on cultural resources in the Project site. Table 3.6-1 summarizes impacts on cultural resources that could result from implementation of the Project.

Table 3.6-1. Summary of Cultural Resources Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?	Potentially Significant Unless Mitigated (Less Than Significant With Mitigation)	CR-1 Further Cultural Resources Inventory CR-2 Cultural Resource Monitoring CR-3 Post Review (Inadvertent) Discovery of Cultural Resource Plan

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	Potentially Significant Unless Mitigated (Less Than Significant With Mitigation)	CR-2 Cultural Resource Monitoring CR-3 Post Review (Inadvertent) Discovery of Cultural Resource Plan
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	Potentially Significant Unless Mitigated (Less Than Significant With Mitigation)	CR-4 Inadvertent Discovery of Human Remains Plan

3.6.1 Existing Conditions

The cultural resources assessment for the Project (Appendix C – Confidential) completed by Catalyst Environmental Solutions, Inc. (Catalyst) included background and archival research, Native American coordination, and a pedestrian survey. A total of three cultural resources were identified in the Project Area as a result of the field inventory, including two previously recorded sites: a precontact/historic lithic and groundstone scatter (P-25-005891) and a multi-component site consisting of a lithic and groundstone scatter, historic debris scatter, abandoned road segment, and the remains of a fossil hot spring (P-25-007333), and one observed archaeological site consisting of a precontact lithic scatter (CES-SV-001).

3.6.1.1 Modoc County Historic Setting

This document does not provide an exhaustive recounting of the region's history. For a comprehensive overview of regional historical development, please consult the historic contexts and themes presented by King et al. (2004) in their Class I Cultural Resources Overview and Research Design for the Alturas, Eagle Lake, and Surprise Resource Areas, prepared for the Bureau of Land Management. The current Project falls within the geographic scope of that study.

The 1846 establishment of the Applegate Trail through Surprise Valley enroute to Oregon marks the first sustained contact between the indigenous Paiute communities and non-indigenous emigrants. The first year it opened, some 90 or 100 wagons and 450 to 500 persons traveled the Applegate Trail (Helfrich et al. 1984:X). In the project vicinity, the route of this historic wagon road approximates that of Fortynine Road as it crosses the valley to the southeast between Upper and Lower Alkali lakes; parallels the western lakeshore through the project vicinity; and then exits the valley far to the northwest through Fandango Pass (Helfrich et al. 1984:18). When dry conditions permitted, non-indigenous emigrants took an alternate, more direct route that angled northwesterly across the valley, traversing the southern bed of Upper Lake and rejoining the main route north of the Project Area near Goose Creek (Helfrich et al. 1984: Maps 12-13). Hot springs and creeks in the project vicinity were regular camping or resting places along this section of the trail.

Founded in 1864, nearby Lake City was the first known American/non-indigenous community of the region. Lake City had the largest population of any town in the region when Modoc County was created in 1874 from the eastern portion of a much larger Siskiyou County. Lake City lost the bid for the county

seat, however, and has long since been eclipsed by the larger, more prosperous valley ranching communities at Cedarville and Ft. Bidwell.

3.6.2 Regulatory Setting

3.6.2.1 State

California Native American Heritage Commission

The Native American Heritage Commission (NAHC) was established in 1976 through Assembly Bill 4239 as California's primary regulatory agency for Native American cultural resource management. The commission serves as the state's designated authority for identifying, cataloging, and protecting Native American cultural sides and sacred locations. The NAHC operates under statutory authority to prevent damage to designated sacred sites and interference with Native American religious practices.

A key regulatory function of the NAHC involves the administration of human remains protocols. When Native American remains are identified outside designated cemeteries, the NAHC implements a Most Likely Descendant identification process. Most Likely Descendants are granted the legal authority to make recommendations regarding the treatment and disposition of the discovered remains. These recommendations, although they cannot halt work on the Project site, give Most Likely Descendants a means by which to ensure that the Native American human remains are treated in the appropriate manner.

California Assembly Bill 52

Signed into law in September 2014, Assembly Bill 52 (AB 52) established a new category of resources, tribal cultural resources, for consideration under the California Environmental Quality Act (CEQA). Tribal cultural resources may include sites, features, places, cultural landscapes, sacred areas, or objects of cultural significance to a California Native American tribe. These resources may be listed in, or determined eligible for listing in, the California Register of Historical Resources (CRHR); included in a local register of historical resources; or identified by the lead CEQA agency, in its discretion and supported by substantial evidence, as significant and eligible for CRHR listing.

AB 52 requires the lead CEQA agency to consult with California Native American tribes that have formally requested consultation when a proposed project may impact tribal cultural resources. This consultation must begin prior to the release of a negative declaration, mitigated negative declaration, or draft environmental impact report. Under AB 52, a project that may cause a substantial adverse change to a tribal cultural resource is considered to have a significant effect on the environment, unless mitigation reduces that impact to a less-than-significant level.

3.6.2.2 Local

Modoc County General Plan (Conservation and Open Space Element)

The Modoc County General Plan states that the destruction of archeological resources has been an issue of increasing concern in recent years. The Conservation and Open Space Element of County's

General Plan (Modoc County 2018) contains one goal, two policies, and one action item related to the protection and preservation of cultural resources as follows:

GOAL CO-1: To preserve, protect, and enhance the valuable natural, cultural, and historical resources of the County

- Policy CO Y: Develop a program to preserve and enhance historic and cultural building and places of significance.
- Policy CO AA: Minimize the loss of archaeological resources through the development review and approval process.
- Action CO G. Include consideration of archaeological history and cultural resources impacts in the review of any development proposal.

3.6.3 Impact Analysis

3.6.3.1 Impact Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to cultural and historic resources. The criteria listed below consider if the Project would:

a) Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?

c) Disturb any human remains, including those interred outside of dedicated cemeteries?

3.6.3.2 Analytical Approach

A Cultural Resources Inventory (CRI) was completed for the proposed Project by Catalyst. The study included a records search, Native American consultation, and field investigations.

The Project Area consists of the physical area that the project will affect (directly and indirectly), with both horizontal and vertical components. The horizontal component is the surface area that will be affected by the project's construction, including both the final footprint of the facility that is to be constructed and the area that will be disturbed by the construction effort. The vertical component is the depth to which the horizontal component of the project will be excavated. Also, the types of resources anticipated in the Project Area play a part in how these elements are delineated. As shown in Figures 1 and 2 in Appendix C, the proposed Project Area includes the eleven well sites and access roads totaling approximately 40 acres. The vertical APE will range from surface grading to 3,000 to 5,000 feet (915 to 1,525 meters) at the well-boring sites.

Records Search

The following sources were consulted to obtain information concerning known archaeological sites, historic properties/historical resources, and historical activities within and/or adjacent to the study area:

- Northeast Information Center of the California Historical Resources Information System at California State University, Chico (NEIC/CHRIS)
- National Register of Historic Places (NRHP) (1979-2018 and supplements)
- California Register of Historical Resources (CRHR) (2011 web list and supplemental information to date)
- California Inventory of Historic Resources (1976)
- California Historical Landmarks (1995 and supplemental information to date)
- California Points of Historical Interest (1992 and supplemental information to date)
- Directory of Properties in the Historic Property Data Files for Modoc County
- Historical maps and aerial photographs
- Native American Heritage Commission (NAHC)

On March 6, 2025, Catalyst requested a cultural resources records search within a half-mile radius for the proposed Project Area at the CHRIS Northeast Information Center. The data review indicates that a total of six previously conducted surveys has been conducted within a half-mile radius, three of which cover portions of the current Project Area (NEIC-1089, NEIC-4974, and NEIC-5536). The Records Review Search Identified nine previously recorded archaeological resources within a half-mile of the Project Area, with a total of two with boundaries overlapping with the current Project Area (P-25-005891 and P-25-007333).

Review of the NRHP, the CRHR, the California Inventory of Historic Resources, and the California Historical Landmarks did not identify any listed resources within a half-mile radius of the Project Area. The route of the Lassen-Applegate Trail, a wagon route established in 1846, is located near the project area. Due to the lack of precision in mapping, the trail alignment has not been accurately identified, so it is unclear how close the trail is to the Project Area; however, it is assumed that portions of it run within a half-mile radius of the project area.

Native American Consultation

A Request for a Sacred Lands Search was submitted to the NAHC on February 19, 2025. The NAHC responded the same day, indicating that their files did not identify the presence of Native American sacred sites or cultural resources in the project vicinity.

On February 21, 2025, comment solicitation letters and a map of the Project Area were submitted to the tribal representatives identified by the NAHC. These letters requested information on known or potential tribal cultural resources within the Project Area

Letters were sent to the following representatives: Tribal Administrator/Environmental Coordinator for the Alturas Rancheria of Pit River Indians; Vi Riley, Cultural Resources Coordinator with the Alturas Rancheria of Pit River Indians; John Glazier, Chair, Bridgeport Paiute Indian Colony; Richard Lake, Chair, Cedarville Rancheria of Northern Paiute Indians; Bernold Pollard, Chair, Fort Bidwell Indian Community of Paiute; Charlotte Lange, Chair, Mono Lake Kootzaduka'a Tribe; Natalie Forrest-Perez, Tribal Historic Preservation Officer (THPO), Pit River Tribe of California; Agnes Gonzalez, Tribal Administrator, Pit River Tribe of California; Jack Potter, Chair, Redding Rancheria; Lillie Lucero, Tribal Historic Preservation Agent, Redding Rancheria; Tracy Edwards, Chief Executive Officer, Redding Rancheria; James Russ, President, Round Valley Reservation/Covelo Indian Community; Arian Hart, Tribal Chair, Susanville

Indian Rancheria; Harold Dixon, Chair, Wadatkuta Band of the Northern Paiute of the Honey Lake Valley, and Melanie McFalls, chair, Walker River Reservation.

Follow-up correspondence was sent to these tribes on March 12, 2025, with no response.

Further follow up emails were sent to the Cedarville Rancheria of Northern Paiute Indians on April 7 and 9, 2025, requesting their input on the project. On April 9, 2025, Jessica Dearing, Cedarville Rancheria Environmental/Housing Director, responded via e-mail requesting additional information on the project so she could discuss the project at the upcoming Executive Committee meeting. The requested project information was provided to Ms. Dearing on April 10, 2025. On April 29, 2025, Ms. Dearing notified Catalyst by e-mail that the Executive Committee had no concerns with the proposed project and that the Committee was not aware of any cultural sites near the project area.

A follow-up email to the Fort Bidwell Indian Community of Paiute was sent on March 26, 2025, further requesting their input on the project. On April 16, 2025, Leon Draper, Fort Bidwell Paiute Reservation Tribal Administrator, stated that he has no concerns with the project and requested to meet in person to discuss collaboration with the geothermal project because the Tribe has its own geothermal interests. On April 22, 2025, Catalyst provided the project proponent's contact information to Mr. Draper. Follow-up e-mails were sent in April 2025 and August 2025; no further responses were received. Copies of all correspondence can be found in Appendix B of the Cultural Resources inventory Report (Appendix C).

Field Investigation

Cultural resources field surveys were completed by a qualified archaeologist between May 7 and 8, and July 23 and 26, 2025, during which the entire accessible Project Area was surveyed.

The purpose of the field was to identify cultural resources that could be potentially affected by the proposed Project. The surface survey consisted of pedestrian transects spaced at intervals between 10 and 15 meters in distance to examine areas of exposed ground throughout the Project Area. The pedestrian survey of the Project Area varied between intensive survey of areas with good ground visibility and intuitive survey in areas with poor ground visibility. Ground visibility ranged from poor to good (0-50%) throughout the Project Area.

Areas of poor visibility were examined via variable deviations from transects to examine areas of exposed ground. These areas with exposed subsurface soil, including rodent burrows and ditches, were thoroughly inspected by methods such as boot scrapes and scraping back grass to expose soils to inspect for evidence of potentially buried cultural deposits and/or soil differentiation.

3.6.3.3 Analysis of Checklist Questions

Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?

Well site 45-12 is almost entirely covered by a precontact lithic scatter (CES-SV-001) consisting mostly of obsidian and some basalt material. Flake density varied between 2 to 25 per square meter. Exact boundaries could not be established as the observed site extended outside of our survey area. It is possible that the site extends west through the ranch buildings and also to the south. Additionally, a large portion of the northeast quarter of the survey area had very low ground

visibility, having been used as a cattle yard and covered by manure in May 2025 and freshly grown vegetation in July 2025. Despite this, six flakes were identified in this area. Therefore, there is a good chance that this area may also be part of the site. There is also an existing well pad near the northwest corner of the Project site (well site 45-12).

Debitage was observed here as well, but the area has been previously disturbed by ranch buildings, an existing wellhead, and an access road. Based on the identification of precontact lithic scatter CES-SV-001 at well site 45-12, which constitutes a historical resource under CEQA, it is recommended that a formal site record be completed documenting all observable boundaries within the Project Area prior to ground disturbance under **Mitigation Measure CR-1**.

Additionally, archaeological monitoring should be implemented during all ground-disturbing activities at well site 45-12 and at the existing well pad in the northwest corner where debitage was identified. Under **Mitigation Measure CR-2** Monitoring is necessary because survey efforts were limited by poor ground visibility in portions of the site, the full extent of the resource could not be determined, and cultural materials are present throughout the well pad location. These measures will ensure that Project implementation does not result in a substantial adverse change to this historical resource as defined under CEQA Guidelines Section 15064.5, reducing potential impacts to a **less-than-significant level with mitigation**.

Mitigation Measure(s)

CR-1. Further Cultural Resources Inventory. All identified archaeological sites and historic buildings and structures shall be recorded on California Department of Parks and Recreation 523 Site Record forms for well site 45-12. A Historic Resources Identification Report shall be prepared to document the findings of the study; the report shall be submitted to the appropriate CHRIS Information Center. If the property has been subject to previous study, additional survey is not required if no cultural resources, including TCRs, were identified during the study and the age and adequacy of the report are considered sufficient by the consulting archaeologist for the purposes of the Project. The report from the previous survey can then be used to satisfy the CEQA requirements for historical resources. If the property has been subject to previous survey and a cultural resource has been identified within the proposed disturbance area, a qualified archaeologist shall conduct an intensive pedestrian survey to assess the current condition of the resource relative to the proposed action.

CR-2. Cultural Resources Monitoring. Prior to ground-disturbing activities, the Applicant shall retain a qualified archaeologist meeting the Secretary of the Interior's Professional Qualification Standards to conduct archaeological monitoring during all initial ground disturbance at well sites 45-12, 82-13, 33-13, 33A-13, 43-13, 35-13, 46-13, 22-24, 31-24, 41-24, 81-24, and all associated access roads.

The archaeological monitor shall follow the project's Post Review (Inadvertent) Discovery Plan and have the authority to temporarily halt or redirect ground-disturbing activities if cultural resources are encountered. All identified cultural resources shall be recorded on DPR 523 forms and submitted to the appropriate Information Center. A monitoring report documenting activities, findings, and mitigation measures shall be prepared upon completion.

This measure is necessary because survey efforts were limited by poor ground visibility, the full extent of cultural resources could not be determined, and cultural materials are present at multiple well pad

locations. This measure will ensure that Project implementation shall not result in a substantial adverse change to historical resources as defined under CEQA Guidelines Section 15064.5, to mitigate any significant impacts.

CR-3. Post Review (Inadvertent) Discovery Plan for Cultural Resources. If cultural resources are encountered during ground-disturbing activities, work in the immediate area shall halt and an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (National Park Service 1983) should be contacted immediately to evaluate the find. If the discovery proves to be significant under CEQA, additional work such as data recovery excavation and Native American consultation shall be warranted to mitigate any significant impacts.

Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?

During the record search, multiple archaeological resources were identified within or adjacent to the Project Area, and the field investigation identified several new cultural resources and confirmed the presence of previously recorded sites. The Surprise Valley region has been culturally important since time immemorial, beginning with the Indigenous Peoples that first inhabited the land and continuing through historic-period settlement and modern ranching operations. The field investigation resulted in the identification of a precontact lithic scatter (CES-SV-001) covering well site 45-12, subsurface cultural deposits near well sites 35-13 and 46-13, and dense artifact concentrations along the access road west of Surprise Valley Road likely within the boundaries of site P-25-005891. Several well sites (82-13, 33-13, 33A-13, 43-13, 46-13, and 81-24) exhibited poor ground visibility due to dense vegetation, flood-induced silt deposition, and wetland conditions, preventing comprehensive assessment of archaeological potential during pedestrian surveys. Additionally, well sites 33-13, 33A-13, and 43-13 are situated at the periphery of previously recorded site P-25-007333. Although formal site recordation, boundary definition, and archaeological monitoring will be conducted where resources have been identified, there remains a possibility of encountering unexpected cultural resources or human remains during ground-disturbing activities in areas where survey visibility was limited. Therefore, impacts would **be less than significant with mitigation**. **Mitigation Measures CR-2 and CR-3**, which follow state and agency guidelines, will mitigate any potential adverse impacts that may occur through formal site documentation, subsurface testing where warranted, archaeological monitoring during construction, and proper protocols for inadvertent discovery of buried cultural resources.

Disturb any human remains, including those interred outside of dedicated cemeteries?

No human remains or tribally important resources were identified during the record search or field investigation. However, there remains a possibility of encountering unexpected cultural resources or human remains during ground-disturbing activities**. Mitigation Measure CR-3** (above) and **Mitigation Measure CR-4**, which are based on state and agency regulations and guidelines, will address any potential adverse impacts resulting from the inadvertent discovery of buried cultural resources or human remains. There fore impacts to human remains will be **less than significant with mitigation.**

Mitigation Measure(s)

CR-4. Inadvertent Discovery Plan for Human Remains. If human remains are identified, regulations outlined in the State of California Health and Safety Code Section 7050.5 state that no further disturbance shall occur until the County Corner, in this case the Modoc County Coroner, has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the Modoc County Coroner must be notified immediately. If the remains are determined to be Indigenous, the Coroner will notify the Native American Heritage Commission, who will determine and notify a most likely descendent (MLD). The MLD shall complete the inspection of the site within 48 hours of being granted access and provide recommendations as to the treatment of the remains to the landowner.

3.6.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. Because the Project will require the conversion of important farmland to the County to non-agricultural uses, the proper storage of topsoil removed from the site is paramount to site restoration to pre-project conditions. Implementation of **MM CR-1** through **MM CR-4** would reduce impacts attributed to reclamation activities that might result in impacts to cultural resources. Adherence to these mitigation measures would reduce Project impacts to cultural resources to **less than significant**.

3.7 Energy

This section describes the existing energy resources of the Project; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on energy resources in the Project area. Table 3.7-1 summarizes impacts on energy resources that could result from implementation of the Project.

Table 3.7-1. Summary of Energy Resources Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	Less than Significant	ENG-1: Energy Conservation Measures
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	Less than Significant	None Required

3.7.1 Existing Conditions

Energy capacity, or electrical power, is generally measured in watts, while energy use is measured in watt-hours (Wh). For example, if a light bulb has a capacity rating of 100 Watts (W), the energy required to keep the bulb on for one hour would be 100 Wh. If ten 100 W bulbs were on for one hour, the energy required would be 1,000 Wh or one kilowatt-hour (kWh). On a utility scale, a generator's

capacity is typically rated in megawatts, which is 1,000,000 W, while energy usage is measured in megawatt-hours (MWh) or gigawatt-hours (GWh), which is 1,000,000,000 Wh.

Transportation dominates California's energy consumption profile. Overall, the transportation sector accounts for 34 percent of state end-use energy consumption (United States Energy Information Administration 2023). According to California Air Resources Board's (CARB's) EMFAC2021 Web Database, Modoc County's on-road transportation sources consumed approximately 432 million gallons of gasoline and 163 million gallons of diesel fuel in 2022 (CARB 2023b).

The proposed Project areas are located in agricultural fields and do not have any existing direct electrical service. The Project would rely on diesel generators for any electrical needs and no electrical utility/infrastructure would be required to perform the exploration effort.

3.7.2 Regulatory Setting

3.7.2.1 Federal

Energy Policy Act of 2005

The Energy Policy Act (EPAct) of 2005 includes several electricity-related provisions for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas. The Renewable Fuel Standard (RFS) program was created under the EPAct of 2005 and established the first renewable fuel volume mandate in the United States. The program regulations were developed in collaboration with refiners, renewable fuel producers, and many other stakeholders. As required under EPAct, the original RFS program (RFS1) required 7.5 billion gallons of renewable fuel to be blended into gasoline by 2012.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act (EISA) (Public Law 110-140) was signed into law by President George W. Bush on December 19, 2007. The Act's goal is to achieve energy security in the United States by increasing renewable fuel production, improving energy efficiency and performance, protecting consumers, improving vehicle fuel economy, and promoting research on greenhouse gas (GHG) capture and storage. Under the EISA, the updated RFS program (RFS2) was expanded in several key ways:

- EISA expanded the RFS program to include diesel, in addition to gasoline.
- EISA increased the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022.
- EISA established new categories of renewable fuel, and set separate volume requirements for each one.
- EISA required the U.S. Environmental Protection Agency (EPA) to apply lifecycle GHG performance threshold standards to ensure that each category of renewable fuel emits fewer GHGs than the petroleum fuel it replaces.

RFS2 lays the foundation for achieving significant reductions of GHG emissions from the use of renewable fuels, for reducing imported petroleum, and encouraging the development and expansion of the nation's renewable fuels sector.

3.7.2.2 State

California Renewables Portfolio Standard Program

Established in 2002 under Senate Bill (SB) 1078, accelerated in 2006 under SB 107, expanded in 2011 under SB 2 and further expanded in 2015 under SB 350, California's Renewables Portfolios Standard (RPS) is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020. On September 12, 2002, then-Governor Gray Davis signed SB 1078. SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010.

In November 2008, then-Governor Arnold Schwarzenegger signed Executive Order (EO) S-14-08, which expands the state's RPS to 33 percent renewable power by 2020. In September 2009, former Governor Schwarzenegger continued California's commitment to the RPS by signing EO S-21-09, which directs the California Air Resources Board (CARB) under its Assembly Bill (AB) 32 authority to enact regulations to help the state meet its RPS goal of 33 percent renewable energy by 2020.

The 33 percent by 2020 goal was codified in April 2011 with SB X1-2, which was signed by Governor Edmund G. Brown, Jr. This RPS preempts the CARB 33 percent Renewable Electricity Standard and applies to all electricity retailers in the state, including publicly owned utilities, investor-owned utilities, electricity service providers, and community choice aggregators. These entities must adopt the new RPS goals of 20 percent of retail sales from renewables by the end of 2013 and 25 percent by the end of 2016, with the 33 percent requirement being met by the end of 2020.

The Clean Energy and Pollution Reduction Act of 2015, SB 350 (Chapter 547, Statutes of 2015) was approved by Governor Brown on October 7, 2015. SB 350 does the following: (1) increases the standards of the California RPS program by requiring that the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50 percent by December 31, 2030; (2) requires the State Energy Resources Conservation and Development Commission to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by January 1, 2030; (3) provides for the evolution of the Independent System Operator into a regional organization; and (4) requires the state to reimburse local agencies and school districts for certain costs mandated by the state through procedures established by statutory provisions. Among other objectives, the legislature intends to double the energy efficiency savings in electricity and natural gas final end uses of retail customers through energy efficiency and conservation (SB-350 Clean Energy and Pollution Reduction Act 2015).

Title 24 Energy Efficiency Standards

California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24, Part 6 of the California Code of Regulations) ("Title 24 Standards") were established in 1978 in response to a legislative mandate to reduce California's energy consumption to ensure that building construction and system design and installation achieve energy efficiency and preserve outdoor and indoor environmental quality. The standards are updated periodically (typically every three years) to allow consideration and possible incorporation of new energy efficiency technologies and methods. The 2025 Standards went into effect on January 1, 2026.

California Assembly Bill No. 1493 (AB 1493, Pavley)

The transportation sector accounts for more than half of California's carbon dioxide (CO_2) emissions in California. AB 1493 (commonly referred to as Pavley regulations), enacted on July 22, 2002, required CARB to set GHG emission standards for new passenger vehicles, light-duty trucks, and other vehicles whose primary use is noncommercial personal transportation manufactured in and after 2009.

CARB's Climate Change Scoping Plan

CARB's Climate Change Scoping Plan, which functions as a roadmap to achieve the California GHG reductions required by AB 32 and SB 32 through subsequently enacted regulations, is discussed in detail in Section 3.9, Greenhouse Gas Emissions. In December 2022, CARB approved the final version of California's 2022 Climate Change Scoping Plan (2022 Scoping Plan Update), which outlines the proposed framework of action for achieving California's new AB 1279 2045 GHG target: a 85 percent reduction in GHG emissions by 2045 relative to 1990 levels. The 2022 Scoping Plan Update focuses on strategies for reducing California's dependency on petroleum to provide customers with clean energy options that address climate change and support clean sector jobs. SB 350 and other regulations are expected to decarbonize the electricity sector over time.

CARB Heavy-Duty On-Road and Off-Road Vehicle Regulations

In 2004, CARB adopted an Airborne Toxic Control Measure (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling in order to reduce public exposure to diesel particulate matter (DPM) emissions (Title 13 CCR Section 2485). The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than five minutes at any given location. While the goal of this measure is primarily to reduce public health impacts from diesel emissions, compliance with the regulation also results in energy savings in the form of reduced fuel consumption from unnecessary idling.

In addition to limiting exhaust from idling trucks, CARB also promulgated emissions standards for off-road diesel construction equipment greater than 25 horsepower (hp) such as loaders, backhoes, and forklifts, as well as many other self-propelled off-road diesel vehicles. The In-Use Off-road Diesel-Fueled Fleets regulation adopted by CARB on July 26, 2007, encourages the retirement, replacement, or repower of older engines with newer emissions-controlled models (13 CCR Section 2449). The compliance schedule requires full implementation by 2023 in all equipment for large and medium fleets and by 2028 for small fleets. While the goal of this measure is primarily to reduce public health

impacts from diesel emissions, compliance with the regulation has shown an increase in energy savings in the form of reduced fuel consumption from more fuel-efficient engines.

3.7.2.3 Local

Modoc County General Plan

During the Modoc County General Plan update in 2018, the Optimal Energy element was omitted. The General Plan identifies potential energy resource development as an asset critical to the County's economic vitality. The General Plan contains no goals or policies concerning energy consumption, or efficiency which would be relevant to this assessment.

3.7.3 Impact Analysis

3.7.3.1 Impact Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to energy resources. The criteria listed below considers if the Project would:

a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

3.7.3.2 Analytical Approach

This impacts analysis describes the potential for the Project and its varying components to impact the energy resources as a result of Project implementation. Potential impacts were evaluated relying on the findings from Appendix A (Air Quality and Greenhouse Gas Technical Report) and available online resources. These data sources and modeling results are used to determine whether Project activities would surpass the threshold of the significance criteria listed above.

3.7.3.3 Analysis of Checklist Questions

Would the Project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Construction

Construction of the Project would require the use of fuels (primarily gasoline and diesel) for the operation of construction equipment and vehicles to perform a variety of activities, including excavation, hauling, well installation, and vehicle travel (including on-site and commuter trips). Table 2.4-2 (Project Construction Phases and Equipment) and Table 2.4-3 (Construction Vehicle Trips) above detail the daily hours of operation and number of days each piece of equipment will be utilized during the Project construction phase. In addition to direct construction-related energy consumption, indirect energy use would be required to make the materials and components used for Project construction.

This includes energy used for extraction of raw materials, manufacturing, and transportation associated with manufacturing.

Fuel energy consumed during Project construction would be temporary and would not represent a substantial demand on energy resources. In addition, energy conservation would occur during Project construction through compliance with the CARB anti-idling and emissions regulations, which require that equipment not used for more than five minutes be turned off. Compliance with these regulations would result in less fuel combustion and energy consumption and thus minimize the Project's construction-related energy use. Project construction equipment would also be required to comply with EPA and CARB engine emission standards. These emission standards require highly efficient combustion systems to maximize fuel efficiency and reduce unnecessary fuel consumption. None the less, **MM ENG-1** would ensure that impacts would remain **less than significant**.

Operation

Well testing operations will require the usage of a 671 HP generator to pump geothermal fluids from the test wells. Testing will occur for up to three months in which generators will be used up to 24-hours a day. Generator use during testing would be temporary and would not represent a substantial demand on energy resources in the area. There are no alternative energy sources at the Project work locations. The Project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources, impacts would be **less than significant**.

Mitigation Measure(s)

ENG-1. Energy Conservation Control Measures. The Applicant shall implement all the following applicable energy conservation control measures during construction of the Project:

- Idling times on all diesel-fueled commercial vehicles over 10,000 pounds shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure 13 CCR §2485). Clear signage to this effect shall be provided for construction workers at all access points.
- Idling times on all diesel-fueled off-road vehicles over 25 horsepower shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes and fleet operators must develop a written policy as required by 13 CCR §2449 ("CARB Off-Road Diesel Regulations").
- All construction equipment shall be maintained and properly tuned in accordance with the manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- Portable equipment shall be powered by electricity if available. If electricity is not available, propane or natural gas shall be used if feasible. Diesel engines shall only be used if electricity is not available, and it is not feasible to use propane or natural gas.

Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Construction equipment would comply with federal, state, and regional requirements where applicable. With respect to truck fleet operations the USEPA and the National Highway Traffic Safety Administration (NHTSA) have adopted fuel efficiency standards for medium- and heavy-duty trucks. The Phase 1 heavy-duty truck standards apply to vehicles from model years 2014 through 2018 and will result in a reduction in fuel consumption from 6 to 23% over the 2010 baseline, depending on the vehicle type. The USEPA and NHTSA also adopted the Phase 2 heavy-duty truck standards, which covered model years 2021 through 2027 and required the phase-in of a 5 to 25% reduction in fuel consumption over the 2017 baseline depending on the compliance year and vehicle type. The energy modeling for trucks does not take into account specific fuel reduction from these regulations, since they would apply to fleets as they incorporate newer trucks meeting the regulatory standard; However, these regulations would have an overall beneficial effect on reducing fuel consumption from trucks overtime as older trucks are replaced with newer models that meet the standards.

In addition, construction equipment and trucks are required to comply with CARB's regulations regarding heavy duty truck idling limits of five minutes at a location and the phase in of off-road emission standards that result in an increase in energy savings in the form of reduced fuel consumption for more fuel-efficient engines. While these regulations are intended to reduce criteria pollutant emissions, compliance with the anti-idling and emissions regulations would also result in the efficient use of construction-related energy. Therefore, the Project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency during construction, and short-term impacts under this criterion would be **less than significant**.

3.7.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. All abandonment and decommissioning activities would be short-term and energy consumption from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.7.3 above and would be l**ess than significant**.

3.8 Geology and Soils

This section describes the existing geology and soils of the Project site; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on geology and soils at the Project site. Table 3.8-1 summarizes impacts on geology and soils that could result from implementation of the Project.

Table 3.8-1. Summary of Geology and Soils Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: **i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other**	i) Less Than Significant ii) Less Than Significant iii) Less Than Significant iv) No Impact	i) None Required ii) None Required iii) None Required. iv) None Required

substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. **ii) Strong seismic ground shaking?** **iii) Seismic-related ground failure, including liquefaction?** **iv) Landslides?**		
b) Result in substantial soil erosion or the loss of topsoil?	Less Than Significant	None Required.
c) 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 on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	Less Than Significant	None Required
d) Be located on expansive soil, as defined in the latest Uniform Building Code, creating substantial direct or indirect risks to life or property?	Less Than Significant	None Required
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	No Impact	None Required
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	Potentially Significant Unless Mitigated (Less Than Significant With Mitigation)	GS-2

3.8.1 Existing Conditions

3.8.1.1 Regional Geology

The site is located in Modoc County which is underlain by two primary Geomorphic Provinces, The Modoc Plateau Provinces on the western two-thirds of the County and the Basin and Range Province along the eastern side. The Modoc Plateau is a volcanic table consisting of lava flows and tuff beds along with many small volcanic cones. The Basin and Range is the westernmost part of the Great Basin. The province is characterized by interior drainage with lakes and playas, and the typical horst and graben structure (subparallel, fault-bounded ranges separated by downdropped basins) (California Geological Survey, 2002).

The Project site is located in in the Surprise Valley region of Modoc County, within the Surprise Valley fault area. The Surprise Valley is a north-trending structural graben bordered on the west and north by the Warner Mountains and on the east by the Hays Canyon Range in Nevada. The Surprise Valley fault is the boundary between the Modoc Plateau geomorphic province to the west and the Basin and Range province to the east (Bryant, 1990). Mapped Geologic Units within the Project area consist of Quaternary Alluvium and Marine Deposits (Figure 9).

3.8.1.2 Soils

Soils within the Project site vary between each well pad development area. The USDA Natural Resources Conservation Service (NRCS) has mapped the soils at the Project site (Figure 3.8-1) as follows:

- Bidwell ashy loam, 2 to 5 percent slopes
- Buntingville ashy loam, 2 to 5 percent slopes
- Donica very stony ashy sandy loam, 2 to 15 percent slopes
- Hovey silty clay loam
- Hussa ashy clay loam, clay substratum, 0 to 2 percent slopes
- Hussa ashy silty clay loam, seeped, 0 to 9 percent slopes
- Simpson ashy sandy loam, 2 to 5 percent slopes
- Surprise gravelly ashy sandy loam, 2 to 5 percent slopes

Figure 3.8-1: Geologic Map and Geological Hazards

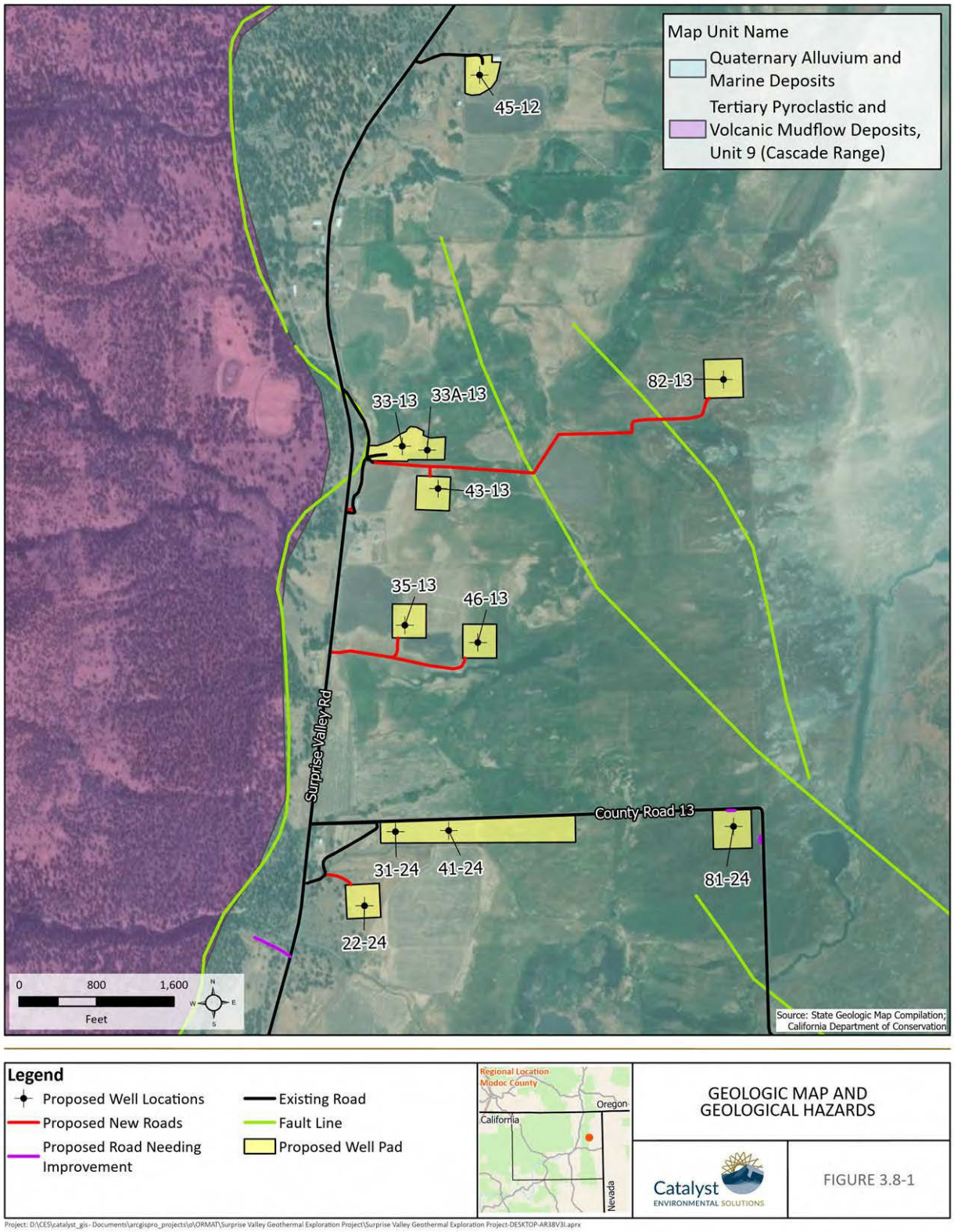
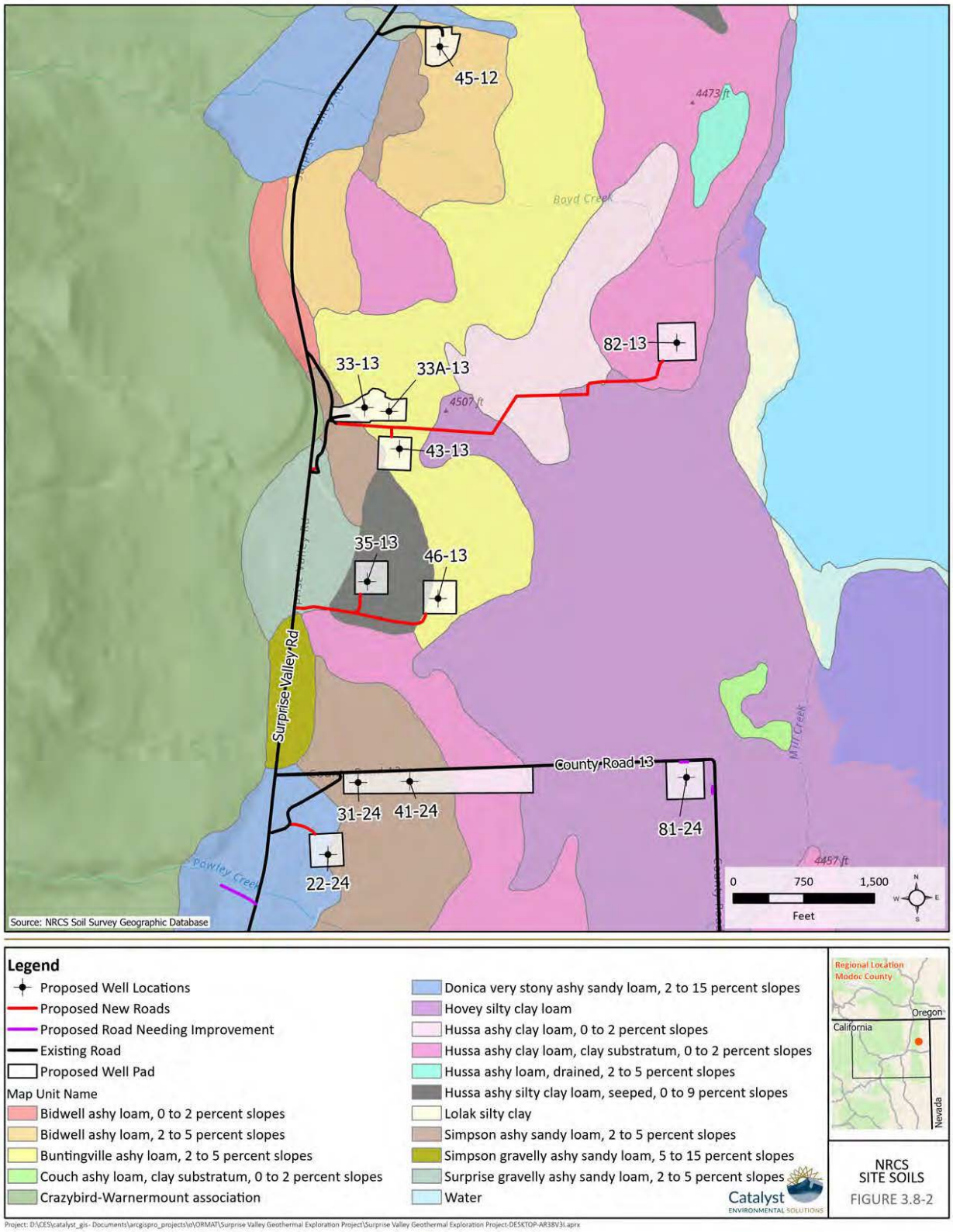


Figure 3.8-2: NRCS Site Soils



Expansive Soils

Expansive soils are soil clays often classifies as silty clays which expands when wet and shrinks when dry (Rajapakse, 2016). The native clays in the Project area soils exhibit moderate to severe swell potential (Natural Resources Conservation Service, 2025). To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557).

Corrosive Soils

Native soils at the site have a low to moderate risk of corrosion to concrete and a moderate to high risk of corrosion to steel. The risk of corrosion is determined by potential soil-induced electrochemical or chemical action which corrodes or weakens these materials. Risk to steal is primarily determined by levels of soil moisture, particle-size distribution, acidity, and electrical conductivity. Risk to Concrete is determined by sulfate and sodium content, texture, moisture content, and acidity of the soil. (Natural Resources Conservation Service, 2025). Materials at the site used for construction of well pads, building foundations, and footings will adhere to geoengineering recommendations to minimize corrosive soil impacts on building materials.

3.8.1.3 Fault Rupture Hazard

Surprise Valley is a seismically active area that is traversed by numerous mapped faults including the Surprise Valley Fault, the Lake City Fault, Valley Floor Faults and "West Side of Hays Range" (Figure 9). Active faults are defined by the California Geological Survey as faults that have ruptured during Holocene time (within the last approximately 11,700 years). Potentially active faults are those that have ruptured during the last 1.8 million years (Quaternary time), but with no direct evidence of a movement within Holocene time.

The Surprise Valley fault is an 84 km-long, north-trending normal fault located along the east side of the Warner Mountains. The Lake City fault is a northwest-trending, inferred fault located between Upper Lake and Middle Alkali Lake. "Valley Floor Faults" are poorly defined and mapped but are thought to consist of many short, discontinuous, generally north-trending faults east of the Surprise Valley fault near Cedarville. An unnamed fault described as the "West Side of the Hays Range so a 5km long fault along the southeaster edge of the Surprise Valley (Bryant, 1990). The Project area is located directly above and adjacent to the Surprise Valley Fault and Lake City Fault Zone. (California Geological Survey, 2025). The Project site is located within a currently mapped Alquist-Priolo Special Studies Fault Zone (California Geological Survey, 2025).

3.8.1.4 Ground Shaking

Ground shaking can occur during an earthquake, and its intensity is related to the proximity of the area to the fault, the focal depth, soil types, the location of the epicenter, and the size (magnitude) of the earthquake. Ground motions are primarily dependent on the earthquake's magnitude and distance to the rupture zone. Accelerations also depend upon rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area. Soils formed from alluvial deposits are more prone to ground shaking than dense materials such as bedrock. Much of the Surprise Valley is located on alluvium which increases the amplitude of an earthquake wave, increasing the risk of structural damage to buildings and infrastructure (Modoc County, 2018).

3.8.1.5 Liquefaction

Liquefaction is a process whereby soil is temporarily transformed to a fluid form during intense and prolonged ground shaking. Liquefaction during major earthquakes may cause severe damage to structures on level ground as a result of settling, titling, or floating (Modoc County, 2018). Liquefaction zones have not been identified in this area (California Geological Survey, 2025). However, due to the location of the Project area directly adjacent to Upper Alkali Lake, there is potential for liquefaction.

3.8.1.6 Lateral Spreading

Lateral spreading typically occurs as a form of horizontal displacement of relatively flat-lying alluvial material toward an open or "free" face such as an open body of water, channel, or excavation. This movement is generally due to failure along a weak plane and may often be associated with liquefaction. As cracks develop within the weakened material, blocks of soil displace laterally toward the open face. Cracking and lateral movement may gradually propagate away from the face as blocks continue to break free. Due to the potential for liquefaction and the fact that the site is located near a body of water, there is potential for lateral spreading.

3.8.1.7 Subsidence

The Project site is not located within a mapped area of known land subsidence (United States Geological Survey, 2025). Due to the depth of groundwater and the fact that the site is not located in a mapped subsidence area, the potential for subsidence is considered low.

3.8.1.8 Landslides

The Project site is relatively flat, and the hazard of landslides is unlikely due to the planar topography of the Site and the region. The site is not located in a mapped Landslide Zone (California Geological Survey, 2025).

3.8.2 Regulatory Setting

This section describes the laws, policies, and regulations that pertain to the Project.

3.8.2.1 Federal

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1977 to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." To accomplish this, the Act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by NEHRP, which refined the description of agency responsibilities, program goals, and objectives.

NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Programs under NEHRP help inform and guide planning and building code requirements such as emergency evacuation responsibilities and seismic code standards such as those to which the Project would be required to adhere.

3.8.2.2 State

Alquist-Priolo Special Studies Earthquake Hazards Act (APEHA)

The APEHA was passed into law following the destructive February 9, 1971, San Fernando earthquake. The APEHA provides a mechanism for reducing losses from surface fault rupture on a statewide basis. The intent of the APEHA is to ensure public safety by prohibiting the siting of most structures for human occupancy across traces of active faults that constitute a potential hazard to structures from surface faulting or fault creep. The state geologist (Chief of the California Division of Mines and Geology) is required to identify "earthquake fault zones" along known active faults in California. Counties and cities must withhold development permits for human occupancy projects within these zones unless geologic studies demonstrate that there would be no issues associated with the development of projects. The Project site is located within a currently mapped APEHA zone.

California Building Code

The California Building Standards Commission is responsible for coordinating, managing, adopting, and approving building codes in California. CCR Title 24 is reserved for state regulations that govern the design and construction of buildings, associated facilities, and equipment, known as building standards. The California Building Code (CBC) is based on the Federal Uniform Building Code used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The California Health and Safety Code (HSC) Section and 18980 HSC Section 18902 give CCR Title 24 the name of California Building Standards Code. The updates to the 2019 California Building Standards Code were published on January 1, 2021, with an effective date of July 1, 2021.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act aims to reduce the threat of seismic hazard to public health and safety by identifying and mitigating seismic hazards. Through the Act, the California Department of Conservation, Division of Mines and Geology, is directed to delineate seismic hazard zones. State, county, and city agencies are directed to utilize such maps in land use and permitting processes. The Act also requires geotechnical investigations particular to the site be conducted before permitting occurs on sites within seismic hazard zones. The Project site is not sited in any known seismic hazard zones.

3.8.2.3 Local

Modoc County General Plan

The Modoc County General Plan, Safety Element identifies geological hazards, seismic hazards, wildland fire hazards, flood hazards and other hazards. The Safety Element outlines relevant Modoc County Local Hazard Mitigation Plan mitigation measures relevant to the above hazards

Local Hazard Mitigation Plan

Modoc County Local Hazard Mitigation Plan (LHMP) was updated in March 2016 and adopted by the County in 2017 (Modoc County, 2018). The purpose of the plan is to reduce or eliminate long-term risk to people and property from the identified hazards (Modoc County, 2016). The LHMP addresses a wide range of risks present in the county and provides mitigation measures to protect people and property. The plan includes risks associated with geological and soil conditions, generally in the County, none of which is directly relevant to the proposed Project.

3.8.3 Impacts Analysis

3.8.3.1 Impact Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to geology and soils. The criteria listed below considers if the Project would:

a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
    i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.
    ii. Strong seismic ground shaking?
    iii. Seismic-related ground failure, including liquefaction?
    iv. Landslides?
b. Result in substantial soil erosion or the loss of topsoil?

c. 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 on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

3.8.3.2 Analytical Approach

This impacts analysis describes the potential for the Project and its varying components (Section 2.3) to impact the geology and soil condition on the Project site. Potential impacts were evaluated from available online resources and publicly available databases. These sources and findings are used to determine whether Project activities would surpass the threshold of the significance criteria listed above.

3.8.3.3 Analysis of Checklist Questions

Would the Project directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:

Rupture of a known earthquake fault, as delineated on the most recent AP Earthquake Fault Zoning Map issued by the state geologist for the area or based on other substantial evidence of a known fault?

As described in Section 3.8.1 above (Existing Conditions), Surprise Valley is a seismically active area that is traversed by numerous mapped faults including the Surprise Valley Fault, the Lake City Fault, Valley Floor Faults and "West Side of Hays Range" (Figure 3.8-1). The Project area is located directly above and adjacent to the Surprise Valley Fault and Lake City Fault Zone (California Geological Survey, 2025). The Project site is located within a currently mapped Alquist-Priolo Special Studies Fault Zone (California Geological Survey, 2025). Consequently, the Project may be subject to fault rupture, but the drilling and testing of the geothermal resource would not induce a fault rupture. Geothermal exploration typically occurs in seismically active areas where faults are present, such as the Project area. Drilling a geothermal test well generally follows fractures, faults, and inclines/synclines, which provide natural pathways down to the geothermal reservoir. These are the same pathways that allow for natural springs and seiches to crest the surface, including in the vicinity of the Project area. If the drilling encounters a stressed fault point, it may release the stored pressure, but this would be a microseismical event and not induce a surface rupture or even be felt on the surface.

Further, the Project does not include any habitable structures, or other elements which would lead to substantive adverse effects, including the risk of loss, injury, or death in the event of a rupture. Furthermore, the Project is limited to the temporary exploration of potential geothermal resources, and there would be no permanent or habitable structures developed as part of the Project. As discussed in Section 2.4.5, at the conclusion of resource testing, all equipment would be removed and

the wells appropriately abandoned. Therefore, there would be **less than significant** impacts to substantive adverse effects, including the risk of loss, injury, or death as a result of a known earthquake fault rupture.

a. **Would the Project directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:**

Strong seismic ground shaking?

The proposed Project is located directly above the Surprise Valley Fault and Lake City Fault Zone. Due to the Project's proximity to these faults, seismic hazards related to ground shaking could occur on the Project site. The intensity of ground shaking is related to the proximity of the area to the fault, the focal depth, soil types, the location of the epicenter, and the size (magnitude) of the earthquake. No earthquakes with strong-motion have been recorded in Modoc County, although the County has felt ground shaking from earthquakes with epicenters located elsewhere (Modoc County, 2018). The Surprise Valley region is at higher risk for strong seismic ground shaking due to its underlying geology. Surprise Valley is largely alluvium which increases the amplitude of the earthquake wave (Modoc County, 2018). The Project would not include any habitable structure which would pose a risk to employees during a seismic event. Therefore, there would be **less than significant** impacts to substantive adverse effects, including the risk of loss, injury, or death as a result of a strong seismic ground shaking.

a. **Would the Project directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:**

Seismic-related ground failure, including liquefaction?

As discussed in Section 3.8.1, liquefaction occurs in areas where loosely packed, saturated soil or sediment at or near the ground surface loses its strength, which can lead to excessive settlement, ground rupture, lateral spreading, or failure of shallow bearing foundations. Liquefaction zones have not been identified in this area (California Geological Survey, 2025). However, due to the location of the Project area directly adjacent to Upper Alkali Lake, there is potential for liquefaction.

To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557). On-site soil that has been piled during excavation will be used as backfill material, as necessary. Only soil that is free of debris and deleterious matter would be used as backfill material. The proposed facilities would be placed on shallow-spread footers and wall footers to support the structures. Thus, impacts to seismic-related ground failure, including liquefaction attributed to the Project would be **less than significant**.

a. **Would the Project directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:**

Landslides?

As discussed in Section 3.7.1, site topography is flat, and no ancient landslides have been mapped in the area. Development of the Project would not directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving landslides. Based on Project site conditions, hazards associated with landslides are considered nominal and there would be **no impacts** from the Project.

Would the Project result in substantial soil erosion or the loss of topsoil?

As described in Section 2, the well pads and access roads would be developed on agricultural land currently dedicated to alfalfa production and would require earthwork for development. A total of 39.5 acers would be disturbed for the well pads and access roads, where ground disturbing activities would include clearing, earthwork, drainage and grading necessary for safe operations and for fire prevention. Clearing would include removal of organic material, stumps, brush and slash, which would either be removed and taken to an appropriate dump site or left onsite. Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas. Removal and stockpiling of topsoil for revegetation purposes could reduce the natural fertility of the soil and cause a loss of soil profiles by mixing soil horizons and subsequent breakdown in soil structure.

The potential for wind erosion could increase with removal of vegetation and exposure of soils attributed to construction/reclamation activities. Furthermore, Project activities that could result in substantial soil erosion (i.e., prolonged exposure of dry ground, driving) would be managed according to County standards. Project operation is not anticipated to result in substantial soil erosion or the loss of topsoil, but construction and reclamation activities may result in **less than significant** impacts to substantial soil erosion or the loss of topsoil.

The Applicant will acquire appropriate CWA Regulatory Permits, prepare a Storm Water Pollution Prevention Plan (SWPPP), and implement Best Management Practices (BMPs) prior to construction and site restoration.

Mitigation Measure(s)

GS-1. Prepare a Stormwater Pollution Prevention Plan. A Stormwater Pollution Prevention Plan (SWPPP) shall be developed and implemented to minimize erosion during construction and reclamation of the Project. The SWPPP would comply with the National Pollutant Discharge Elimination System (NPDES) General Construction Permit and shall be required to include the following:

- A detailed description of all Best Management Practices (BMPs) that shall be employed
- An outline of the areas on site that shall be disturbed during construction and reclamation of the Project
- A proposed schedule for the implementation of erosion control measures

In addition, all surface water and drainage features within 1,000 feet of construction and reclamation activities shall be identified. Construction and reclamation activities within 100 feet of these resources shall implement the BMPs detailed in the SWPPP.

Implementation of **MM GS-1** would reduce the Project impacts related to erosion and soil loss to a level of **less than significant**.

Would the Project 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 on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

As discussed in Section 3.8.1, due to the location of the Project area directly adjacent to Upper Alkali Lake there is potential for Liquefaction and lateral spreading due to saturation of soils. To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557). The project does not include any injection well operations or other project components which would exacerbate these conditions.

The Project site is not located within a mapped area of known land subsidence (United States Geological Survey, 2025). The test wells would pass through groundwater aquifers and would not interact with groundwater resources or contribute to water draw down. Therefore, the Project would not create a risk of subsidence. The Project site is relatively flat, and the hazard of landslides is unlikely due to the planar topography of the site and the region. The site is not located in a mapped Landslide Zone (California Geological Survey, 2025).

Therefore, the potential for the Project to result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse would be **less than significant**.

Would the Project be located on expansive soil, as defined in the latest Uniform Building Code, creating substantial direct or indirect risks to life or property?

As discussed in Section 3.8.1, the native clays in the Project area soils exhibit moderate to severe swell potential (Natural Resources Conservation Service, 2025). To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557).

Due to the lack of habitable structures, limited structures and temporary nature of the Project it is unlikely damage from expansive soils would create substantia direct or indirect risk to life or property. Therefore, direct and indirect risks to life and property would be **less than significant**.

Would the Project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

The Project does not include any septic tanks or wastewater disposal systems. Therefore, the Project would have **no impact** on soils and the capacity to adequately support the use of septic tanks or alternative wastewater disposal systems.

Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No paleontological resources were identified in the record search or field investigation. However, there is a potential, albeit minimal, to encounter unanticipated paleontological resources during ground-disturbing activities, well drilling in particular. Paleontological resources are embedded in bed rock and the only aspect of the Project with potential to disturb paleontological resources is geothermal wells drilling. **Mitigation Measure GS-2**, based on state and agency regulations and guidelines, will mitigate any potential adverse impacts that could occur if there were an inadvertent discovery of buried paleontological resources.

Incorporation of **MM-GS-2** would protect paleontological resources and develop treatment measures to effectively eliminate potentially significant impacts to previously undiscovered paleontological resources. Therefore, impacts would be reduced to a **less than significant level with mitigation incorporated**.

Mitigation Measure(s)

GS-2. Prepare Unanticipated Discovery Plan for Paleontological Resources. If paleontological resources are encountered during ground-disturbing activities, work in the immediate area shall halt and the County and a qualified Paleontologist shall be contacted immediately to evaluate the find. The Project shall prepare an Unanticipated Discovery Plan for paleontological resources to establish the findings protocols and minimize potential for damaging paleontological resources.

3.8.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. The geothermal test well will be abandoned in conformance with the well abandonment requirements of CalGEM. CalGEM requirements will be prepared and implemented. The abandonment plan would describe the proposed approach to facility abandonment, equipment removal, disposal, and site restoration. All above-ground equipment will be dismantled and removed from the entire site. The surface of the site would be restored to conform to approximate pre-Project land uses (e.g., agriculture or open space). **No impacts** are anticipated during the decommissioning and restoration, all ground disturbance would have occurred during the construction phase of the Project.

3.9 Greenhouse Gas Emissions

This section describes the existing greenhouse gas emissions of the County; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on greenhouse gas emissions in the Project area. Table 3.9-1 summarizes impacts on greenhouse gas emissions that could result from implementation of the Project.

Table 3.9-1. Summary of Greenhouse Gas Emissions Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Less than Significant	None Required
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Less than Significant	None Required

3.9.1 Existing Conditions

Greenhouse gas (GHG) emissions and climate change are a cumulative global issue. CARB and EPA regulate GHG emissions within the State of California and the United States, respectively. While CARB has the primary regulatory responsibility within California for GHG emissions, local agencies can also adopt policies for GHG emission reduction. CARB has divided California into regional air basins. The Project is located within Modoc County and within the Northeast Plateau Air Basin.

The standard state definition of GHG includes six substances: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulfur hexafluoride (SF_6) (CARB 2014). Tropospheric O_3 (a short-lived, not-well-mixed gas) and black carbon are also important climate pollutants. CO_2 is the most abundant GHG, and collectively CO_2, CH_4, and N_2O amount to 80 percent of GHG effects.

For each GHG, a global warming potential (GWP) has been calculated to reflect how long emissions remain in the atmosphere and how strongly energy is absorbed on a per-kilogram basis relative to CO2. GWP is a metric that indicates the relative climate forcing of a kilogram of emissions when averaged over the period of interest (both 20-year and 100-year horizons are used for the GWPs shown in Table 3.9-2). To account for this higher potential, emissions of other GHGs are frequently expressed in the equivalent of CO_2, denoted as CO_2e. CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect.

Table 3.9-2. Global Warming Potential for Selected Greenhouse Gases

Pollutant	Lifetime (Years)	Global Warming Potential (20-Year)	Global Warming Potential (100-Year)
Carbon Dioxide	100	1	1
Nitrous Oxide	121	264	265
Nitrogen Triflouride	500	12,800	16,100
Sulfur Hexafluoride	3,200	17,500	23,500
Perfluorocarbons	3,000-50,000	5,000-8,000	7,000-11,000
Black Carbon	days to weeks	270-6,200	100-1,700
Methane	12	84	28

Hydrofluorocarbons	Uncertain	100-11,000	100-12,000

Source: (CARB, 2014)

The primary effect of rising global concentrations of atmospheric GHG is a rise in the average global temperature of approximately 0.2 degrees Celsius per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling using emission rates shows that further warming is likely to occur given the expected rise in global atmospheric GHG concentrations from innumerable sources of GHG emissions worldwide, which would induce further changes in the global climate system during the current century.

Scientific understanding of the fundamental processes responsible for global climate change has improved over the past decade. However, there remain significant scientific uncertainties. For example, uncertainties exist in predictions of local effects of climate change, occurrence of extreme weather events, and effects of aerosols, changes in clouds, shifts in the intensity and distribution of precipitation, and changes in oceanic circulation. Due to the complexity of the climate system, the uncertainty surrounding the implications of climate change may never be eliminated. Because of these uncertainties, there continues to be significant debate as to the extent to which increased concentrations of GHGs have caused or would cause climate change, and with respect to the appropriate actions to limit and/or respond to climate change. In addition, it may not be possible to link specific development projects to future specific climate change impacts, though estimating project-specific impacts is possible.

California produced approximately 371.1 million metric tons carbon dioxide equivalent ($MMTCO_2e$) in 2022, which is below the State's GHG reduction target of 1990 level GHG emissions (i.e., 431 $MMTCO_2e$) by 2020 (CARB, 2024). Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions in 2022, accounting for approximately 39 percent of total GHG emissions in the State (CARB, 2024). This sector was followed by the industrial sector at approximately 23 percent and the electric power sector (including both in-state and out-of-state sources) at approximately 16 (CARB, 2024). In 2014, CARB had projected that, unregulated, statewide GHG emissions for the year 2020 will be approximately 509 $MMTCO_2e$ (CARB, 2014). These projections represent the emissions that were anticipated in the absence of any GHG reduction actions.

3.9.2 Regulatory Setting

3.9.2.1 Federal

Clean Air Act

The Federal Clean Air Act (CAA), passed in 1970 and last amended in 1990, is the primary federal law that governs air quality. The Federal CAA delegates primary responsibility for clean air to the U.S. EPA. The U.S. EPA develops rules and regulations to preserve and improve air quality and delegates specific responsibilities to state and local agencies. Under the act, the U.S. EPA has established the NAAQS for six criteria air pollutants that are pervasive in urban environments and for which state and national health-based ambient air quality standards have been established. Ozone, CO, NO_2, SO_2, Pb, and PM (Including both PM_{10}, and $PM_{2.5}$) are the six criteria air pollutants. Ozone is a secondary pollutant, nitrogen oxides (NO_X) and volatile organic compounds (VOCs) are of particular interest as they are

precursors to ozone formation. In addition, national standards exist for Pb. The NAAQS standards are set at levels that protect public health with a margin of safety and are subject to periodic review and revision.

The Federal CAA requires U.S EPA to designate areas as attainment, nonattainment, or maintenance (previously nonattainment and currently attainment) for each criteria pollutant based on whether the NAAQS have been achieved.

Mandatory Reporting of Greenhouse Gases (Title 40, Part 98 of the Code of Federal Regulations)

Under Subpart DD, owners and operators of electric power system facilities with a total nameplate capacity that exceeds 17,820 lbs (7,838 kg) of sulfur hexafluoride (SF_6) and/or perfluorocarbons (PFCs) must report emissions of SF_6 and/or PFCs from the use of electrical transmission and distribution equipment. Owners and operators are required to collect emissions data, calculate GHG emissions, and follow the specified procedures for quality assurance, missing data, recordkeeping, and reporting per the requirements of 40 CFR Part 98 Subpart DD – Electric Transmission and Distribution Equipment Use.

3.9.2.2 State

Executive Order S-3-05

On June 1, 2005, Executive Order S-3-05 set the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels. It calls for the Secretary of CalEPA to be responsible for coordination of State agencies and progress reporting.

Executive Order B-30-15

In April 2015, Governor Edmund Brown issued an Executive Order establishing a statewide GHG reduction goal of 40 percent below 1990 levels by 2030. The emission reduction target acts as an interim goal between the AB 32 goal (i.e., achieve 1990 emission levels by 2020) and Governor Brown's Executive Order S-03-05 goal of reducing statewide emissions 80 percent below 1990 levels by 2050. In addition, the Executive Order aligns California's 2030 GHG reduction goal with the European Union's reduction target (i.e., 40 percent below 1990 levels by 2030) that was adopted in October 2014.

Assembly Bill 32 (AB 32)

In September 2006, the California Global Warming Solutions Act of 2006, also known as AB 32, was signed into law. AB 32 focuses on reducing GHG emissions in California and requires CARB to adopt rules and regulations that would achieve GHG emissions equivalent to Statewide levels in 1990 by 2020. CARB initially determined that the total Statewide aggregated GHG 1990 emissions level and 2020 emissions limit was 427 $MMTCO_2e$. The 2020 target reduction was estimated to be 174 $MMTCO_2e$.

To achieve the goal, AB 32 mandates that CARB establish a quantified emissions cap, institute a schedule to meet the cap, implement regulations to reduce Statewide GHG emissions from stationary

sources, and develop tracking, reporting, and enforcement mechanisms to ensure that reductions are achieved.

Assembly Bill 1279 (AB 1279)

AB 1279, the California Climate Crisis Act, passed on September 16, 2022, requires that the state achieve net zero GHG emissions as soon as possible, but no later than 2045. In addition, AB 1279 requires the state to achieve and maintain net negative GHG emissions and ensure that by 2045, statewide anthropogenic GHG emissions are reduced to at least 85% below the 1990 levels. The bill requires updates to the scoping plan (once every five years) to implement various policies and strategies that enable carbon dioxide removal solutions and carbon capture, utilization, and storage technologies.

Senate Bill 32 (SB 32)

Senate Bill (SB) 32, signed September 8, 2016, updates AB 32 to include an emissions reduction goal for the year 2030. Specifically, SB 32 requires the state board to ensure that statewide GHG emissions are reduced to 40 percent below the 1990 level by 2030. The new plan, outlined in SB 32, involves increasing renewable energy use, imposing tighter limits on the carbon content of gasoline and diesel fuel, putting more electric cars on the road, improving energy efficiency, and curbing emissions from key industries.

Senate Bill 375 (SB 375)

Acknowledging the relationship between land use planning and transportation sector GHG emissions, Senate Bill (SB) 375 was passed by the State Assembly on August 25, 2008, and signed by the Governor on September 30, 2008. This legislation links regional planning for housing and transportation with the GHG reduction goals outlined in AB 32. Reductions in GHG emissions would be achieved by, for example, locating employment opportunities close to transit.

Under SB 375, each Metropolitan Planning Organization (MPO) would be required to adopt a Sustainable Community Strategy (SCS) to encourage compact development that reduce passenger vehicle miles traveled (VMT) and trips so that the region will meet a target, created by CARB, for reducing GHG emissions. If the SCS is unable to achieve the regional GHG emissions reduction targets, then the MPO is required to prepare an alternative planning strategy that shows how the GHG emissions reduction target could be achieved through alternative development patterns, infrastructure, and/or transportation measure.

Climate Change Scoping Plan

In 2008, CARB approved the original Climate Change Scoping Plan as required by AB 32. Subsequently, CARB approved updates to the Climate Change Scoping Plan in 2014 (First Update) and 2017 (2017 Update), with the 2017 Update considering SB 32 (adopted in 2016) in addition to AB 32. In December 2022, CARB approved the final version of California's 2022 Climate Change Scoping Plan (2022 Scoping Plan Update), which outlines the proposed framework of action for achieving California's new AB 1279 2045 GHG target: a 85 percent reduction in GHG emissions by 2045 relative to 1990 levels. The original Climate Change Scoping Plan proposed a "comprehensive set of actions designed to reduce overall

carbon GHG emissions in California, improve our environment, reduce our dependence on oil, diversify our energy sources, save energy, create new jobs, and enhance public health. The original Climate Change Scoping Plan identified a range of GHG reduction actions that included direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms, such as a cap-and-trade system, and an AB 32 implementation fee to fund the program. The 2022 Scoping Plan Update focuses on strategies for reducing California's dependency on petroleum to provide customers with clean energy options that address climate change and support clean sector jobs. SB 350 and other regulations are expected to decarbonize the electricity sector over time.

California Green Building Standards (CALGreen Code)

The California Green Building Standards Code (California Code of Regulations, Title 24, Part 11), commonly referred to as the CALGreen Code, went into effect on January 1, 2017. CALGreen standards require new residential and commercial buildings to comply with mandatory measures under five topical areas: planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. CALGreen also provides voluntary tiers and measures that local governments may adopt that encourage or require additional measures in the five green building topics. The 2025 CALGreen code updates were effective as of January 1, 2026.

The California Energy Code (California Code of Regulations, Title 24, Section 6) was created as part of the California Building Standards Code (Title 24 of the California Code of Regulations) by the California Building Standards Commission in 1978 to establish statewide building energy efficiency standards to reduce California's energy consumption. These standards include provisions applicable to all buildings, residential and nonresidential, which describe requirements for documentation and certificates that the building meets the standards. Compliance with Title 24 is enforced through the building permit process.

3.9.2.3 Local

Modoc County General Plan

The Modoc County General Plan contains goals, objectives, policies and/or programs to conserve the natural environment and address the physical impacts of climate change. However, the General Plan does not directly address the emission of greenhouse gases through any policy, goals or action items.

3.9.3 Impacts Analysis

3.9.3.1 Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to GHGs. The criteria listed below considers if the Project would:

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The Project components are located within the jurisdiction of the MCAPCD which has not adopted GHG thresholds of significance for CEQA. Per CEQA Guidelines Section 15064(h)(3), a project's incremental contribution to a cumulative impact can be found not cumulatively considerable if the Project will comply with an approved plan or mitigation program that provides specific requirements that will avoid or substantially lessen the cumulative problem within the geographic area of the Project. To qualify, such a plan or program must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency. Examples of such programs include a "water quality control plan, air quality attainment or maintenance plan, integrated waste management plan, habitat conservation plan, natural community conservation plans [and] plans or regulations for the reduction of greenhouse gas emissions." Put another way, CEQA Guidelines Section 15064(h)(3) allows a lead agency to make a finding of less than significance for GHG emissions if a project complies with regulatory programs to reduce GHG emissions.

In the absence of any adopted numeric threshold, the significance of the Project's GHG emissions is evaluated consistent with CEQA Guidelines Section 15064.4(b) by considering whether the Project complies with applicable plans, policies, regulations, and requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. For the Project, the most directly applicable adopted regulatory plan to reduce GHG emissions is CARB AB 32 Scoping Plan which includes 39 Recommended Actions designed to reduce overall GHG emissions in California.

3.9.3.2 Analytical Approach

This impacts analysis evaluates the potential for the Project and its varying components to impact GHGs.

Construction of the Project was assumed to commence in the fourth quarter of 2026 and was estimated to take up to 25 months with another three months for site reclamation. The Project would result in short-term emissions of air pollutants associated with construction and testing operations. Construction emissions would include exhaust from the operation of conventional construction equipment, on-road emissions from employee vehicle trips and haul truck trips, fugitive dust as a result of grading and vehicle travel on paved and unpaved surfaces.

Construction emissions were estimated using the latest version of California Emissions Estimator Model (CalEEMod), version 2022.1. CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operation of a variety of land use projects. The model utilizes widely accepted federal and state models for emission estimates and default data from sources such as U.S. EPA AP-42 emission factors, CARB vehicle emission models, and studies from California agencies such as the California Energy Commission (CEC). CalEEMod inputs for construction and testing activities consist of the data provided for the construction schedule, offroad equipment operations and vehicle miles traveled above. Default CalEEMod inputs were used for modeling where Project-specific details were not readily ascertainable (e.g., fleet mix and trip length).

3.9.3.3 Analysis of Checklist Questions

Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction of the proposed Project would generate GHG emissions over a 22-25 month construction period, with another three months for site reclamation. Exhaust emissions would result from construction equipment and machinery as well as from vehicular traffic generated by construction activities. Construction and operation GHG emissions were estimated using SCAQMD's CalEEMod 2022.1 model (refer to Appendix A) based on assumptions detailed in Section 2.4, including the Project's construction schedule and testing activities. Short-term construction and testing emissions (e.g., off-road equipment and vehicle trips) associated with the proposed Project were evaluated. For all GHG emissions assumptions and calculations, see Appendix A. Based on the results of this modeling, construction emissions would result in a maximum of 7,379.4 $MTCO_2e$ per year. Total project GHG emissions for construction are estimated at 13,123 $MTCO_2e$ as shown in Table 3.9-3.

Table 3.9-3. Estimated Project Construction GHG Emissions

Construction Year	GHG ($MTCO_2e$/year)
2026	448
2027	7,369
2028	5,305
2029	0.98
TOTAL	**13,123**

Source: CalEEMod

As summarized in Table 3.9-3, total GHG construction emissions would be approximately 13,123 $MTCO_2e$. In accordance with industry standard, the total GHG emissions from construction were amortized (i.e., averaged annually) over a 30-year timeframe, with a resulting annual emission of 437.4 $MTCO_2e$ per year.

As summarized in Section 3.9.1 above, the MCAPCD does not have numeric thresholds for GHG emissions for CEQA. Per CEQA Guidelines Section 15064(h)(3), a project's incremental contribution to a cumulative impact can be found not cumulatively considerable if the Project will comply with an approved plan or mitigation program that provides specific requirements that will avoid or substantially lessen the cumulative problem within the geographic area of the Project. To qualify, such a plan or program must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency. Examples of such programs include a "air quality attainment or maintenance plan and/or plans or regulations for the reduction of greenhouse gas emissions." Put another way, CEQA Guidelines Section 15064(h)(3) allows a lead agency to make a finding of less than significance for GHG emissions if a project complies with regulatory programs to reduce GHG emissions.

In the absence of any adopted numeric threshold, the significance of the proposed Project's GHG emissions is evaluated consistent with CEQA Guidelines Section 15064.4(b) by considering whether the

proposed Project complies with applicable plans, policies, regulations, and requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. Accordingly, the proposed Project is evaluated against the CARB Scoping Plan. Measures included in the CARB Scoping Plan would indirectly address GHG emission levels associated with construction activities, including the phasing-in of cleaner technology for diesel engine fleets (including construction equipment) and the development of a low-carbon fuel standard. Policies formulated under the mandate of AB 32 that apply to construction-related activity either directly or indirectly, are assumed to be implemented statewide and would affect the Project should those policies be implemented before construction begins. Specifically, implementation of AB 32 control measures for reduced vehicle emissions would decrease GHG emissions from the Project. In addition, the Project is in support of a potential future renewable energy project which supports the GHG reduction measures to increase renewable and zero-carbon energy generation including installation of utility scale solar and geothermal energy as a particular focus of the Scoping Plan GHG Reduction Measure E-3 (Renewable Portfolio Standard).

Although not directly applicable to the proposed Project, the proposed Project would not conflict with population growth projections of the Modoc County Regional Transportation Plan (Modoc County Transportation Commission 2019), or its goals associated with GHG reductions. Specifically, the Project would not contribute to population growth outside of those projections. As such, the Project would be consistent with the current land use designation for the Project site and would not create housing or otherwise lead to substantial unplanned population growth in the vicinity and is considered consistent with the GHG reduction goals of the Regional Transportation Plan.

The plan consistency analysis demonstrates that the Project is consistent with plans, policies, regulations and GHG reduction actions/strategies outlined in CARB's Scoping Plan and Modoc County Regional Transportation Plan. As the proposed Project would not conflict with applicable plans, policies, and regulations adopted for the purpose of reducing emissions of GHGs, the proposed Project's impacts related to GHG emissions would be less than significant. Further, based on the results of the quantitative analysis as described above, the Project would result in 437.4 $MTCO_2e$ emissions per year (with construction emissions amortized over 30 years). These emissions are significantly less than the bright-line threshold of 1,100 $MTCO_2e$ per year often used for projects in nearby air districts. Because the Project is consistent and does not conflict with the applicable plans, policies, and regulations, and because the Project's incremental increase in GHG emissions is below the 1,100 $MTCO_2e$ per year *de minimis* threshold for industrial projects, the Project's incremental increase in GHG emissions of 437.4 $MTCO_2e$ per year (construction emissions amortized over 30 years) would be **less than significant**.

Would the Project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

As described above, California has enacted several pieces of legislation that relate to GHG emissions and climate change, much of which sets aggressive goals for GHG reductions within the state. The first and most far-reaching is AB 32, now followed by SB 32 and AB 1279, in which CARB must ensure that statewide anthropogenic GHG emissions are reduced to at least 85% below the 1990 levels by 2045. While AB 32 establishes control measures that would apply to light, medium, and heavy-duty vehicles, and the proposed Project would operate those types of vehicles, these measures are being

implemented at the state level and the proposed Project would not interfere with the implementation of the control measures. Implementation of AB 32 control measures for reduced vehicle emissions would decrease GHG emissions from the Project. Accordingly, the proposed Project would have **less than significant** impacts on applicable plans, policies and regulations adopted for the purpose of reducing the emissions of greenhouse gases.

3.9.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. The site will be reclaimed to farmable land. All abandonment and decommissioning activities would be short-term and any emissions from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.9.3 above and would be **less than significant**.

All abandonment and decommissioning activities would be short-term and any GHG emissions from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.9.3 above and would not be significant (i.e., well below the bright-line threshold of 1,100 $MTCO_2e$ per year often used for industrial projects in nearby districts).

3.10 Hazards and Hazardous Materials

This section describes the existing hazards and hazardous materials of the Project; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of hazards and hazardous materials attributed to the Project. Table 3.10-1 summarizes impacts on hazards and hazardous materials that could result from implementation of the Project.

Table 3.10-1. Summary of Hazards and Hazardous Materials Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	Less Than Significant	None Required
b) 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?	Less Than Significant	None Required
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	No Impact	None Required
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	No Impact	None Required
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the	No Impact	None Required

Project result in a safety hazard or excessive noise for people residing or working in the Project area?		
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	Less Than Significant	None Required
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	Less Than Significant	None Required

3.10.1 Existing Conditions

A hazardous material is defined as any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. The term "hazardous materials" refers to both hazardous substances and hazardous wastes. Under federal and state laws, any material, including waste, may be considered hazardous if it is specifically listed by statute as such or if it is toxic, ignitable, corrosive, or reactive. The potential for an accident is increased in regions near roadways that are frequently used for transporting hazardous material and in regions with agricultural or industrial facilities that use, store, handle, or dispose of hazardous material. The amount of hazardous waste generated in the County is small, consisting primarily of small quantity generators and household waste (Modoc County, 2018).

3.10.1.1 EnviroStor

CalEPA Department of Toxic Substances Control (DTSC) maintains EnviroStor, a data management system for tracking cleanup, permitting, enforcement and investigation efforts at hazardous waste facilities and sites with known contamination or sites where there may be reasons to investigate further. EnviroStor lists 100 permitted hazardous waste facilities under the CalEPA DTSC in California, and 724 corrective action sites (Department of Toxic Substances Control, 2025). Per the current EnviroStor database no cleanup sites are listed in the Project area or in the immediate vicinity (1-mile) (Department of Toxic Substances Control, 2025).

3.10.1.2 Geotracker

The SWRCB maintains GeoTracker, a database of environmental data from water quality regulatory programs, including oil and gas monitoring related activities. The SWRCB also maintains a list of solid waste disposal sites with waste constituents above hazardous waste levels outside the waste management unit. Per the current GeoTracker database the Project area is not currently found on this list and there are no sites in the vicinity of the Project area (State Water Resources Control Board, 2025). The SWRCB also maintains a list of active Cease and Desist Orders (CDO) and Cleanup and Abatement Orders (CAO), and the Project area is not currently found on this list as well (State Water Resources Control Board, 2025).

3.10.1.3 Wildfire Risk

The Project site is located in the unincorporated area of Modoc County. The Project area is not located in an area mapped for fire hazard severity but is located directly adjacent to areas mapped as "High"

and “Very High” (CalFire, 2024). The Project area is primarily located in or adjacent to irrigated agricultural lands. The Project would not increase wildfire risk; therefore, no impacts are anticipated by Project.

3.10.1.4 Airports

The Project is not located within 2 miles of a public airport or a public use airport. The closest airport is Cedarville Airport located approximately 7.5 miles south of the Project area. No impacts would occur to airports attributed to the Project.

3.10.2 Regulatory Setting

This section describes the laws, policies, and regulations applicable to Hazards and Hazardous materials.

3.10.2.1 Federal

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Over 5 years, $1.6 billion was collected and the tax went to a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. The Comprehensive Environmental Response, Compensation, and Liability Act established prohibitions and requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified.

Emergency Planning Community Right-to-Know Act of 1986 (42 United States Code 11001 et seq.)

The Emergency Planning Community Right-to-Know Act was included under the Superfund Amendments and Reauthorization Act (SARA) law and is commonly referred to as SARA Title III. Emergency Planning Community Right-to-Know was passed in response to concerns regarding the environmental and safety hazards posed by the storage and handling of toxic chemicals. These concerns were triggered by the disaster in Bhopal, India, in which more than 2,000 people suffered death or serious injury from the accidental release of methyl isocyanate. To reduce the likelihood of such a disaster in the U.S., Congress imposed requirements on both states and regulated facilities.

Emergency Planning Community Right-to-Know establishes requirements for federal, state, and local governments, Indian Tribes, and industry regarding emergency planning and “Community Right-to-Know” reporting on hazardous and toxic chemicals. SARA Title III requires states and local emergency planning groups to develop community emergency response plans for protection from a list of Extremely Hazardous Substances (40 CFR 355). The Emergency Planning Community Right-to-Know provisions help increase the public’s knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. In California, SARA Title III is implemented through the California Accidental Release Prevention.

Federal Insecticide, Fungicide, and Rodenticide Act

The objective of the Federal Insecticide, Fungicide, and Rodenticide Act is to provide federal control of pesticide distribution, sale, and use. All pesticides used in the U.S. must be registered (licensed) by the EPA. Registration assures that pesticides would be properly labeled and that, if used in accordance with specifications, they would not cause unreasonable harm to the environment. Use of each registered pesticide must be consistent with use directions contained on the label or labeling.

Federal Water Pollution Control Act (Clean Water Act)

The objective of the Federal Water Pollution Control Act, commonly referred to as the CWA, is to restore and maintain the chemical, physical, and biological integrity of the nation's waters by preventing point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. The oil SPCC Program of the CWA specifically seeks to prevent oil discharges from reaching waters of the U.S. or adjoining shorelines. Further, farms are subject to the SPCC rule if they:

- Store, transfer, use, or consume oil or oil products.

Could reasonably be expected to discharge oil to waters of the U.S. or adjoining shorelines. Farms that meet these criteria are subject to the SPCC rule if they meet at least one of the following capacity thresholds:

- Aboveground oil storage capacity greater than 1,320 gallons
- Completely buried oil storage capacity greater than 42,000 gallons

However, the following are exemptions to the SPCC rule:

- Completely buried storage tanks subject to all the technical requirements of the underground storage tank regulations
- Containers with a storage capacity less than 55 gallons of oil
- Wastewater treatment facilities
- Permanently closed containers
- Motive power containers (e.g., automotive or truck fuel tanks)

Hazardous Materials Transport Act – Code of Federal Regulations

The Hazardous Materials Transportation Act was published in 1975. Its primary objective is to provide adequate protection against the risks to life and property inherent in the transportation of hazardous material in commerce by improving the regulatory and enforcement authority of the Secretary of Transportation. A hazardous material, as defined by the Secretary of Transportation is, any “particular quantity or form” of a material that “may pose an unreasonable risk to health and safety or property.”

Occupational Safety and Health Administration

Occupational Safety and Health Administration's (OSHA) mission is to ensure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.

OSHA standards are listed in 29 CFR Part 1910. The OHSA Process Safety Management of Highly Hazardous Chemicals (29 CFR Part 110.119) is intended to prevent or minimize the consequences of a catastrophic release of toxic, reactive, flammable, or explosive highly hazardous chemicals by regulating their use, storage, manufacturing, and handling. The standard intends to accomplish its goal by requiring a comprehensive management program integrating technologies, procedures, and management practices.

3.10.2.2 State

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources

The Division of Oil, Gas, and Geothermal Resources was formed in 1915 to address the needs of the state, local governments, and industry by regulating statewide oil and gas activities with uniform laws and regulations. The Division supervises the drilling, operation, maintenance, and plugging and abandonment of onshore and offshore oil, gas, and geothermal wells, preventing damage to: (1) life, health, property, and natural resources; (2) underground and surface waters suitable for irrigation or domestic use; and (3) oil, gas, and geothermal reservoirs. The Division's programs include: well permitting and testing; safety inspections; oversight of production and injection projects; environmental lease inspections; idle-well testing; inspecting oilfield tanks, pipelines, and sumps; hazardous and orphan well plugging and abandonment contracts; and subsidence monitoring.

California Department of Toxic Substances Control

DTSC regulates hazardous waste, cleans-up existing contamination, and looks for ways to reduce the hazardous waste produced in California. Approximately 1,000 scientists, engineers, and specialized support staff are responsible for ensuring that companies and individuals handle, transport, store, treat, dispose of, and clean-up hazardous wastes appropriately. Through these measures, DTSC contributes to greater safety for all Californians, and less hazardous waste reaches the environment.

On January 1, 2003, the Registered Environmental Assessor program joined DTSC. The program certifies environmental experts and specialists as being qualified to perform a number of environmental assessment activities. Those activities include private site management, Phase I ESAs, risk assessment, and more.

California Division of Occupational Safety and Health

The California Division of Occupational Safety and Health protects workers and the public from safety hazards through its programs and provides consultative assistance to employers. California Division of Occupational Safety and Health issues permits, provides employee training workshops, conducts inspections of facilities, investigates health and safety complaints, and develops and enforces employer health and safety policies and procedures.

California Environmental Protection Agency

California Environmental Protection Agency and the SWRCB establish rules governing the use of hazardous materials and the management of hazardous waste. Applicable state and local laws include the following:

- Public Safety/Fire Regulations/Building Codes
- Hazardous Waste Control Law
- Hazardous Substances Information and Training Act
- Air Toxics Hot Spots and Emissions Inventory Law
- Underground Storage of Hazardous Substances Act
- Porter-Cologne Water Quality Control Act

Within Cal-EPA, DTSC has primary regulatory responsibility, with delegation of enforcement to local jurisdictions that enter into agreements with the state agency, for the management of hazardous materials and the generation, transport, and disposal of hazardous waste under the authority of the Hazardous Waste Control Law.

California Emergency Response Plan

California has developed an Emergency Response Plan to coordinate emergency services provided by federal, state, and local government and private agencies. Response to hazardous materials incidents is one part of this plan. The plan is managed by the State Office of Emergency Services (OES), which coordinates the responses of other agencies including Cal-EPA, the California Highway Patrol, CDFW, RWQCB, Modoc County Sheriff's Department, ICFD, and the City of Modoc Police Department.

3.10.2.3 Local

Modoc County General Plan

The Land Use Element states that hazardous waste generated in the County is minor, consisting primarily of small quantity generators and household waste the General Plan states that the County should adopt a hazardous waste management plan and work private industry manage its hazardous wastes, which may eventually include a facility for the collection and transfer of hazardous wastes.

Modoc Environmental Health Department

Modoc Environmental Health is the appointed the Certified Unified Program Agency (CUPA) for Modoc County. The Unified Program is the consolidation of 6 state environmental programs into one program under the authority of CUPA. The CUPA inspects businesses or facilities that handle or store hazardous materials, generate hazardous waste, own or operate ASTs or USTs, and comply with the California Accidental Release Prevention Program. The CUPA Program is instrumental in accomplishing this goal through education, community and industry outreach, inspections, and enforcement.

Modoc County Local Hazards Mitigation Plan

Modoc County Local Hazard Mitigation Plan (LHMP) was updated in March of 2016 and adopted in the 2017 (Modoc County, 2018). The purpose of the plan is to reduce or eliminate long-term risk to people and property from the identified hazards (Modoc County, 2016). The LHMP addresses a wide range of risks present in the county and provides mitigation measures to protect people and property. The plan includes risks associated with Hazardous Materials Transport generally in the County. Per the LHMP Hazardous waste is mostly transported through the county by truck or rail systems. No specific mitigation measures for Hazardous waste are adopted in the LHMP which would be directly relevant to the proposed Project. .

Office of Emergency Services

As part of the Modoc County Sherifs Department, the County OES is mandated by the California Emergency Services Act (Chapter 7, Division 1, Title 2 of Government Code) to serve as the liaison between the State and all the local government in the County. The OES provides centralized emergency management during major disasters, and coordinates emergency operations between various local jurisdictions within the County. The OES has developed several plans, consistent with federal and state policy guidance, to provide the County and participating local jurisdictions and agencies a framework for conducting emergency planning, response, and recovery operations, and handling of hazardous substances. For further information regarding the Project and its impact to public services referred to Section 3.16 below.

3.10.3 Impact Analysis

3.10.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to hazards and hazardous materials. The criteria listed below considers if the Project would:

a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b. 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?

c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?

f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

3.10.3.2 Analytical Approach

Evaluation of Project impacts related to hazards and hazardous materials relied on publicly available information (Envirostor and GeoTracker) obtained through a desktop analysis.

3.10.3.3 Analysis of Checklist Questions

Would the Project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

The Project construction would require the use of construction vehicles, associated grease, oil, and fuels. Vehicle fuels, oils, grease, have the potential to be released into the environment through natural events (i.e., earthquakes), or human error (i.e., spills). The storage of these materials and handling would adhere to all requirements set forth by the Modoc County OES (Modoc County Sheriff), DTSC, and CUPA. Employees would be trained to handle these materials, spills, and cleanup, and training would adhere to OHSA regulations. In addition, some pesticides may be stored at the Project site for routine nuisance plant maintenance (i.e., weed control). These pesticides would be stored and used according to Federal Insecticide Fungicide and Rodenticide Act (FIFRA) regulations and employees would be trained in proper storage and handling procedures.

Geothermal fluid produced from the wells will be monitored for chemistry and other factors relevant to commercial geothermal potential. Depending on the makeup of the fluid extracted it could potentially be categorized as hazardous. The steel baker tanks will contain all extractions, these fluids will then be transported offsite by a licensed contractor to an appropriate facility. Due to the temporary nature of well testing the Project will not routinely transport hazardous materials even if found, therefore the Project will result in a **less than significant** impact.

Would the Project 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?

The Project construction would require the use grease, oil, fuels, and some pesticides may be stored at the Project work sites. Geothermal fluids collected from the testing may also be considered hazardous materials as described above. Used grease, oil, fuels, and pesticides will be stored in small quantities which would not be likely to escape the drill pad area in the event of a spill. Geothermal fluids will be present in larger qualities (over 20,000-gallons per baker tank). Baker tanks will be constructed of steel and maintained per the manufacturers' recommendations and are unlikely to rupture and expel large quantities of fluid. Minor spills are more likely to occur during transfers, however, these spills would be minor and unlikely to be released into the surrounding environment.

If onsite hazardous materials where to be released into the environment they would likely be limited to the surrounding agricultural fields, and would not pose a significant hazard to the public or natural environment. In addition, a review of information from Envirostor and GeoTracker reveals the Project

site is not listed as a hazardous materials site and there are no active sites that require cleanup, such as LUST sites, Department of Defense sites, and Cleanup Program sites within one mile of the Project site. Therefore, **less than significant** impacts to any reasonably foreseeable release of hazardous materials into the environment. No Impacts are anticipated to past hazardous materials or active cleanups sites.

Would the Project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

The Project is not located within one-quarter mile of an existing school. The closest school is Surprise Valley Elementary School, located approximately 9.9 miles to the south of the Project site. Therefore, the Project would have **no impact** on emitting or handling hazardous or acutely hazardous materials substances or waste within one-quarter mile of an existing or proposed school.

Would the Project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

As described above, the Project site is not listed as a hazardous materials site under the Cal EPA, DTSC. Therefore, implementation of the Project would result in **no impact** related to the Project site being located on a listed hazardous materials site pursuant to Government Code Section 65962.5.

For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?

The Project is not located within 2 miles of a public airport or a public use airport. The closest airport is Cedarville Airport located approximately 8.5 miles southeast of the Project site. Therefore, the Project would have **no impact** on ongoing or planned airport activities or people/employees.

Would the Project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Modoc County Emergency Operations Plan is the primary guiding document for emergency response and emergency evacuation in the County. The evacuation Anex to the EOP provides guidance on evacuation operations but does not provide specific evacuation routes.

The Applicant would coordinate any construction activities and use of oversized loads or movement of construction/decommissioning equipment with Modoc County and/or California Department of Transportation (Caltrans) and the Alturas Highway Patrol office. Further, the Project shall coordinate with County for any requested dedication of rights-of-way needed for Surprise Valley Road for the consideration of existing and any future road needs. Lastly, the Project shall file for an encroachment permit for any work or proposed work in the affected County or CalTrans road rights-of-way and for any and all new, altered or unauthorized existing driveway(s) to access the lot or lots and for any proposed road crossings. Thus, the Project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Also, any impacts related to ingress/egress and traffic are further evaluated in Section 3.18 Transportation. Therefore, the Project would result in a **less than significant** impact associated with the possible impediment to emergency response plans or emergency evacuation plans.

Would the Project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

The Project site is not located in areas considered wildlands, as the vast majority of the surrounding area is cultivated farmlands. The Project is located within a Local Responsibility Area but adjacent to high and very high fire hazard severity zones in a State Responsibility Area (SRA) to the west. The Project work sites are surrounded by irrigated agricultural fields, and all equipment will be operated on cleared drilling pads or roadways. The Project is temporary in nature and does not include any habitable structures. Therefore, it is unlikely the Project would expose people or structures to wildland fires. There would be a **less than significant** impact associated with risk involving wildland fires.

3.10.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. The Project work sites would be returned to the existing condition. Hazards and hazardous material risks during restoration will be similar in nature to the Project and long term be identical to existing conditions. Therefore, potential impacts would be similar to Section 3.10.3 and **less than significant**.

3.11 Hydrology/Water Quality

This section describes the existing hydrology and water quality within the Project site; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project and mitigation measures for hydrology and water quality. Table 3.11-1 summarizes impacts on hydrology and water quality that could result from implementation of the Project.

Table 3.11-1. Summary of Hydrology and Water Quality Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	Potentially Significant Unless Mitigated (Less Than Significant With Mitigation)	HYD-1 Acquire Appropriate CWA Regulatory Permits, Prepare SWPPP, and Implement BMPs Prior to Construction and Site Restoration
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin	No Impact	None Required
c) 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 which would: **(i) result in substantial erosion or siltation on- or off-site;**	Less Than Significant	HYD-1 Acquire Appropriate CWA Regulatory Permits, Prepare SWPPP, and Implement BMPs Prior to Construction and Site Restoration

(ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; **(iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or** **(iv) impede or redirect flood flows?**		
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	No Impact	None Required
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	Less Than Significant	None Required

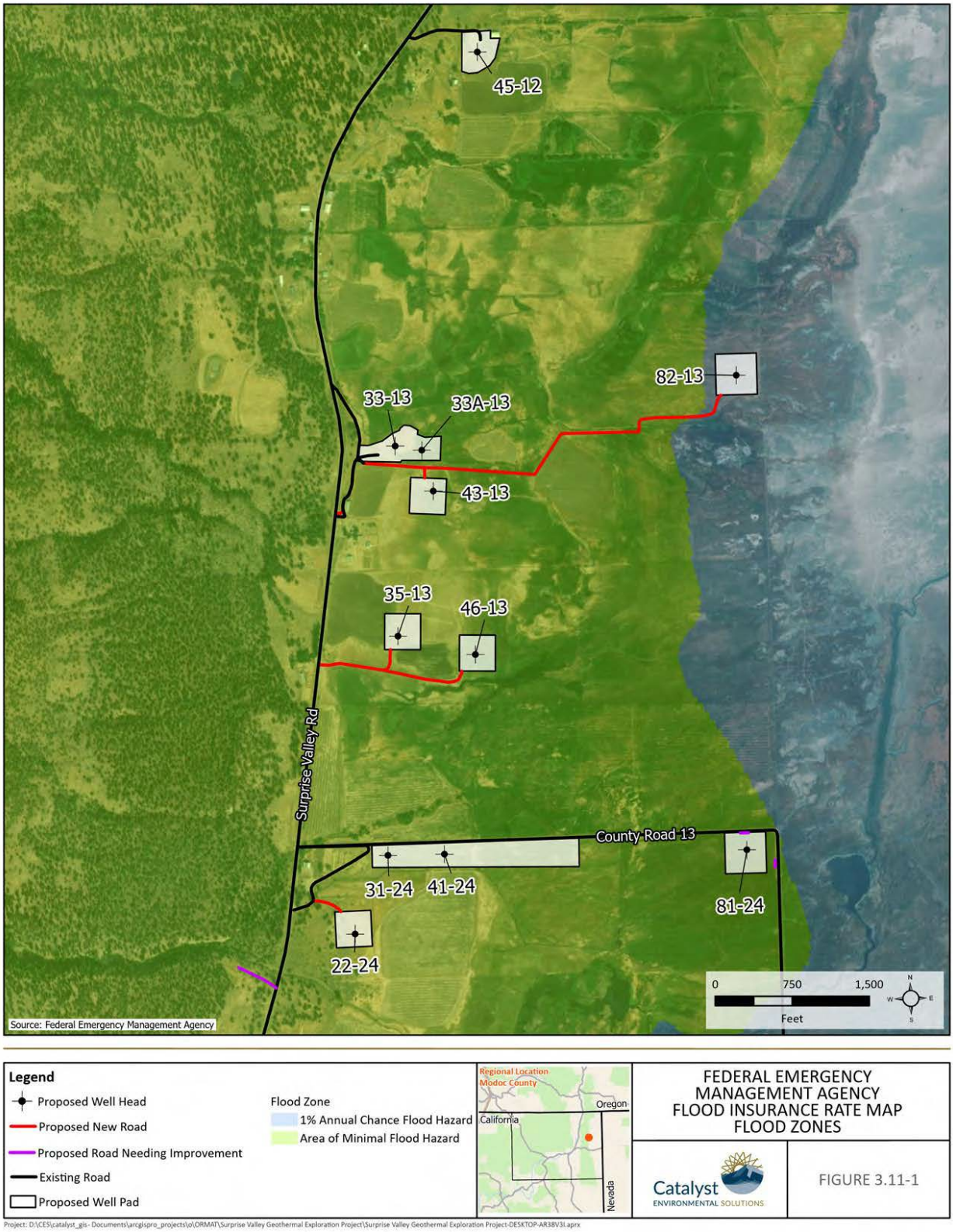
3.11.1 Existing Conditions

The Project site is located in the North Lahontan Hydrologic Basin Planning Area. The North Lahontan Hydrologic Region includes part of the western edge of the Great Basin, extending through most of Nevada and northern Utah, the eastern drainages of the Cascade Range and the eastern Sierra Nevada, north of the Mono Lake drainage (California Department of Water Resources, 2013) North Lahontan Hydrologic Region covers overs 6,122 square miles and includes portions of Modoc, Lassen, Sierra, Nevada, Placer, El Dorado, Alpine, and Mono Counties (California Department of Water Resources, 2013). The Project site is located within the Upper Alkali Lake Watershed (Hydrologic Unit Code [HUC-10] 1808000101). The climate is relatively dry, with precipitation averaging 12 to 15 inches annually. Average temperatures in May, July and September are 56, 68 and 58, respectively (Modoc County, 2018).

3.11.1.1 Localized Drainage Conditions

The Project area is located adjacent to the Upper Alkali Lake, the shores around the lake are predominantly freshwater emergent wetlands which have been converted to agriculture. Three of the proposed drill pad locations are located within areas mapped by the USFWS National Wetlands Inventory as Freshwater Emergent Wetland. Multiple intermittent streams flow from the foothills to the west into the Project area, including Powley Creek Boyd Creek and Bucher Creek. These streams largely lose definition as they enter the agriculture areas. Defined surface water resources in the vicinity of the work areas include a stock pond to the east of well-pad 43-13, undisturbed wetlands along Upper Alkali Lake, and a stream south of well-pad 35-13 and 46-13. Powlely Creek flows south of well-pad and eventually flows into the Lake City Hot Springs, hot springs and wetlands complex.

Figure 3.11-1: FEMA FIRM



3.11.1.2 Flooding

According to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) (Map Number 06049C0925E) the majority Project area is within the FEMA Flood Zone D. The FEMA Zone D (unshaded) designation is an area determined to be outside the 0.2 percent annual chance floodplain. One well pad is located in the Special Flood Hazard Area indicating it is subject to a 1% annal chance flood (FEMA, 2010).

3.11.1.3 Surface Water Quality

Surface water in the region mainly originates from rainfall in the Warner Mountains to the east with some flows into local terminus lakes, such as the Upper, Middle, and Lower Alkali Lakes in Surprise Valley. A small portion of surface water flows into basins that feed groundwater in Oregon and Nevada (California Department of Water Resources, 2013). The Surprise Valley is isolated from other portions of the North Lahontan Hydrological Region and is not affected by any imports or exports of water from the area.

Based on the 2024 305(b)/303(d) Integrated Report two rivers in the area that feed into the Upper Alkali Lake are listed for impairments. Bidwell Creek which flows through fort Bidwell and into the Norther portion of Upper Alkali Lake Is listed for Total Dissolved Solids (TDS). Tributary to Mill Creek which flows into the southern portion of the lake (joining Mill Creek at Lake City) is similarly impacted for TDS. Other water bodies in the Surprise Valley region are listed for Chloride, Bacteria, and Dissolved Solids (California Water Boards, 2024). Common sources for impairments to surface water quality in Modoc County are land management practices, such as forestry and agriculture, and septic systems (Modoc County, 2018).

3.11.1.4 Groundwater Hydrology

The Project site is located in the Surprise Valley Groundwater Basin (Basin 6-1). The basin is approximately 50 miles long and 12 miles wide and is bounded by all sides by block faulted structures. The basin is closed and has no hydrological outlet. The water-bearing formations consist of Holocene alluvium and alluvial fan deposits, Pleistocene near-shore deposits, and Pliocene to Pleistocene lake deposits (California State Water Resources Control Board, 2004).

Estimates of groundwater extraction for agricultural and municipal or industrial uses are 41,000 and 290 acre-feet, respectively. Deep percolation from applied water is estimated to be 6,600 acre-feet. Groundwater quality within the basin can be variable. Calcium bicarbonate type waters occur on the western edge of the basin and sodium bicarbonate type waters occur easterly. Calcium to sodium bicarbonate water occurs west of Lower and Middle Alkali Lakes. Poor quality water of sodium sulfate to sodium sulfate chloride character is present east of Middle Alkali Lake and along the southern and western edges of Upper Alkali Lake (California State Water Resources Control Board, 2004)

Groundwater levels withing the Surprise Valley Ground water basin were identified as an issue in the Modoc County General Plan which noted decline near Cedarville of 30 feet between 1972 and 1982 resulting from high volume agricultural pumping. The General Plan states that recharge has been impaired by channelization of streams. Presently, the basin is identified by the Regional Water Quality Control Boards as a very low priority and is not at risk of overdraft (California Department of Water

Resources, 2020). The casings of the test wells would pass through any groundwater aquifers to access the lower geothermal reservoir.

3.11.2 Regulatory Setting

This section describes the laws, policies, and regulations applicable to hydrology and water quality.

3.11.2.1 Federal

Clean Water Act

The federal Clean Water Act of 1972 (CWA) is the basic federal law that addresses surface water quality control and protection of beneficial uses of water. The purpose of the CWA is to provide guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters through prevention and elimination of pollution. The CWA applies to discharges of pollutants into waters of the United States. The CWA establishes a framework for regulating stormwater discharges from municipal, industrial, and construction activities under National Pollutant Discharge Elimination System (NPDES) regulations. In California, the State Water Resources Control Board (SWRCB) administers the NPDES program. The following CWA sections are most relevant to the regulation of surface water in Modoc County:

CWA Section 303(d)

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two primary elements: 1) designated beneficial uses of waterbodies; and 2) criteria that protect the designated uses.

Under CWA Section 303(d), states, territories, and authorized tribes are required to develop a list of waterbodies that are considered to be "impaired" from a water quality standpoint. Waterbodies that appear on this list do not meet, or are not expected to meet, water quality standards even after the minimum required levels of pollution-control technologies have been implemented to reduce point sources of pollution. The law requires that respective jurisdictions establish priority rankings for surface waterbodies on the list and develop action plans, referred to as total maximum daily loads (TMDLs), to improve water quality. TMDL refers to the amount of a specific pollutant a river, stream, or lake can assimilate and still meet federal water quality standards as provided in the CWA. TMDL accounts for all sources of pollution, including point sources, nonpoint sources, and natural background sources.

Section 303(d) list of impaired water bodies provides a prioritization and schedule for development of TMDLs for the State. SWRCB, in compliance with the Section 303(d) of the CWA (33 U.S. Code, Section 1313[d]), publishes the list of segments having limited water quality in California, which includes a priority schedule for the development of TMDLs for each contaminant or "stressor" impacting the water body (SWRCB 2011).

CWA Section 401

Every applicant for a federal permit or license for any activity that may result in a discharge to a water body must obtain a CWA Section 401 Water Quality Certification for the proposed activity and comply with State water quality standards prescribed in the certification. In California, these certifications are

issued by SWRCB under the auspices of the Regional Water Quality Control Board (RWQCB). Most certifications are issued in connection with CWA Section 404 U.S. Army Corps of Engineers (USACE) permits for dredge and fill discharges.

CWA Section 402

CWA Section 402 sets forth regulations that prohibit the discharge of pollutants into waters of the United States from any point source without obtaining an NPDES permit. SWRCB implements the NPDES and the State's water quality programs by regulating point-source discharges of wastewater and agricultural runoff to land and surface waters to protect their beneficial uses. To comply with the CWA water quality regulations, the various RWQCBs in California (nine regions) require permits for discharging or proposing to discharge materials that could affect water quality. SWRCB and its RWQCBs administer the NPDES permit program.

Although the NPDES permit program initially focused on point-source discharges of municipal and industrial wastewater that were assigned individual permits for specific outfalls, results of the Nationwide Urban Runoff Program identified contaminated stormwater as one of the primary causes of water quality impairment. To regulate runoff-related (nonpoint-source) discharges, the U.S. Environmental Protection Agency (USEPA) developed a variety of general NPDES permits for controlling industrial, construction, and municipal stormwater discharges.

SWRCB/RWQCB also regulates discharges to, and the quality of, groundwater resources through the issuance of Waste Discharge Requirements (WDRs). WDRs are issued to discharges that specify limitations relative to the Water Quality Control Plan for the Lahontan Region (California Department of Water Resources, 2013).

CWA Section 404

Section 404 of the CWA establishes a permit program, administered by USACE, regulating discharge of dredged or fill materials into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. CWA Section 404 permits are issued by USACE.

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations that limit development in floodplains. FEMA also issues Flood Insurance Rate Maps (FIRM) that identify which land areas are subject to flooding. These maps provide flood information and identify flood hazard zones in the community. The design standard for flood protection covered by the FIRM is established by FEMA, with the minimum level of flood protection for new development determined to be the 1-in-100 (0.01) annual exceedance probability (i.e., the 100-year flood event).

For projects that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source and, thus, result in the modification of the existing regulatory floodway, effective Base Flood Elevations (BFEs), SFHA, or conditional letter of map revision (CLOMR) would need to be

prepared and approved by the Caltrans, the County, and FEMA prior to any work occurring. One well pad (S2a) is located within the 100-year flood zone. The Project would not affect the hydrology or hydraulic characteristics of the Project site.

3.11.2.2 State

Porter-Cologne Water Quality Control Act of 1969

Division 7 of the California Water Code is the basic water-quality control law for California. This law is titled the Porter-Cologne Water Quality Control Act (Porter-Cologne). Porter-Cologne establishes a regulatory program to protect water quality and the beneficial uses of State waters.

Porter-Cologne is California's comprehensive water-quality control law. It requires the adoption of water quality control plans (basin plans) by the RWQCBs for watersheds within their regions. The basin plans are reviewed triennially and amended as necessary by the RWQCB, subject to the approval of the California Office of Administrative Law, SWRCB, and ultimately USEPA. Moreover, pursuant to Porter-Cologne, these basin plans become part of the California Water Plan when such plans have been reported to the legislature (California Water Code, Section 13141). Porter-Cologne also regulates river or stream crossings during road, pipeline, or transmission line construction that may result in a discharge into a State waterbody that is not considered to be under the jurisdiction of USACE.

In some cases, the RWQCB may issue WDRs under Porter-Cologne that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

Water Quality Control Plan for the Lahontan Region

The Water Quality Control Plan for the Lahontan Region (Basin Plan) sets forth water quality standards and control measures for surface and groundwaters of north and south Lahontan Region. The Basin Plan designates beneficial uses for waterbodies and establishes water quality objectives, waste discharge prohibitions, and other implementation measures to protect those beneficial uses. State water quality standards also include a Nondegradation Policy. Water quality control measures include TMDLs, which are often, but not always, adopted as Basin Plan amendments. The Lahontan RWQCB administers the Basin Plan for the region. Specifically, the Basin Plan is designed to accomplish the following:

- designate beneficial uses for surface and ground waters
- set the narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to California's antidegradation policy
- describe implementation programs to protect the beneficial uses of all water in the region
- describe surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan

The Basin Plan incorporates by reference all applicable SWRCB and RWQCB plans and policies. In addition to the Basin Plan, federal water quality standards for certain toxic pollutants apply to surface

waters within California. These standards are contained in the National Toxics Rule (40 C.F.R. 131.36) and the CTR. The following are definitions of the applicable beneficial uses:

- Agricultural Supply (AGR) - Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- Commercial and Sport Fishing (COMM) - Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
- Industrial Service Supply (IND) – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.
- Inland Saline Water Habitat (SAL) - Includes uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.
- Municipal and Domestic Supply (MUN) - Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply Freshwater Replenishment (FRSH) – Uses of water for natural or artificial maintenance of surface water quantity or quality.
- Non-contact Water Recreation (REC II) – Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
- Preservation of Rare, Threatened, or Endangered Species (RARE) – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.
- Spawning, Reproduction, and/or Early Development (SPWN) - Includes uses of water that support high quality habitats suitable for reproduction, early development and sustenance of marine fish and/or cold freshwater fish.
- Water Contact Recreation (REC I) – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.
- Wildlife Habitat (WILD) – Uses of water that support terrestrial ecosystems including, but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Statewide Construction General Permit

Dischargers whose projects disturb one or more acres of soil, or less than 1.0 acre but are part of a larger common plan of development that in total disturbs 1.0 or more acres, are required to obtain coverage under SWRCB Order 2012-0006-DWQ (amending Order 2009-0009-DWQ as amended by 2010-0014-DWQ), the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit). Construction activity subject to this permit also includes linear underground/overhead projects disturbing at least 1.0 acre. Construction and demolition activities subject to this permit include clearing, grading, grubbing, and excavation, or any other activity that results in a land disturbance equal to or greater than 1.0 acre.

Linear Utility Project (LUP) construction includes those activities necessary for installation of underground and overhead linear facilities (e.g., conduits; substructures; pipelines; towers and poles; cables and wires; connectors; switching, regulating, and transforming equipment; and associated ancillary facilities). LUP construction also includes those activities necessary for underground utility mark-out; potholing; concrete and asphalt cutting and removal; trenching, excavating, boring, and drilling; access road and pole/tower pad and cable/wire pull station construction; substation construction; substructure installation; tower footings and/or foundations construction; pole and tower installations; pipeline installations; welding; concrete and/or pavement repair or replacement; and stockpile/borrow locations. As Order 2003-0007-DWQ previously regulated LUP construction activities, these projects are now regulated by Attachment A of Order 2012-0006-DWQ.

Permit Applicant is required to submit a Notice of Intent (NOI) to the SWRCB and to prepare a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP identifies best management practices (BMPs) that must be implemented to reduce construction effects on receiving water quality based on potential pollutants. The BMPs identified are directed at implementing sediment- and erosion-control measures and other measures to control potential chemical contaminants. The SWPPP also includes descriptions of the BMPs to reduce pollutants in stormwater discharges after all construction phases are completed at the site (postconstruction BMPs).

The Construction General Permit requires a risk-level assessment for construction sites, an active stormwater effluent monitoring and reporting program, rain event action plans, and numeric effluent limitations and numeric action levels for pH and turbidity.

Statewide Industrial General Permit

The SWRCB issued Water Quality Order 97-03-DWQ, NPDES General Permit No. CAS000001 WDRs for discharges of stormwater associated with industrial activities. This General Permit is intended to cover all new or existing stormwater discharges and authorized non-stormwater discharges from facilities required by federal regulations to obtain a permit, including those designated by the RWQCBs, facilities whose operators seek coverage under this General Permit, and facilities required by future USEPA stormwater regulations (Modoc County 2015). Attachment 1 of the permit describes the types of facilities that are covered, summarized as follows:

- facilities that are subject to stormwater effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards (40 C.F.R. Subchapter N)
- manufacturing facilities

- mining/oil and gas facilities
- hazardous waste treatment, storage, or disposal facilities
- landfills, land application sites, and open dumps that receive industrial waste
- recycling facilities such as metal scrap yards, battery reclaimers, salvage yards, and automobile yards
- steam electric-generating facilities
- transportation facilities that conduct any type of vehicle maintenance such as fueling, cleaning, repairing, etc.
- sewage treatment plants
- certain facilities (often referred to as "light industry") where industrial materials, equipment, or activities are exposed to stormwater

Requirements of this permit include effluent limitations, receiving water limitations, SWPPP preparation, and stormwater monitoring programs. Facility operators must control pollutant discharges using the best available technology economically achievable and best conventional pollutant control technology. Discharges from facilities must not cause or contribute to a violation of an applicable water quality standard.

Section 1600-1616 of the California Fish and Game Code

CDFW asserts jurisdiction over the bed and bank of a stream and associated wildlife and habitats as established in California Fish and Game Code §§ 1600–1616. Fish and Game Code section 1602 requires any person, state or local governmental agency, or public utility to notify CDFW prior to beginning any project that may "substantially divert or obstruct the natural flow of any river, stream, or lake; substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or deposit or dispose of debris, waste, or other materials containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake."

Generally, notification to CDFW is required for any project that will take place in or in the vicinity of a river, stream, lake, or their tributaries. In CDFW's definition, "any river, stream, or lake" includes those that are dry for periods of time (ephemeral or episodic) as well as those that flow year-round (perennial). This includes rivers or streams that flow at least periodically (e.g., maybe dry for periods of time) or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses that have a surface or subsurface flow which supports or has supported riparian vegetation. This includes ephemeral streams, desert washes, and water courses with a subsurface flow. Permits may also apply to work undertaken within the flood plain of a body of water.

If CDFW determines that a Project may substantially adversely affect existing fish or wildlife resources, a Lake or Streambed Alteration Agreement (SAA) will be required (§ 1603). Prior to issuance of an SAA, CEQA checklist must be submitted to CDFW.

3.11.2.3 Local

Modoc County General Plan

The Conservation and Open Space Element of Modoc County's General Plan provides goals, objectives, and policies to guide the development, utilization, and preservation of water resources in the County. This element assures that water resources are conserved and utilized to enhance long-term availability, while providing for current supplies and demands. The Climate Change Element of the General Plan contains goals, objectives, and policies related to reduction of flood risk The General Plan includes the following Policies related to water use and management:

Policy CO E - Encourage the increased development and use of surface water.

Policy CO F - Cooperate with responsible agencies and organizations to solve water quality problems particularly septic system related problems.

Policy CO G - Work with the agricultural community to resolve any groundwater overdraft problems.

Policy CO H - Adopt as part of the General Plan, the Surprise Valley Groundwater Recharge Protection Areas map, to assure the continued protection of the identified areas through the development permit process. The criteria for review is contained in the Action Program.

Policy CO I - Require adequate domestic water supply for all rural subdivisions

Action Item CO A - Initiate a cooperative effort among state and local agencies and special districts to explore appropriate actions necessary to resolve the long-term water supply and quality problems in the County.

Action Item CO B - When any development is proposed within or adjacent to the areas identified on the Surprise Valley Ground Water Recharge Protection Areas map, the following criteria and actions shall apply, as necessary to assure protection of the identified recharge areas. .

- Subdivision of property in the recharge areas, with attendant use of wells and septic systems for home sites and other development should be minimized and designed to prevent potential water quality degradation and reduction in recharge rates and amounts. All septic systems approvals in these areas should include assurance that degradation will not occur. Strict adherence to public health standards for sewage disposal systems should be maintained. Wells for domestic consideration should be given to development within floodways and within 200 feet of year-round and ephemeral stream channels.
- The County may require, as part of development projects in recharge areas, that the applicant submit a report prepared by a professional geologist or hydrologist assessing the potential effect on recharge areas and appropriate mitigation.
- In reviewing development proposals in the recharge areas, flood protection factors shall be taken into consideration. Appropriate mitigation to protect life and property should include structural engineering to assure development facilities are protected, such as raising the base floor of structures, or relocation outside floodways, rather than

channelization and grading, fill, or other topographic or hydrologic modifications which will channelize surface flows or decrease existing or potential recharge.

- Recreational use of recharge areas which require minimum physical development and do not put public health and safety at risk should be allowed, if such development is consistent with the intent to protect and develop existing and potential recharge facilities, structures and uses
- Agricultural uses such as grazing and pasture which do not require structural or other physical development may be allowed as long as recharge potential is not impaired.
- The development of recharge facilities, resource management and open space uses shall be considered principal uses of the recharge areas.
- Public and private organizations and individuals shall be encouraged to seek suitable means of protecting and enhancing areas of riparian habitat, to develop recharge projects and in resolving environmental conflicts. Funding sources for the acquisition, cooperative management and/or development recharge projects in the recharge areas should be sought.
- Consider the feasibility of adopting an ordinance implementing Section 66484.5 et seq. of the State Subdivision Map Act relative to groundwater recharge facilities in support of actions taken by valley residents or agencies.
- Larger parcel sizes shall be considered as one method to protect recharge areas from multiple ownerships and increased land use intensities which may affect recharge areas.

Goal SE 3 - Protect the community from risks posed by flooding

Policy SE X - The County shall decline to approve development in the one hundred-year flood zone unless mitigation measures meeting Federal Flood Insurance Administration criteria are provided

Policy SE Y - The County shall assure that any new development in the County located within a flood zone shall include adequate flood control mitigation measures.

Policy SE Z - The County shall work with the Lassen-Modoc County Flood Control and Water Conservation District in the Project review process to ensure that adequate measures are implemented to prevent flooding.

Action Item SE G - The County shall decline to approve development in the one hundred-year flood zone unless mitigation measures meeting Federal Flood Insurance Administration criteria are provided.

Action Item SE H - The County shall assure that any new development in the County (except Alturas) located within a flood zone shall include adequate flood control mitigation measures.

Modoc County Code of Ordinances, Title20

The County's Ordinance Code provides specific direction for the protection of water resources in Title 20- Groundwater § 20.04.010. This title is exclusive to the regulation of the extraction of groundwater for use outside the basin from which it was extracted. Geothermal test wells will be drilled to a depth

of 3,000-5,000 feet below the surface and bypass groundwater aquifers. Therefore, it is not applicable to the proposed Project as no use of groundwater is proposed and no exportation of groundwater from the basin is proposed.

3.11.3 Impacts Analysis

3.11.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to hydrology and water quality. The criteria listed below considers if the Project would:

a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

b. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

c. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?

d. 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 which would:

   i. result in substantial erosion or siltation on- or off-site;

   ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;

   iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or;

   iv. impede or redirect flood flows?

e. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

f. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

3.11.3.2 Analytical Approach

This impacts analysis evaluates the potential for the Project and its varying components (described in Section 2) to impact the hydrology and water quality at the Project site. The analysis prepared for this CEQA document relied on the information provided in the *Water Quality Management Plan* (Appendix D). These sources were used to determine the hydrology and water quality within and around the Project site and determine whether project activities would surpass the threshold of the significance criteria listed above.

3.11.3.3 Analysis of Checklist Questions

Would the Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Construction

As described in Section 2.3 (Proposed Facilities) and summarized here, multiple construction-related activities could have potential direct or indirect impacts on the water quality of local surface water features and shallow groundwater resources including sedimentation, erosion, and handling hazardous materials. These impacts are considered less than significant. However, implementation of **MM HYD-1**. **Mitigation Measure HYD-1** ensures the Project acquires the appropriate CWA regulatory permits, prepares a SWPPP, and implements BMPs prior to construction and site restoration. Prior to construction and grading activities, the Applicant will file a Notice of Intent (NOI) with the SWRCB to comply with the General NPDES Construction Permit and prepare a SWPPP. The SWPPP would include measures that would be implemented during project construction to minimize and control construction and postconstruction runoff to the maximum extent practicable. In addition, the NPDES permit requires the implementation of BMPs that achieve a level of pollution control to the maximum extent practical. With the implementation of **MM HYD-1**, impacts on surface water quality as attributable to the Project would be reduced to levels **less than significant**. In addition, monitoring and contingency response measures would be included to verify compliance with water quality objectives for all surface waters crossed during construction.

Testing

Water quality impacts may occur once the Project is in operation through runoff over developed surfaces, vehicle track out, trash, and oil and grease. Runoff may pick up pollutants such as oil and grease, trace metals, and nutrients. These pollutants can become suspended in runoff and enter surrounding waterways. Based on this, the Project has the potential to result in both direct and indirect water quality impacts that could be significant. Thus, with the implementation of **MM HYD-1**, impacts on surface water quality as attributable to project operation would be reduced to a less than significant level through the inclusion of focused BMPs for the protection of surface water resources. In addition to **MM HYD-1**. Through the implementation of **MM HYD-1**these impacts would be reduced to levels **less than significant**.

Land Deformation

The Project site is not located within a mapped area of known land subsidence (United States Geological Survey, 2025). Geothermal test wells will be drilled to a depth of 3,000-5,0000 feet and operations shall bypass groundwater aquifers and would not contribute to water draw down and therefore not create a risk of subsidence. Surprise Valley has historically delt with subsidence issues as groundwater levels and subsidence within the Surprise Valley Ground water basin were identified as an issue in the Modoc County General Plan which noted decline near Cedarville of 30 feet between 1972 and 1982 as result of high volume agricultural pumping. The General Plan states that recharge has been impaired by channelization of streams. The basin is presently identified by the Regional Water Quality Control Board as a very low priority basin and is not as risk of overdraft or additional subsidence as a

result (California Department of Water Resources, 2020). The Project would result in **less than significan**t impacts.

Mitigation Measure(s)

HYD-1. Acquire Appropriate CWA Regulatory Permits, Prepare SWPPP, and Implement BMPs Prior to Construction and Site Restoration.

The Applicant shall prepare a project-specific SWPPP and be responsible for securing coverage under SWRCB's NPDES stormwater permit for general construction activity (Order 2009-0009-DWQ). The SWPPP shall identify specific actions and BMPs relating to the prevention of stormwater pollution from project-related construction sources by identifying a practical sequence for site restoration, BMP implementation, contingency measures, responsible parties, and agency contacts. The SWPPP shall reflect localized surface hydrological conditions and shall be reviewed and approved by each project applicant prior to commencement of work and shall be made conditions of the contract with each contractor selected to build and decommission future renewable energy facilities developed under the Project. The SWPPP(s) shall, at a minimum, incorporate control measures in the following categories:

- Soil stabilization and erosion control practices (e.g., hydroseeding, erosion control blankets, mulching)
- Sediment control practices (temporary sediment basins, fiber rolls)
- Temporary and postconstruction onsite and offsite runoff controls
- Special considerations and BMPs for water crossings, wetlands, and drainages
- Monitoring protocols for discharge(s) and receiving waters, with emphasis placed on the following water quality objectives: dissolved oxygen, floating material, oil and grease, pH, and turbidity
- Waste management, handling, and disposal control practices
- Corrective action and spill contingency measures
- Agency and responsible party contact information
- Training procedures that shall be used to ensure that workers are aware of permit requirements and proper installation methods for BMPs specified in the SWPPP

The SWPPP shall be prepared by a qualified SWPPP practitioner with BMPs selected to achieve maximum pollutant removal and represent the best available technology that is economically achievable. Emphasis for BMPs shall be placed on controlling discharges of oxygen-depleting substances, floating material, oil and grease, acidic or caustic substances or compounds, and turbidity. BMPs for soil stabilization and erosion control practices and sediment control practices shall also be required. Performance and effectiveness of these BMPs shall be determined either by visual means where applicable (i.e., observation of above-normal sediment release), or by actual water sampling in cases where verification of contaminant reduction or elimination, (inadvertent petroleum release) is required to determine adequacy of the measure.

Implementation of **MM HYD-1** would reduce project impacts to surface water quality attributed to the construction, operation, and reclamation of the Project to a level less than significant through Project specific BMPs for the protection of surface water resources. Monitoring and contingency response measures would be included to verify compliance with water quality objectives for all surface waters crossed during construction.

Would the Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?

The Project would require the drilling of three new geothermal test wells. The test wells would be completed to depths between 3,000 and 5,000 feet. Casing depths will comply with CalGEM Regulations (Chapter 4, Article 3, §§ 1723, 2018). The geothermal well casings would pass through any groundwater aquifers to access the lower geothermal reservoirs. Any water needed for fugitive dust control, or other BMPs that require water through the Project's WQMP would be obtained by offsite purchasing as needed from commercial sources. No groundwater wells would be drilled, nor would the Project require the use of groundwater. Therefore, **no impact** on groundwater supply or recharge would occur.

Would the Project 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 which would:

result in substantial erosion or siltation on- or off-site?

Soil erosion could result during construction and earthmoving as well as during site reclamation. However, the Applicant is required to comply with the Construction General Permit and the Industrial General Permit, and all county grading permit requirements. A WQMP was prepared for both the construction and operations phases of the Project (Appendix D). The WQMP and SWPPP will BMPs to minimize potential erosion and siltation effects. The site will be designed and prepared to provide adequate stormwater conveyance and/or infiltration. The Project would not significantly alter the site's drainage patterns and would not result in erosion or siltation on-or off-site; therefore, impacts to erosion or siltation would be **less than significant**.

Mitigation Measure(s)

No additional mitigation measures beyond **MM HYD-1** are required.

Implementation of **MM HYD-1** would reduce any project impacts associated with the alteration of the existing drainage pattern of the site resulting in substantial erosion or siltation on-or off-site to **less than significant** through compliance with County standards, compliance with the NPDES through BMPs, and project SWPPP.

Would the Project 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 which would:

substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?

The Project would not substantially increase the rate or amount of surface runoff resulting in flooding on-or offsite. The WQMP prepared for the Project provides recommendations and BMPs to minimize potential erosion and siltation effects (Appendix D). Through implementation of **MM HYD-1,** the drainage pattern would not be altered in a way that would result in increased surface runoff or flooding on-or offsite. Construction, operation, and reclamation of the Project would result in a **less than significant** impact to the existing drainage pattern of the site and not increase the rate or amount of surface runoff.

Mitigation Measure(s)

No additional mitigation measures beyond **MM HYD-1** are required.

Implementation of **MM HYD-1** would reduce any project impacts associated with the alteration of the existing drainage pattern resulting in a substantial increase in the rate of surface runoff to levels of **less than significant** through compliance with County standards, compliance with the NPDES, and Project BMPs.

> **Would the Project 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 which would:**
>
> ***create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?***

The Project would not alter the existing drainage pattern of the site, nor alter the course of any stream or river. As described above, the Project would not create impervious surfaces, as the well pads and access roads would be comprised of gravel and dirt materials. The Applicant would comply with County Standards, the NPDES, and project specific BMPs. This compliance would reduce the potential for excess runoff waters which would exceed the capacity of existing or planned stormwater drainage systems and would avoid adding substantial sources of polluted runoff using the best available technology economically achievable. Therefore, potential Project impacts to stormwater drainage would be **less than significant**.

Mitigation Measure(s)

No additional mitigation measures beyond **MM HYD-1** are required.

> **Would the Project 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 which would:**
>
> ***Impede or redirect flood flows?***

The Project will not alter the existing drainage pattern of the site, nor alter the course of any stream or river. As described above the Project would create not impervious surfaces. The Applicant would comply with County standards, the NPDES, and project specific BMPs. The Applicant's compliance would reduce the potential for impediment or redirection of flood flows. Therefore, potential Project impacts to flood flows would be **less than significant**.

Mitigation Measure(s)

No additional mitigation measures beyond **MM HYD-1** are required.

Would the Project be in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

As described above in Section 3.11.1 and Figure 3.11-1, the majority of the Project area is within the FEMA Flood Zone X. The FEMA Zone X designation is an area determined to be outside the 0.2 percent annual chance floodplain. One well pad (82-13) is located within the 100-year flood zone. The well pad would be graded to an elevation above the 100-year flood zone as verified by the County floodplain manager. Therefore, the Project would not affect the hydrology or hydraulic characteristics of the Project site. Therefore, the Project would not be in a tsunami, or seiche zone. Therefore, **no Impact** impacts to flood hazards or inundation would occur.

Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The Project is required to comply with Modoc County, state, and federal water quality standards. Any potentially significant impacts to surface water quality or ground water would be reduced to levels less than significant with the implementation of **MM HYD-1**. Specifically, **MM HYD-1**ensures that water quality standards are met throughout construction, operation, and decommissioning. The Applicant will maintain compliance with the NPDES, implement BMPs, and create a project specific SWPPP. Impacts to water quality or a groundwater management plan(s) would be reduced to **less than significant**.

Mitigation Measure(s)

No additional mitigation measures beyond **MM HYD-1** are required.

Implementation of **MM HYD-1** would reduce any project impacts associated with surface water or groundwater quality to levels less than significant through compliance with County standards, compliance with the NPDES, and project SWPPP. With adherence to **MM HYD-1** the Project would result in **less than significant** residual impacts to the hydrology or water quality of the Project site.

3.11.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. Because the Project will require the conversion of important farmland to the County to non-agricultural uses, the proper storage of topsoil removed from the site is paramount to site restoration to pre-project conditions. Implementation of **MM HYD-1** would reduce impacts attributed to reclamation activities that might result in erosion or increased stormwater runoff. Adherence to **MM HYD-1** would reduce Project impacts to water quality to **less than significant**.

3.12 Land Use/Planning

This section describes current land use, land use designation, and land use policies within and in the vicinity of the Project; identifies applicable federal, state, and local regulations; and analyzes potential impacts on land use and planning attributed to the Project. Table 3.12-1 summarizes impacts on land use and planning that could result from implementation of the Project.

Table 3.12-1. Summary of Land Use and Planning Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Physically divide an established community?	No Impact	None Required
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	Less Than Significant	None Required

3.12.1 Existing Conditions

The Project consists of the construction of eleven well pads (37.2-acres) and 1.2 miles of new access road construction (up to 2.1 acres) for a total of 39.5-acres of disturbance. Table 3.12-2 identifies the Assessor's Parcel Numbers (APN) on which well pads or roads would be developed or improved, and also includes the parcel's approximate acreage, General Plan use designation, zoning, and Williamson Act enrollment status (Figure 3.3-2).

Table 3.12-2. Project Assessor Parcel Numbers, Acreages, Project Disturbance, and Zoning

APN	Parcel Acreage	General Plan Land Use	Zoning	Williamson Act
026-080-018	~68.6	Exclusive Ag	U- Unclassified	No
026-100-014	~119.8	Exclusive Ag	U- Unclassified	Yes
026-100-006	~157.74	Exclusive Ag/ General Ag	U- Unclassified	No
026-100-007	~157.8	Exclusive Ag/ General Ag	U- Unclassified	No
026-100-008	~397.8	Exclusive Ag/ General Ag	U- Unclassified	Yes
026-100-004	~236.7	Exclusive Ag/ General Ag	U- Unclassified	Yes
026-080-009	~232.0	Exclusive Ag/ General Ag	U- Unclassified	Yes
Total	~1,370	-	-	

As shown in Figure 3.3-1, the Project site and surrounding land use is predominately crop cultivation, grazing, and open space. As depicted in Figure 2.1-3, the Project site is within five privately owned parcels, all zoned as Unclassified. The parcels are owned by several landowners which have leased the proposed development areas to the Applicant.

3.12.2 Regulatory Setting

This section describes the laws, policies, and regulations that pertain to the Project.

3.12.2.1 State

State Planning and Zoning Laws

California Government Code Section 65300 et seq. establishes the obligation of cities and counties to adopt and implement General Plans. The General Plan is a comprehensive, long-term, and general document that describes plans for the physical development of a city or county and of any land outside its boundaries that, in the city's or county's judgment, bears relation to its planning.

The General Plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the General Plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the City's or County's vision for the area. The General Plan is a long-range document that typically addresses the physical character of an area over a 20-year period or more.

The State Zoning Law (California Government Code Section 65800 et seq.) establishes that zoning ordinances, which are laws that define allowable land uses within a specific zone district, are required to be consistent with the General Plan and any applicable specific plans.

3.12.2.2 Local

Modoc County General Plan

The purpose of the County's General Plan (as amended through 2018) is to serve as a community's "constitution" for the development and use of its land. It is a long-term document, detailing the vision and process for the development of the County. The County General Plan includes the following eight elements: Land Use; Housing; Circulation; Conservation and Open Space; Noise; Safety; Flooding; Climate Change. Collectively, these elements satisfy the seven mandatory General Plan elements as established in the California Government Code. Goals, objectives, and implementing policies and actions programs have been established for each of the elements (Modoc County, 2018)

Modoc County Zoning Ordinance (Title 18 of County Code)

The County's Land Use Ordinance provides the physical land use planning criteria for development within the jurisdiction of the County. The Land Use Ordinance identifies the permitted and conditional uses within a zoning designation. Uses identified as conditionally permitted require a UP, which is subject to the discretionary approval of the County Board of Supervisors per a recommendation by the County Planning Commission. All Project parcels are zoned as Unclassified.

3.12.3 Impacts Analysis

This section analyzes the potential impacts of the Project and the significance criteria related to land use and planning, the methodology employed for the evaluation, impact assessment, and mitigation requirements where necessary.

3.12.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to land use and planning. Project impacts related to land use and planning are considered significant if the Project would:

a. Physically divide an established community?

b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

3.12.3.2 Analytical Approach

This impact analysis evaluates the potential for the Project and its varying components (described in Section 2) to impact land use and planning at/around the Project site. The analysis relied on publicly available information and a review of Modoc County's land use and zoning ordinances. The Modoc County General Plan was also consulted for impact potential and appropriate mitigation measures approved by the County.

3.12.3.3 Analysis of Checklist Questions

Would the Project physically divide an established community?

The Project work areas will occur on 39.5 -acres across seven parcels. The Project is approximately 1.85 miles north of Lake City CDP, which is comprised of a concentration of rural residences and surrounding scattered rural residences. The proposed well pads would be spread throughout the Project area and not physically divide any established communities. Further, all proposed developments would be temporary and reclaimed after testing. Given the low density of proposed work areas, distance from existing communities, and temporary nature of the Project; implementation of the Project would not divide an established community and **no impact** would occur.

Would the Project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The Project parcels are zoned as Unclassified and within Exclusive Agriculture/General Agriculture or Exclusive Agriculture land use areas. Modoc County Zoning Code identifies commercial energy exploration as a compatible use for U zoned parcels with the issuance of a UP. The Project would also require a UP due to the enrollment of several parcels in Williamson Act contracts, as described in Section 3.3. With an approved UP, the Project would conform with the standards presented Modoc County Zoning Ordinance and General Plan. Therefore, implementation of the Project would not cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect and impacts would be **less than significant**.

3.12.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. The geothermal testing wells will be abandoned in conformance with the well

abandonment requirements of CalGEM. CalGEM requirements would be prepared and implemented. The abandonment plan would describe the proposed approach to facility abandonment, equipment removal, disposal, and site restoration. All above-ground equipment will be dismantled and removed from the entire site. The surface of the site would be restored to conform to approximate pre-project land uses (e.g., agriculture or open space). Site restoration would essentially return the site to a pre-construction state, which will have **no impact** on land use as the site(s) is made available again for agricultural production or another compatible use (i.e., open space).

3.13 Mineral Resources

This section describes the existing mineral resources found at the Project site; identifies applicable federal, state, and local regulations; and analyzes the potential impacts attributed to the Project on mineral resources. Table 3.13-1 summarizes impacts on mineral resources that could result from implementation of the Project.

Table 3.13-1. Summary of Mineral Resources Impacts

Would the Project:	Project	Mitigation Measure(s)
a) 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?	No Impact	None Required
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local General Plan, specific plan or other land use plan?	No Impact	None Required

3.13.1 Existing Conditions

There are thirteen active mines within Modoc County; all of which produce sand and gravel, cinders or stone products. The nearest mining site is Lake City Mine located 5 miles southeast of the Project site and produces sand and gravel products. The Project site does not contain any known mineral resources identified in the Modoc County General Plan, nor is it located in an area where mineral resources are being extracted (Modoc County, 2018).

USGS has identified two KGRAs in the County, defined as:

> "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…" (30 U.S.C. 1001)

3.13.2 Regulatory Setting

3.13.2.1 State

Surface Mining and Reclamation Act of 1975

In 1975, the Surface Mining and Reclamation Act (SMARA) was passed by the California Legislature to both address the need for continued mineral supplies as well as mitigate or prevent negative impacts to public health, property, and the environment that could result from mining activities. Regulations within SMARA are jointly administered by the Department of Conservation's Office of Mine Reclamation (OMR) and the State Mining and Geology Board (SMGB). Along with acting as the appeals board, the SMGB serves to distribute and clarify information regarding provisions within the Act. To complement these services, the OMR provides technical assistance for lead agencies and operators, maintains a database of mine locations and operational information statewide, and is responsible for matters related to compliance.

To better enforce provisions in the Act, SMARA directs the State Geologist to classify (identify and map) the nonfuel mineral resources of the State to show where economically significant mineral deposits occur and where they are likely to occur based upon the best available scientific data. Mineral land classification is the principal responsibility of the Mineral Resources and Mineral Hazards Mapping Program (MRMHMP). Although no SMARA Mineral Land Classification Studies are currently available for Modoc County, study of the region by the State Geologist could result in findings that classify potentially significant mineral deposits and identification of restrictions aimed at curbing development of those areas.

The County Planning Department as lead agency has the responsibility under SMARA, as amended, and State Policy for Surface Mining and Reclamation Practice, to regulate surface mining and reclamation within its jurisdiction including the reclamation of federal lands to assure that:

> Adverse environmental effects are prevented or minimized and mined lands are reclaimed to a usable condition which is readily adopted for alternative land use.
>
> The production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment.
>
> Residual hazards to the public health and safety are eliminated (Public Resources Code, Section 2712).

Under the Surface Mining and Reclamation Act of 1975, with specified exceptions, a person is prohibited from conducting surface mining operations without obtaining a permit from, and submitting a reclamation plan to and receiving approval by, the lead agency for the surface mining operation. A person who obtained a vested right to conduct surface mining operations prior to January 1, 1976, is not required to obtain a permit but is required to submit a reclamation plan to the lead agency. The State Mining and Geology Board is required to review lead agency ordinances which establish permit and reclamation procedures. To comply with SMARA, the County enacted Ordinance 236-85 to enact §18.100.300 (E) into the Modoc Code of Ordinances as of November 1999.

3.13.3 Impacts Analysis

3.13.3.1 Impact Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to mineral resources. The criteria listed below considers if the Project would:

a. 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.

b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local General Plan, specific plan or other land use plan.

3.13.3.2 Analytical Approach

Evaluation of Project impacts related to mineral resources in Modoc County relied on publicly available information obtained through desktop analysis.

3.13.3.3 Analysis of Checklist Questions

Would the Project 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?

As described in Section 3.13.1, no known mineral resources that are of value to the region and the residents of the State were identified within the Project area. The nearest mining site is Lake City Mine located 5 miles southeast of the Project site and produces sand and gravel products. Further, the Project site does not contain any known mineral resources identified in the Modoc County General Plan, nor is it located at a site where mineral resources are being extracted (Modoc County, 2018). Therefore, the Project would have **no impact** on the availability of known mineral resources.

Would the Project result in the loss of availability of a locally important mineral resource recovery site delineated on a local General Plan, specific plan or other land use plan.

As described above in Section 3.13.1, no known mineral resource delineated on a local General Plan, specific plan, or other land use plan has been identified within the Project area. Therefore, the Project would have **no impact** on the availability of locally important mineral resource recovery sites.

3.13.4 Facility Decommissioning and Site Restoration

No mineral resources have been identified within the Project boundary that would be of value to the region and the residents of the state. Therefore, facility decommissioning and site restoration would have **no impact** on the loss or gain of availability of known mineral resources.

3.14 Noise

This section describes the existing ambient noise environment of the Project area; identifies applicable federal, state, and local regulations; and analyzes the potential noise impacts of the Project. Table 3.14-1 summarizes impacts on noise resources that could result from implementation of the Project.

Table 3.14-1. Summary of Noise Resources Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies?	Less than Significant	None
b) Generation of excessive groundborne vibration or groundborne noise levels?	Less than Significant	None
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?	No Impact	None

3.14.1 Existing Conditions

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. When sound becomes excessive or unwanted, it is referred to as noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting, the time of day and the type of activity during which the noise occurs, and the sensitivity of the individual.

Sound (noise) levels are measured and quantified with several metrics. All of them use the logarithmic decibel (dB) scale with 0 dB roughly equal to the threshold of human hearing. A property of the decibel scale is that the sound pressure levels of two separate sounds are not directly additive. For example, if a 50 dB sound is added to another 50 dB sound, the total is only a 3 dB increase (to 53 dB). Thus, every 3 dB change in sound levels represents a doubling or halving of sound energy. Related to this is the fact that a less-than-3 dB change in sound levels is imperceptible to the human ear.

The frequency of sound is a measure of the pressure fluctuations per second, measured in hertz (Hz). Most sounds do not consist of a single frequency but consist of a broad band of frequencies differing in level. The characterization of sound level magnitude with respect to frequency is the sound spectrum. Many rating methods exist to analyze sound of different spectra. The method used for this analysis is A-weighting (there are also B- and C-weighting filters). The A-weighted scale (dBA) most closely approximates how the human ear responds to sound at various frequencies by progressively deemphasizing frequency components below 1,000 Hz and above 6,300 Hz and reflects the relative decreased sensitivity of humans to both low and extremely high frequencies (Federal Highway Administration [FHWA] 2018).

The duration of noise and the time period at which it occurs are important factors in determining the impact of noise. Several methods are used for describing variable sounds including the equivalent level

(L_{eq}), the maximum level (L_{max}), and the percent-exceeded levels. These metrics are derived from a large number of moment-to-moment A-weighted sound level measurements. Some common metrics reported in community noise monitoring studies are described below:

- L_{eq}, the equivalent level, can describe any series of noise events of arbitrary duration, although the most common averaging period is hourly. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events, and Leq is the common energy-equivalent sound/noise descriptor.
- L_{max} is the maximum sound level during a given time. L_{max} is typically due to discrete, identifiable events such as an airplane overflight, car or truck passing by, or a dog barking.
- L_{90} is the sound level in dBA exceeded 90 percent of the time during the measurement period. L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when no obvious nearby intermittent noise sources occur.
- L_{50} is the median sound level in dBA exceeded 50 percent of the time during the measurement period.
- L_{10} is the sound level in dBA exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. L10 is sometimes called the intrusive sound level because it is caused by occasional louder noises like those from passing motor vehicles.

In determining the daily measure of community noise, it is important to account for the difference in human response to daytime and nighttime noise. Noise is more disturbing at night than during the day, and noise indices have been developed to account for the varying duration of noise events over time as well as community response to them. The Day-Night Average Level (L_{dn}) is such an index. L_{dn} represents the 24-hour A-weighted equivalent sound level with a 10 dBA penalty added to the "nighttime" hourly noise levels between 10:00 p.m. and 7:00 a.m. Because of the time-of-day penalties associated with the L_{dn} index, the L_{eq} for a continuously operating sound source during a 24-hour period will be numerically less. The Community Noise Equivalent Level (CNEL), similar to L_{dn}, applies a 10 dBA penalty for noise levels occurring during the nighttime hours between 10:00 p.m. and 7:00 a.m., and a 5 dBA penalty for noise levels the sound levels occurring during evening hours between 7:00 p.m. and 10:00 p.m. CNEL has been adopted by the State of California to define the community noise environment for development of the community noise element of a General Plan. Noise is also more disturbing the closer a receptor is to the source; noise levels decrease by 6 dB as the distance from its source doubles (FHWA 2011).

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels, and because of the potential for nighttime noise to result in sleep disruption. Additional land uses such as schools, transient lodging, historic sites, cemeteries, and places of worship are also generally considered

sensitive to increases in noise levels. These land use types are also considered vibration-sensitive land uses, as are commercial and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance.

Some population groups, such as children, the elderly, and acutely and chronically ill persons are considered more sensitive to air pollution than others. Sensitive receptor locations typically include residential areas, hospitals, elder-care facilities, rehabilitation centers, daycare centers, and parks. The Project site is in a rural area surrounded by agricultural fields.

Existing Noise Sources and Ambient Noise Levels

Existing ambient noise in the vicinity of the Project sites is consistent with a rural agricultural landscape with the dominant noise sources consisting of vehicular traffic on local roads, air traffic associated with nearby municipal airports, and the operation of agricultural equipment. The major source of vehicular noise in the Project area is traffic along Surprise Valley Road.

Existing Vibration Environment

Similar to the environmental setting for noise, the vibration environment is dominated by traffic from nearby roadways. Heavy trucks can generate ground-borne vibrations that vary depending on vehicle type, weight, and pavement conditions. According to the FTA (2018), *Transit noise and Vibration Impacts Assessments*, "if the roadway is fairly smooth, the vibration from rubber-tired traffic is rarely perceptible." Roads in the Project area are smooth asphalt and it is unlikely that traffic on the local roadway is perceptible.

Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels, and because of the potential for nighttime noise to result in sleep disruption. Additional land uses such as schools, transient lodging, historic sites, cemeteries, and places of worship are also generally considered sensitive to increases in noise levels. These land use types are also considered vibration-sensitive land uses, as are commercial and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance.

There are no sensitive receptors (i.e., schools, hospitals, etc.) in close proximity (i.e., within 1 mile radius) of the site The closest residence is located approximately 650 feet to the northwest of the southern-most well site (Well 22-24). One other residence is within 1,000 feet of a test well site, located approximately 850 feet southwest from Well 43-13. No other sensitive receptors are located within 1,000 feet of Project components.

3.14.2 Regulatory Setting

3.14.2.1 Federal

No federal regulations govern offsite (community) noise. The Occupational Safety and Health Act of 1970 specifies measures designed to protect workers against the effects of noise exposure and lists permissible noise level exposure as a function of the amount of time to which a worker is exposed. Occupational Safety and Health Administration (OSHA) regulations also dictate hearing conservation program requirements and workspace noise monitoring requirements. OSHA requirements limit worker noise exposure to 90 dBA over an 8-hour work shift. Furthermore, if 8-hour worker noise exposure at a work site exceeds 85 dBA, the area must be posted as a noise hazard zone; and a hearing conservation program would be required.

United States Fish and Wildlife Service (USFWS) has established a level of 60 dBA equivalent continuous noise level (L_{eq}) as the maximum permissible noise level to which certain riparian bird species may be subjected during the mating and nesting seasons.

3.14.2.2 State

State Government Code requires counties to draft a Noise Element for their General Plans to establish acceptable noise limits for various land uses. The Modoc County General Plan contains a Noise Element which provides land use compatibility criteria as Community Noise Equivalent Level (CNEL) for acceptable land use noise levels. CEQA Guidelines defining a significant noise effect require that the impacts of a project be considered cumulatively in conjunction with those of other projects planned for the area.

3.14.2.3 Local

Noise Element

The Noise Element of the Modoc County General Plan states that noise levels in the County are generally low and expectations of Modoc residences for maintaining this condition are generally much higher than in more urban counties. However, it is generally accepted that individuals have property rights which allow them to participate in activities that could be considered noisy provided noise does not interfere with other's use and enjoyment of their property. This tolerance for relatively noisy activities is exemplified by the use of seasonal industrial operations such as sawmills and agricultural facilities near residential areas. The stated objectives of the Nosie Element is:

- Provide sufficient noise exposure information in the General Plan so that existing and potential noise impacts may be effectively addressed in the land use planning and project review processes.
- Develop and implement effective strategies to abate and avoid excessive noise exposures in the County by requiring that effective noise mitigation measures be incorporated into the design of new noise-generating and new noise-sensitive land uses.
- Protect areas within the County where the present noise environment is deemed acceptable.

Modoc County General Plan goals, policies, and action items relating to noise and relevant to the proposed Project are:

Goal N-1: To protect the citizens of Modoc County from the harmful effects of exposure to excessive noise.

- Policy N A. Areas within Modoc County exposed to existing or projected future exterior noise levels exceeding 60 dB L_{dn} should be designated as noise-impacted areas.
- Policy N B. New development of residential or other noise sensitive land uses should not be permitted in noise-impacted areas unless effective mitigation measures are incorporated into the Project design to reduce noise levels in outdoor activity areas to 60 dB Ldn or less and interior noise levels to 45 dB L_{dn} or less. In areas where it is not possible to reduce exterior noise levels to 60 dB L_{dn} or less, using a practical application of the best available noise-reduction technology, an exterior noise level of up to 65 dB L_{dn} will be allowed. Under no circumstances should interior noise levels be permitted to exceed 45 dB L_{dn} with the windows and doors closed.
- Policy N E. Noise level criteria applied to land uses other than residential or other noise-sensitive uses should be consistent with recommendations of the California Office of Noise Control.
- Policy N I. All building permits should be reviewed by the Planning Department for consistency with the Noise Element and other elements.

3.14.3 Impacts Analysis

3.14.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to noise. The criteria listed below considers if the Project would:

a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies?

b. Generation of excessive groundborne vibration or groundborne noise levels?

c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

3.14.3.2 Analytical Approach

The Project construction and operation noise levels were estimated using the computer noise propagation model SoundPLAN Essential (version 6), which calculates noise impacts taking into account terrain features including relative elevations of noise sources, receivers, and intervening objects, ground effects due to areas of pavement and unpaved ground, and atmospheric effects on sound

propagation. The following assumptions and parameters are included in the SoundPLAN supported noise source assessment:

- Ground effect acoustical absorption coefficient equal to 0.0, which represents the acoustically reflective "hard" surface for the majority of the exploration site. Vegetated fields surrounding the Project site were assigned a coefficient of 1.0, which represents the acoustically "soft" surface associated with the vegetated ground cover;
- Reflection order of 1, which allows for a single reflection of sound paths on encountered structural surfaces such as buildings and structures; and
- Calm meteorological conditions (i.e., no wind) with 50 degrees Fahrenheit and 70% relative humidity.

Onsite Construction Noise

The potential construction noise levels onsite associated with proposed Project construction activities were estimated for the noisiest construction activities. Accordingly, the noise model conservatively assumes that construction equipment presented in Table 2.4-2 above for well drilling operations, in addition to maximum traffic on local roads, would be operated simultaneously, and is modeled to the nearest sensitive receptor to project components (i.e., residential receptor near well site 22-24). In actual practice, however, the types and numbers of construction equipment near any specific receptor location will vary over time.

Offsite Noise (Construction Traffic)

Estimated vehicle trips associated with each phase of construction is presented above in Table 2.4-3. For the purpose of this analysis, the principals of logarithmic summation are applied to estimate the maximum noise increase associated with construction traffic along local surface streets. Specifically, noise levels increase by 3 dBA when the number of similar noise sources double. The increase in delivery/haul trucks and construction worker vehicle trips are not anticipated to double the amount of traffic that currently exist in the surrounding area. As such, the increase in delivery/haul trucks and worker vehicles in the surrounding roadways is not anticipated to incrementally increase noise levels in the surrounding area by 3 dBA or more and are not analyzed further herein.

3.14.3.3 Analysis of Checklist Questions

Would the Project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies?

Based on the types and number of equipment to be used, construction activities associated with Project site construction and well drilling are identified to have the greatest potential to increase noise levels in the Project area. For a conservative analysis, the cumulative noise for both phases of construction including drilling of all test wells is assumed to occur simultaneously (although only one well would actually be drilled at any given time) and is propagated to the nearest sensitive receptors to estimate the maximum change in noise levels resulting from the proposed Project as summarized in Table 3.14-1 and illustrated in the figures in Appendix E (Noise Technical Report), maximum noise levels

associated with temporary construction and testing activities at the nearest sensitive residential receptor would not exceed the Modoc County exterior noise standard of 60 dBA L_{dn} and nighttime well drilling activities would not result in a perceptible increase in noise levels at the nearest sensitive receptor.

Table 3.14-1. Modeled Maximum Project Construction Sound Levels.

Modeled Receptors	Modeled Daytime Construction Noise Level[1]	Modeled Nighttime Construction Noise Level[1]	Modeled Day/Night Construction Noise Level (L_{dn})	Noise Standard[2] (L_{dn}/Day/Night L_{eq})	Exceed Presumed Standard?
Nearest Residential Receptor (Southwest of Well 45-12)	38.0	30.4	39.1	60/60/50	No
Nearest Residential Receptor (Southwest of Well 43-13)	39.4	34.0	41.7	60/60/50	No
Nearest Residential Receptor (Northwest of Well 22-14)	44.9	33.4	44.4	60/60/50	No

Notes:

1. Modeled noise level is associated with construction equipment. Modeled construction noise levels less than ambient would not be expected to increase noise levels at the modeled receptors.
2. The noise standard for exterior noise levels provided in the Modoc County General Plan Noise Element specifies that exterior noise levels shall not exceed 60 dBA L_{dn} at the nearest sensitive receptor. This standard is equivalent to a daytime L_{eq} 60 dBA, evening L_{eq} of 55 dBA, and nighttime L_{eq} of 50 dBA.

Generation of excessive groundborne vibration or groundborne noise levels?

The speed limit on the adjacent roadways is 55 miles per hour and the road surface is in good condition. As trucks enter and exit the site, they would traverse the asphalt drive at very low speeds. As noted in FTA (2018), rubber tires and suspension systems provide vibration isolation, and therefore, it is unusual for ground-borne vibration associated with on-road vehicle movement to be perceptible. As such, vibration impacts associated with Project operation are expected to be **less than significant**.

For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

The Project site is not located within an airport land use plan nor is it within two miles of a public airport or public use airport. As such, **no impact** would occur to people residing or working in the Project area related to excessive noise levels.

3.14.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. All abandonment and decommissioning activities would be short-term and any noise from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.14.4 above and would be **less than significant**. Noise would entirely cease with the discontinuation of geothermal energy exploration/testing activities.

3.15 Population and Housing

This section describes current populations and housing within the vicinity of the Project; identifies applicable federal, state, and local regulations; and analyzes potential impacts on populations and housing attributed to the Project. Table 3.15-1 summarizes impacts on populations and housing that could result from implementation of the Project.

Table 3.15-1. Summary of Population and Housing Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and business) or indirectly (for example, through extension of roads or other infrastructure)?	No Impact	None Required
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	No Impact	None Required

3.15.1 Existing Conditions

The Project area is located 1.85 miles north of Lake City, 11.5 miles south of Fort Bidwell, and 10.25 miles west of the Nevada and California state border. The Project does not propose the development of houses or businesses, nor the addition of transportation networks and other infrastructure besides project-specific access road development. As of the 2020 Census, Lake City and Fort Bidwell have populations of 71 and 180, respectively (United States Census Bureau, 2020).

3.15.1.1 Population by Race and Ethnicity

The U.S. Census Bureau reports that in 2020, 93 percent of the population in Lake City identified as White, representing the largest race category within the two cities. In Fort Bidwell, 45 percent of the population identified as American Indian and Alaskan Native. Table 3.15-2 provides the racial and ethnic composition for Lake City and Fort Bidwell, which is generally representative of the greater Project area.

Table 3.15-2. Racial and Ethnic Composition (2020)

Race	Lake City CDP*	Fort Bidwell CDP*
White	65	89
Black or African American	0	0
American Indian and Alaska Native	1	81
Asian	0	0
Native Hawaiian and Other Pacific Islander	0	0
Other	0	0

Two or More Races	5	10
Total	**71**	**180**

* Census Designated Place; Source: U.S. Census Bureau 2020

3.15.1.2 Population by Age

The age characteristics of a population are an important factor in evaluating current and future housing needs. Each age group consists of distinct lifestyles, income ranges, family types and sizes, and housing preferences. Evaluating the age breakdown of a community is important in determining future housing development.

Residents aged 25 to 54 are considered to be in their prime working years. Residents aged 18-64 represent approximately 70 and 60 percent of the populations within Lake City and Fort Bidwell, respectively. School-age children and below represent 30 and 6 percent of the populations within Lake City and Fort Bidwell, respectively. Persons aged 65 and older account for 0 and 34 percent of the populations within Lake City and Fort Bidwell, respectively.

Table 3.15-3. Population by Age (2020)

Age (years) and Sex	Lake City CDP*	For Bidwell CDP*
Persons under 5 years	2	7
Persons under 18 years	9	10
Persons between 18 and 64	21	103
Persons 65 years and over	0	59
Total	**30**	**172**

* Census Designated Place; Source: U.S. Census Bureau 2020

3.15.1.3 Trends

Between 2010 and 2021, the population in the unincorporated portion of the County declined by 829 people (-12.1 percent), while the population in Modoc County as a whole decreased by 963 people (-8.6 percent) over the same period. As shown on Table 3.15-4 the population in unincorporated Modoc County, has been consistently decreasing (County of Modoc Planning Department, 2024). The California Department of Finance projected that population for the County is expected to decrease by 50.0 percent, from 8,686 to 4357, between 2020 and 2070 (State of California Department of Finance, 2024).Table 3.15-4 displays the population trend within unincorporated Modoc County between the years 2010 and 2021.

Table 3.15-4. Population Trends – Unincorporated Modoc County

County	Year		Change	
	2010	2021	Total Population	Percent
Modoc	6859	6030	829	-12.1%

3.15.1.4 Housing

Modoc County is currently in the process of updating its 2024-2029 General Plan Housing Element but has not yet adopted a final draft of this plan. Until this plan is adopted, previously adopted plans remain in place. The existing Housing Element 2019-2024 was adopted January 12, 2021. The County is currently in compliance with State regulations (California Government Code Section 65583).

3.15.1.5 Household Characteristics

The U.S. Census Bureau defines a household as all persons who occupy a housing unit. This may include single persons living alone, families related by blood or marriage, as well as unrelated individuals living together. Persons living in retirement or convalescent homes, dormitories or other group living situations are enumerated separately and are not counted in household population. Household type and size, income level, the presence of special needs populations, and other household characteristics determine the type of housing needed by residents.

Family households decreased in Modoc County from 64.1% in 2015 to 58.1% in 2017. All other household types showed an increase from 41.8% to 57.1%. The trend is that households with families are on the decline. This trend is more than likely due to the lack of employment opportunities. While increasing numerically in 2017, married-couple families, non-family households, householders living alone and householders 65 years and over all increased as a proportion of total Modoc County households compared to year 2015 (County of Modoc Planning Department, 2019).

3.15.1.6 Housing Inventory and Market Conditions

Person per Household

An important indicator of the relationship between population growth and household formation is "persons per household." If persons per household were increasing, then population would be growing faster than households. Conversely, if the number of persons per household is decreasing, then households would be forming at a faster rate than population growth. In the area surrounding the Project, total average persons per household increased by 12.7 percent in Lake City and 40.1 percent in Fort Bidwell between 2010 to 2023 (Table 3.15-4).

Table 3.15-5. Average Persons per Household

City	2010	2023	Percent Change
Lake City CDP	1.64	1.88	12.7%
Fort Bidwell CDP	1.73	2.92	40.1%

* Census Designated Place; Source: U.S. Census Bureau 2010; 2023

Number of Households

According to the U.S. Census Bureau, the total number of households in the vicinity of the Project decreased by 41.4 percent. Between 2010 and 2023, the number of households in Lake City CDP

decreased by approximately 66 percent and decreased in Fort Bidwell CDP by 27.2 percent (Table 3.15-5).

Table 3.15-6. Total Households

City	2010	2020	Percent Change
Lake City CDP	47	16	-66.0%
Fort Bidwell CDP	81	59	-27.2%
Total	**128**	**75**	**-41.4%**

* Census Designated Place; Source: U.S. Census Bureau 2010; 2023

Poverty

The population below poverty levels for Lake City and Fort Bidwell was determined using the U.S. Census Bureau 2023 American Community Survey (ACS) 5-year estimates. Table 3.15-7 shows the poverty rates for each age group for Lake City and Fort Bidwell. In Modoc County, 22.5 percent of the population is below the poverty level.

Table 3.15-8. Population below Poverty Level, 2016-2020

	Lake City Percent Below	Fort Bidwell Percent Below
Children < 18 years	0%	4.1%
Adults (18-64) years	0%	16.2%
Elderly (65+) years	0%	0.6%
Total Population Below Poverty Level	**0%**	**20.9%**
Modoc County Below Poverty Level	22.5%	

Source: U.S. Census Bureau, 2018-2023 American Community Survey (ACS)

3.15.2 Regulatory Setting

3.15.2.1 Local

Modoc County General Plan 2019-2024 Housing Element Update

The Modoc County 2019-2024 Housing Element update was adopted in 2021, currently a 2024-2029 update is being prepared and has undergone public review but has yet to be adopted. The Housing Element of the Modoc County General Plan is one of the eight County General Plan elements mandated by the State of California, as articulated in Sections 65580 and 65589.8 of the Government Code. Each city and county are required to discuss how it will meet its fair share of the housing need in the state. The purpose of the Housing Element is to ensure that local governments adequately plan to meet the housing needs of all people within the community (County of Modoc Planning Department, 2019). The

Housing Element contains a number of goals and policies to encourage continuous analysis and evaluation of population trends and housing needs to allow for the development of sites and facilities The Housing Element also acknowledges the governmental, environmental, infrastructure, and land use constraints on residential development in the County.

3.15.3 Impacts Analysis

3.15.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to population and housing. The criteria listed below considers if the Project would:

a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and business) or indirectly (for example, through extension of roads or other infrastructure)?

b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

3.15.3.2 Analytical Approach

Evaluation of Project impacts related to population and housing in Modoc County relied on publicly available information obtained through a desktop analysis.

3.15.3.3 Analysis of Checklist Questions

Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and business) or indirectly (for example, through extension of roads or other infrastructure)?

As described in Section 2.4, the Project would require a temporary increase in labor force (15 workers) during the short-term construction period (approximately 22-25 months), with another three months for site restoration/reclamation. It is assumed that the workforce would be from northern California or Nevada and would likely not require permanent accommodations. The Project does not involve the construction of any new housing or commercial areas that would attract new residents to the area, nor does it require the extension of infrastructure besides minor access roads. Therefore, the Project would have **no impact** on population growth.

Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

The Project is located on agricultural parcels with the nearest residency located approximately 650 feet to the northwest of the southern-most well site (Well 22-24). One other residence is within 1,000 feet of a test well site, located approximately 850 feet southwest from Well 43-13. No other sensitive receptors are located within 1,000 feet of Project components. The Project would not force any nearby residents to seek other housing during construction or testing; therefore, the Project would have **no impact** on housing.

3.15.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. All abandonment and decommissioning activities would be short-term and any impacts to population/housing from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.15.3 above and would have **no impact** on population and housing.

3.16 Public Services

This section describes the existing public services of the County; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on public services in Modoc County. Public services encompass fire protection, law enforcement, schools, parks, post office, and other resources designed for the health, safety, or enjoyment of the public. Impacts to other public services such as wastewater, water, electrical, and other utilities are evaluated in Section 3.20 below.

Table 3.16-1 summarizes impacts on public services that could result from implementation of the Project.

Table 3.16-1. Summary of Public Services Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: **Fire protection?** **Police protection?** **Schools?** **Parks?** **Other public facilities?**	Less than significant	None Required

3.16.1 Existing Conditions

The Project site is located within the Lake City Fire Protection District and the Modoc County Sheriff Department's areas of service.

3.16.1.1 Fire Protection Services

The Project site is located within the Lake City Fire Protection District. The Lake City Fire Department is a volunteer fire department located along North Steet in Lake City, approximately 1.8 miles south of the Project site. The District's resources include eight volunteer fire fighters and six vehicles. The fire

fighters meet on the first Thursday of each month for training (Modoc Local Agency Formation Commision , 2017).

3.16.1.2 Law Enforcement Services

The Project site is located within the Modoc County Sheriff's Office service area, which patrols 4,200 square miles, including all unincorporated areas of Modoc County, and County waterways and recreation areas, including 2,688,000 acres of public lands. Patrols include approximately eight deputies and one reserve unit. The Sheriff's Office also serves as the County Office of Emergency Services. Patrols are generally based out of the Alturas Sheriff's Office (Modoc County Sheriffs Office, 2025)

3.16.2 Regulatory Setting

This section describes the laws, policies, and regulations that pertain to the Project.

3.16.2.1 State

Fire Codes and Guidelines

The California Fire Code (Title 24, Part 9 of the CCR) establishes regulations to safeguard against hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures, and premises. The Fire Code also establishes requirements intended to provide safety and assistance to firefighters and emergency responders during emergency operations. The provisions of the Fire Code apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure throughout the State of California. The Fire Code includes regulations regarding fire resistance-rated construction, fire protection systems such as alarm and sprinkler systems, fire services features such as fire apparatus access roads, means of egress, fire safety during construction and demolition, and wildland-urban interface areas.

3.16.2.2 Local

Modoc County General Plan

The Safety Element of the Modoc County General Plan includes information on local hazards which may impact Public services. The Safety Element does not include any goals Policies or action items related to fire or police services and defers to the Modoc County Local Hazard Mitigation Plan (LHMP) (Modoc County, 2016). The Climate Change Element contains several Goal, polices and action item relating to saft and public services such as fire protection and law enforcement which include the following:

> **Goal SE 1 -** To protect the public health and safety through limitation of development in hazardous areas.
>
> **Goal SE 2 -** Protect the community from risks posed by climate change.
>
> **Goal SE 3 -** Protect the community from risks posed by flooding.
>
> **Goal SE 4 -** Protect the community from the risks posed by wildfire.

Policy SE A - The County should not permit new development on land which has been identified as environmentally unsound to support such development.

Policy SE B - Any development on hillsides should minimize topographic alteration. In any case, development should be restricted to slopes of 30% or less.

Policy SE C - New development should demonstrate the availability of adequate fire protection and suppression facilities.

Policy SE D - Recommendations within the state Fire Safe Guide should be implemented wherever practical in Modoc County.

Policy SE E - Urban and rural residential development should be discouraged in hillside areas lacking an adequate water supply or nearby available fire protection facilities

Policy SE F - Development should generally be discouraged in areas of high wildland fire hazard where vegetation management programs, including the creation and maintenance of fuel breaks to separate urban uses would result in unacceptable impacts on open space, scenic and ecological conditions.

Polic SE J - Industrial and commercial development should generally be discouraged in areas of high wildland fire or other hazard area.

Policy SE G - All urban and rural development, existing and proposed, should be provided with adequate water supply and fire protection facilities and services. Facilities serving hill area development should be adequate to provide both structural and wildland fire protection. The primary responsibility falls upon the owner and the developer.

Policy SE Q - The County shall require that open space within developed areas be designed and maintained to minimize fire hazards and ensure compatibility between development and any significant biological resources.

Policy SE U - Structures, features of structures, or uses which present an unacceptable risk of fire should be brought into conformance with applicable fire safety standards

Policy SE CC - New development shall provide and continually maintain adequate water supplies, access for adequate fire safety, street addressing and signage, vegetative clearance, evacuation, fuel modification and defensible space in accordance with Cal Fire, Fire Safe Regulations.

Action Item SE A - Zone or otherwise designate all areas within potential hazard areas so as to ensure safe development or appropriate mitigation measures.

Action Item SE B - Prepare a hillside development ordinance and implement same in the review and approval of development in slope areas.

Action Item SE D - Implement all appropriate recommendations for the Fire Safe Guide.

Action Item SE E - The County shall collaborate with CalFire and other fire agencies to develop a County Fire Code. This shall include fire protection plan requirements for development in very high fire hazard areas.

Action Item SE I - The County should collaborate with the California Department of Forestry and Fire Protection and local fire protection districts to inspect development projects to assure fire risks are minimized.

Action Item SE J - The County shall work with the local fire districts and the California Department of Forestry and Fire Protection to develop and implement an effective and environmentally sound weed abatement program and utilize the CDF defensible space standards and recommendations.

Action Item SE K - The County shall work with local fire districts and the California Department of Forestry and Fire Protection to use the Lassen-Modoc CalFire Unit Fire Plan as the standard to develop fire hazard evaluations, assessments of assets at risk, prioritization of hazard mitigation actions and implementation and monitoring components. This effort will include development and establishing regulations that comply with Title 14, CCR, Division 1.5, Chapter 7, Subchapter 2, Articles 1-5 (commencing with Section 1270) (SRA Fire Safe Regulations) and title 14, CCR, Division 1-5, Chapter 7, Subchapter 3, Article 3 (commencing with Section 1299.01 (Fire Hazard Reduction Around Buildings and Structures Regulations) for SRAs and/or VHFHZs.

Action Item SE L - The County shall collaborate with the California Department of Forestry and Fire Protection and the appropriate interest groups, such as the Modoc County Fire Safe Council, to develop and maintain a Community Wildfire Prevention Plan. This will include programs that create wildfire defense zones, such as fuel breaks and staging areas for emergency services.

Action Item SE M - The County shall implement policies and programs throughout the General Plan, such as the Circulation Element, to improve emergency access to high hazard/open space areas.

Action Item SE N - The County recognizes that portions of the county are located in a Very High Fire Hazard Severity Zone and, therefore, will comply with relevant State regulations per Government Code Section 51175.

Action Item SE O The County shall work with the local fire districts and the California Department of Forestry and Fire Protection to identify and map substandard structures that pose a fire safety threat and coordinate and provide for appropriate fire hazard mitigation, such as rehabilitation or demolition

Action Item SE R - The County shall implement all mitigation measures listed in the Modoc County Local Hazard Migration Plan adopted on February 14, 2017 and as updated from time to time

Action Item SE S - The County shall collaborate with local fire districts and the California Department of Forestry and Fire Protection to develop an overall evacuation plan for catastrophic emergencies

Action Item SE T - The County shall collaborate with local fire districts and the California Department of Forestry and Fire Protection to conduct periodic public outreach programs to implement the Modoc County Mitigation Plan. This program shall include assessment of and projection of current and future needs for service.

Action Item SE U - The County shall collaborate with local fire districts and the California Department of Forestry and Fire Protection to develop a water supply fire protection plan that:

1. Prioritize areas in need of water supply infrastructure.
2. Maintenance and long-term integrity of planned and existing water supply infrastructure.
3. Includes information on emergency service trainings and inter-agency preparedness coordination or mutual aid agreements.

Modoc County Local Hazard Mitigation Plan (LHMP)

Modoc County Local Hazard Mitigation Plan (LHMP) was updated in March 2016 and adopted by the County in 2017 (Modoc County, 2018). The purpose of the plan is to reduce or eliminate long-term risk to people and property from the identified hazards (Modoc County, 2016). The LHMP addresses a wide range of risks present in the county and provides mitigation measures to protect people and property. The plan includes risks associated with fire services conditions, generally in the County, none of which is directly relevant to the proposed Project.

3.16.3 Impacts Analysis

3.16.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to public services. The criteria listed below considers if the Project would:

a. result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

- Fire protection
- Police protection
- Schools
- Parks
- Other public facilities

3.16.3.2 Analytical Approach

Evaluation of Project impacts related to public services in Modoc County relied on publicly available information obtained through a desktop analysis.

3.16.3.3 Analysis of Checklist Questions

Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Fire Protection?

The proposed Project would not create any permanent structures or create any additional fire hazards which would require improvement to local fire infrastructure. In addition, the number of construction workers coming to the region for the duration of construction activity would not substantially strain the existing fire resources of the County. Therefore, impacts to fire protection would be **less than significant**.

Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Police Protection?

The Project would not impact or displace the location of existing police protection facilities. Also, the number of construction and flow testing workers coming to the region would be limited to 15 workers for 22-25 months (with another three months for site restoration/reclamation) and would not substantially increase demand for police protection services. The Project would also include public safety mechanisms such as fences and gates for site security and preclude unauthorized access. Therefore, impacts to police protection would be **less than significant**.

Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Schools?

The number of construction and operational workers coming to the region would be limited to 15 workers for 22-25 months (with another three months for site restoration/reclamation) and would not substantially increase demand for schools or require the construction of new schools. Therefore, impacts to schools would be **less than significant**.

Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Parks?

No public parks or recreational areas/resources are present in the Project area. The number of construction and operational workers coming to the region would be limited to 15 workers for 22-25 months (with another three months for site restoration/reclamation) and would not substantially increase demand on existing or future recreational facilities, including parks or nature reserves. Therefore, impacts to parks would be **less than significant**.

Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Other public services?

The number of construction and operational workers coming to the region would be limited to 15 workers for 22-25 months (with another three months for site restoration/reclamation) and would not substantially increase demand for any public service. Impacts of the Project on public utilities and service systems are evaluated in Section 3.20 below. Therefore, impacts to other public services would be **less than significant**.

3.16.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. All abandonment and decommissioning activities would be short-term and any impacts to public services from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.16.3 above and would be **less than significant**.

3.17 Recreation

This section describes the existing recreational resources surrounding the Project; identifies applicable federal, state, and local regulations; and analyses Project impacts to recreation in Modoc County. Table 3.17-1 summarizes impacts to recreational resources that could result from implementation of the Project.

Table 3.17-1. Summary of Recreation Resources Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Increase the use of the existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	No Impact	None Required
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse effect on the environment?	No Impact	None Required

3.17.1 Existing Conditions

The Project site and surrounding land use is predominately agricultural under the County's General Plan. The Project site is surrounded by a mix of agricultural fields and open space.

3.17.1.1 Recreation Facilities in Modoc County

Modoc County's recreational resources, include scenic wildland areas, wildlife, forests, lakes, streams and reservoirs, offer recreational opportunities such as fishing, hunting, bird and wildlife watching, hiking, picnicking, bicycling, camping, backpacking and skiing. The Modoc National Forest, the federal and state game refuges, and the Lava Beds National Monument provide extensive outdoor recreational opportunity.

The County has 12 parks and recreation areas, as well as the County fairgrounds located in Cedarville. Approximately 30 camping and picnicking facilities and an extensive trail system are present in the County.

3.17.1.2 Nearest Recreation Facilities

There are no developed recreation facilities in the vicinity of the Project area, the nearest facilities are located in Cedarville 10-miles to the south and include the County Fair Grounds, Cressler Bonner Trading Post, and California Historic Landmark No. 14. Other undeveloped recreation resources are located in Modoc National Forest directly west of the Project site, which includes Middle Fork Davis Creek Mine and Plum Valley Campground approximately 5-miles west of the site. Other resources within the Modoc National Forest are limited to Forest Roads that are largely obscured from the site due to topography.

Beneficial uses for Upper Alkali Lake are listed as REC-1 and REC-2. REC-1 uses are described as:

> *Beneficial uses of waters used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.*

REC-2 uses are described as:

> *Noncontact Water Recreation. Beneficial uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.*

However, physical public access to the lake is limited. The western edge of the lake is predominantly private land in agricultural use. The eastern edge is predominantly BLM land, with limited road development to the lake. There are no developed public marinas, beaches, campgrounds or other recreational facilities along the lake shore.

3.17.2 Regulatory Setting

3.17.2.1 Federal

Quimby Act

The 1975 Quimby Act was passed in order to require the provision of parkland and open space for recreational use. The act requires developers to set aside land, donate conservation easements, or pay fees for park improvements. The Quimby Act allows for the constant provision of parks for California communities. The Quimby Act standards adopted in jurisdictions typically require the provision of 3 to 5 acres of parkland per 1,000 residents (CDPR 2002). The Act is designed to ensure "adequate" provision of parkland and open space through the Quimby Act Standards. Through these standards, lead agencies can require developers to provide land for parks, donate for conservation easements, or pay in-lieu fees for the creation or rehabilitation of recreational facilities.

3.17.2.2 State

California Parklands Act of 1980

The California Parklands Act of 1980 is included in the California Public Resources Code, Section 5096.141-5096-145. The California Parklands Act recognizes the responsibility of the state to provide recreational opportunities and facilities for the residents of California. According to the California Parklands Act of 1980, "…when there is proper planning and development, parks, beaches, recreation areas and recreational facilities, and historical resources preservation projects contribute not only to a healthy physical and moral environment, but also contribute to the economic betterment of the state, and, therefore, it is in the public interest for the state to acquire, develop, and restore areas for recreation, conservation, and preservation and to aid local governments of the state in acquiring, developing, and restoring such areas as will contribute to the realization of the policy declared in this chapter..."

Overall, the California Parklands Act of 1980 identifies the importance of available parkland and recreational areas throughout the State for use by residents and visitors. The California Parklands Act also recognizes the importance of funding in order to provide new and to improve existing recreational facilities and parkland areas.

3.17.2.3 Local

Modoc County General Plan Conservation and Open Space Element

The Conservation and Open Space Element of the Modoc County General Plan provides goals and policies for the stewardship of County parks and recreational facilities for the enjoyment of County residents and visitors. Recreation tourism is an important part of Modoc Counties economy (Modoc County, 2018). Goals and Policies regarding recreation include:

Policy CO V - Support enhancement of existing park and recreation resources for both tourist and resident use.

Policy CO W - Encourage the development of private recreation facilities.

Policy CO X - Intense recreational uses and residential development should be discouraged in hill open space areas lacking an adequate water supply or nearby available fire protection facilities

3.17.3 Impacts Analysis

3.17.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to recreational resources. The criteria listed below considers if the Project would:

Increase the use of the existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse effect on the environment.

3.17.3.2 Analytical Approach

Evaluation of Project impacts related to recreational resources in Modoc County relied on publicly available information obtained through a desktop analysis.

3.17.3.3 Analysis of Checklist Questions

Would the Project increase the use of the existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

The Project would not directly or indirectly substantially increase the number of residents or use of local recreational facilities. This limited impact would keep the County compliant with the Quimby Act, which requires five acres of parkland for every 1,000 residents. During construction and testing, approximately 15 workers are anticipated to be on the Project site for 22-25 months. These workers and employees are anticipated to come from existing populations that live in or commute from the surrounding local community. As there would be no long-term increase of residents, the Project would not lead to an increase of use or deterioration of existing neighborhood, regional, or other recreational facilities. Therefore, the Project would have **no impact** on the use or deterioration of existing recreational resources.

Would the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse effect on the environment?

The geothermal exploration project would not develop any recreational resources or require the development or alteration of any recreation resources. Therefore, the Project will have **no impact** on the construction or expansion of recreational facilities which might have an adverse effect on the environment.

3.17.4 Facility Decommissioning and Site Restoration

No recreational resources or uses are present on the Project site(s), therefore, facility decommissioning and site restoration would have **no impact** on any recreational opportunities or resources.

3.18 Transportation

This section describes the existing transportation of the Project; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on transportation in the Project area. Table 3.18-1 summarizes impacts on transportation that could result from implementation of the Project.

Table 3.18-1. Summary of Transportation Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	No Impact	None
b) Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	Less than Significant	None
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	Less than Significant	None
d) Result in inadequate emergency access?	Less than Significant	None

3.18.1 Existing Conditions

As described in the Modoc County General Plan (Modoc County 2018) and the Modoc County Regional Transportation Plan (Modoc County Transportation Commission 2019), the regional roadway network consists of three highways - U.S. 395 (US-395), State Route 139 (SR-139), and State Route 299 (SR-299). The network also include the regionally significant major collector - County Road 1 (Surprise Valley Road), and minor collector - County Road 9 (Fandango Pass Road).

3.18.1.1 Freeways

There are no roadways designated as freeways within Modoc County.

3.18.1.2 Major Highways

Major arterial roadways typically consist of four to six travel lanes with two to three lanes travel in each direction separated by either a raised or painted median. However, state highways in Modoc County are all two-lane paved routes totaling 177.6 distance miles, which consist of U.S. 395, State Route 299 (SR-299), and State Route 139 (SR-139), described as follows:

- **U.S. 395 (US-395)** US-395 runs in a south to north direction from the Lassen County line through the City of Alturas to the Oregon border. This highway is a common route for recreational travelers going from Eastern California and Nevada to destinations in Central and Eastern Oregon.
- **State Route 139 (SR-139)** SR-139 traverses the western portion of Modoc County through the communities of Adin, Canby, and Newell on its way to Tulelake in Siskiyou County.

- **State Route 299 (SR-299)** SR-299 runs generally west to east from the southwestern portion of Modoc County through the communities of Adin, Canby, Alturas, and Cedarville to the Nevada state line.

3.18.1.3 Collectors

The regional roadway system also features several important collectors that generally run in either an east-west or north-south orientation. The important north-south collector includes County Road 1 (Surprise Valley Road), and the important east-west collector includes County Road 9 (Fandango Pass Road).

3.18.1.4 Scenic Highways

No designated state scenic highways occur in Modoc County; however, SR-139 and SR-299 between Tulelake and Adin are considered eligible for State Scenic Highway Designation.

3.18.1.5 Existing Traffic Volumes

Table 3.18-2 summarizes the existing Annual Average Daily Trips (AADT) for road segments in the vicinity of the proposed Project.

Table 3.18-2. Existing Road Conditions

Segment	Direction	Limits	AADT[2]
SR-299	E-W	Jct. Lake City Road (County Road 1)	1,050
SR-139	E-W	Jct. County Road 91	1,200
US-395	N-S	Oregon State Line	820
US-395	N-S	Jct. SR-299 East	1,700

Source: CalTrans 2024

3.18.1.6 Transit Network

The Modoc Transportation Agency operates Sage Stage and is the primary public transportation provider in the region, providing demand response service in and around the City of Alturas and three intercity service routes to Klamath Falls, Oregon, Redding, California and Reno, Nevada. The bus system currently provides two types of public transportation services: intercity/commuter (fixed-route with deviation) and local demand response service that is referred to as Dial-A-Ride. This service is provided within a 10-mile radius of Alturas, including to and from Modoc Estates and Cal Pines subdivisions. Sage Stage provides curb-to-curb service to the general public and door-to-door access for elderly and disabled persons. Due to limited resources and highly fluctuating demands, all Sage Stage services are operated on a reservation basis.

To support intercity travel and interregional trips accessing specialized health care and other services in distant urban centers, the Sage Stage operates three intercity routes. These routes link Alturas to regional centers in Reno, Nevada three times per week; in Redding, California and Klamath Falls, Oregon once weekly. For passenger convenience, the bus drops off and picks up riders at specific

destinations, such as hospitals, health care facilities, airports, bus and train stations, and popular locations within the city limits.

Strong Family Health Center, DART, Veteran's Services, and Modoc County social service programs provide some transit services to specified populations. TEACH Senior Citizen Services, TEACH, and many Modoc County human resource programs primarily rely on Sage Stage for their client's transportation needs.

3.18.2 Regulatory Setting

3.18.2.1 State

California Department of Transportation

The State of California Department of Transportation (Caltrans) has responsibility over the design, construction, maintenance, and operation of the California State Highway System. Caltrans has jurisdiction over State highway right-of-way and sets maximum load limits for trucks and safety requirements for oversized vehicles that operate on highways. The proposed Project does not include any components which would encroach into Caltrans jurisdiction.

3.18.2.2 Local

Modoc County General Plan

The Modoc County General Plan Circulation Element provides the necessary framework to guide the growth and development of the County's transportation-related infrastructure. The County's General Plan includes the following policies that apply to the proposed Project:

- C A. All roads should be constructed and improved to minimum County design standards.
- C B. Private roads not constructed to minimum County standards will not be accepted for dedication.
- C C. All roads constructed must meet minimum fire and other emergency standards, including construction, maintenance program, street signs and turn-around space.
- C F. All costs of new on and off-site improvements to County roads should be borne by project developers. Construction or upgrading of bridges in connection with new residential developments should also be borne by project developers.
- C I. The location, distribution and size of transmission lines and pipelines should be consistent with the land uses and development to minimize adverse social or environmental impacts. Such lines should avoid interference with adjacent land uses and assure that aesthetic values will not be degraded.

3.18.3 Impacts Analysis

3.18.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to transportation. The criteria listed below considers if the Project would:

a. Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

b. Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

d. Result in inadequate emergency access?

3.18.3.2 Analytical Approach

As discussed above, under SB-743, a project's effect on automobile delay shall not constitute a significant environmental impact. Therefore, LOS and other similar vehicle delay or capacity metrics may no longer serve as transportation impact metrics for CEQA impact analyses. The OPR has updated the CEQA Guidelines and provided a final technical advisory in December 2018 which recommends VMT as the most appropriate measure of transportation impacts under CEQA. For land use and transportation projects, SB-743-compliant CEQA analysis became mandatory on July 1, 2020. Automobile delay, as described solely by LOS or similar measure of traffic congestion, is no longer considered a significant impact under CEQA. However, the Modoc County Department of Public Works requires transportation analyses to review roadway capacity in terms of LOS to identify deficiencies and required improvements to the circulation system, outside of the CEQA analysis.

VMT Impact Significance Criteria

The County has not adopted its own VMT thresholds, for this reason the OPR Technical Advisory (December 2018) was used to evaluate VMT impacts. OPR's Technical Advisory provides guidance for lead agencies to evaluate transportation impacts from projects based on VMT metrics. It provides screening criteria, which can be used to quickly identify whether a project should be expected to cause a less-than-significant impact related to VMT. Per OPR's Technical Advisory, projects may be screened out as follows:

- Small Projects: projects generate fewer than 110 trips per day,
- Local Serving Retail (generally less than 50,000 square feet in building area),
- Location-Based (low VMT areas, within ½ mile of an existing major transit stop, or along a high-quality transit corridor), and
- Provision of affordable housing.

3.18.3.3 Analysis of Checklist Questions

Would the Project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

The Project would not involve any transportation improvements or programs that would conflict with adopted policies, plans, or programs supporting alternative transportation. As such, **no impact** to any transportation plan, ordinance, or policy would occur.

Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Construction of the proposed exploration wells and access roads may result in nominal and short-term increases in vehicle trips by construction workers and construction vehicles on area roadways. These trips would include construction workers commuting to and from the Project Site, haul truck trips associated with the transfer and disposal of materials, and material and equipment deliveries. The number of construction-related trips would vary each day, depending on construction phase, planned activity, and material needs. Table 3.18-3 summarizes the maximum estimated Project daily VMT for construction and operations.

Table 3.18-3. Maximum Project Daily VMT

Trip Type	Number of One-Way Trips	One-Way Trip Length (miles)[2]	Daily VMT (miles)
Workers[1]	30	11.9	357
Vendor[3]	104	9.0	936
Haul[3]	6	20	120
Temporary Construction Maximum Total Daily VMT			**1,413**

Notes:

1. A maximum of 15 construction workers are assumed.
2. Trip lengths consist of default CalEEMod values with exception of vendors for delivery of Project equipment during construction.
3. All materials deliveries are assigned to vendor trips and water deliveries are assigned to haul trips.

In their Technical Advisory on Evaluating Transportation Impacts on CEQA (December 2018), the Governor's Office of Planning and Research (OPR) recommends the use of VMT metrics when analyzing land use projects and plans. Absent substantial evidence indicating that a project would generate a potentially significant level of VMT, or inconsistency with a Sustainable Communities Strategy (SCS) or General Plan, projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than significant transportation impact. Per CEQA Guidelines, §15064.3 subdivision (a), 'vehicle miles traveled' refers to the amount and distance of automobile travel attributable to a project." Here, the term "automobile" refers to on-road passenger vehicles, specifically cars and light trucks and is not applied for heavy-duty trucks. Accordingly, construction of the Project would result in 30 on-road passenger vehicle trips which is much fewer than the screening threshold for small projects of 110 on-road passenger vehicle trips. As such, the Project can be assumed to result in **less than significant impacts** on transportation and circulation.

Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The Project would not result in any changes to any roads, intersections, streets, highways, nor would it provide any incompatible uses to the street and highway system. All vehicles that would be used for travel to and from the Project site would be licensed and comply with all appropriate transportation laws and regulations including obtaining and adhering to provisions of any required permits for oversized loads. As such, **less than significant impacts** related to transportation design hazards would occur.

Would the Project result in inadequate emergency access?

The access road improvements may require an encroachment permit from the County Public Works Department for any work onto, into or within the County road or street right of way. For any work requiring an encroachment permit, a Temporary Traffic Control Plan would be developed and submitted to the County Public Works Department for approval. The Temporary Traffic Control Plan would include measures to mitigate traffic impacts to the satisfaction of the County Public Works Department. Traffic control would be in accordance with the current California Temporary Traffic Control Handbook or as directed by the Modoc County Traffic Engineer. Further, all other proposed facilities would be constructed within the property boundaries of the Project site and would not affect emergency vehicle access to the facility or any roadway. Therefore, **less than significant impacts** to emergency access to the plant site or surrounding area would occur under the Project.

3.18.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. All abandonment and decommissioning activities would be short-term and any impacts to traffic/transportation resources from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.18.3 above and would be **less than significant**.

3.19 Tribal Cultural Resources

This section describes the existing tribal cultural resources of the Project; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on tribal cultural resources in the Project site. Table 3.19-1 summarizes impacts on tribal cultural resources that could result from implementation of the Project.

Table 3.19-1. Summary of Tribal Cultural Resources Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object	Potentially Significant Unless Mitigated (Less Than Significant With Mitigation)	TCR-1 Post-Review Discovery of Potential Tribal Cultural Resource Plan

with cultural value to a California Native American tribe, and that is: **i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or**		
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	Potentially Significant Unless Mitigated (Less Than Significant With Mitigation)	TCR-1 Post-Review Discovery of Potential Tribal Cultural Resource Plan

3.19.1 Existing Conditions

3.19.1.1 Ethnographic Setting

The Project area lies within a region historically occupied and utilized by several cultural and linguistically diverse Native American groups. At the time of initial non-indigenous contact, the Northern Paiute, specifically the Gidutikadu of Surprise Valley, occupied the valley (Kelly 1932; Raven in Moratto 1984). Christopher Raven summarized the ethnographically documented, traditional Paiute lifeway as follows.

Large, multifamily groups lived in winter villages, subsisting on stored foods and those animals (such as rabbits) that could be taken year-round in valley floor settings. During the spring, summer, and fall there was a fractionization of group size, with family groups moving into higher country to take roots (including camas), seeds (especially grass seeds such as Indian ricegrass and Great Basin wildrye), greens and berries. Most animals, save carnivores, were hunted for food; pronghorn and rabbits were hunted communally.

Village composition was fluid, consisting in any winter of an assemblage of those foraging groups who in late fall found themselves in the vicinity (Kelly 1932). The result was that personal contacts and family ties were maintained over long distances. Although band leadership focused on a headman whose succession was often hereditary, political organization appears to have been generally loose. Paiute winter shelters consist of single-family dwellings in the form of conical, mat-covered structures, 3 to 5 meters in diameter, against which brush or grass was laid. The living floor might or might not be excavated (Riddell 1960). Summer houses were more casual, often consisting only of roofless, brush windscreens. Technology consisted largely of the basic tools and methods employed by other California and Great Basin groups, with little by way of unique or specialized equipment. (Raven, in Moratto 1984:440-441).

Three known wintering grounds exist around present-day Lake City. One includes a juniper stand a short distance north of town and is called Wa-dunu'ba (from *wap*, juniper, and *dunu'ba*, bunch or stand). Another site lies near the lake shore and is called Sawa'-dunu'ba (*sawa'*, sagebrush). Informants report that this area is now cleared and planted in wheat. Camps scatter from below the peak known

as Hu-na'-na-mubi (badger-his-nose), just south of Lake City, all along the range slopes south toward Cedarville and on to Eagleville (Kelly 1932:78).

By 1849, the promise of gold had increased the movement of non-indigenous emigrants through and into Northern Paiute territory. By 1859, gold and silver were discovered in the area, causing non-indigenous encroachment. The Northern Paiutes formed alliances with neighboring bands and tribes and worked together to rid their lands of the non-indigenous emigrants. The Northern Paiutes participated in a number of armed conflicts, including the Pyramid Lake War of 1860, the Snake Wars of 1866 and 1868, and the Battle of Infernal Caverns in 1867.

Reservations were established, first at Pyramid Lake and the Walker River in Nevada and followed by smaller colonies and reservations throughout the Northern Paiute territory. The Eidsness (1992) report notes that approximately 400 Native American individuals live in the Surprise Valley area (Eidsness 1992). Among these are a number of Paiute descendants who are members of the Fort Bidwell Reservation or the Cedarville Rancheria.

The Fort Bidwell Indian Community, known as the Gidutikad Band of Northern Paiutes, is a sovereign tribal nation whose ancestral lands are located in northeastern California near the Oregon and Nevada borders. The Gidutikad people are part of the broader Northern Paiute nations whose traditional territories span California, Nevada, Oregon, and Idaho. They speak Northern Paiute, part of the Western Numic branch of the Uto-Aztecan language family.

The community's history reflects the broader experience of Indigenous peoples during non-indigenous westward expansion. In 1865, the U.S. military established Camp Bidwell on Gidutikad lands, and in 1866 President Andrew Johnson designated it as an Indian training school. The Indian Reorganization Act of 1934 established formal federal recognition and tribal self-governance (gidutikadpaiute.com 2026).

The Cedarville Rancheria is a federally recognized sovereign tribal nation composed of descendants of Northern Paiute, Achomawi, and Atsugewi peoples in Modoc County, California. The tribe's ancestral territory encompasses northeastern California, including the Warner Mountains, Modoc Plateau, and surrounding river valleys and lakes. Historically known by various band names including Kosealekte (Goose Lake People), the tribe's traditional territory provided abundant resources through hunting, fishing, and gathering practices refined over thousands of years. The community maintained strong cultural traditions including basketry, beadwork, and oral storytelling that continue today.

The reservation was established in 1915, providing 26.58 acres of federal trust land. In 1956, the federal government terminated the tribe's recognition through a devastating policy that severed their sovereign status and access to resources. Through persistent advocacy, the Cedarville Rancheria achieved federal recognition restoration in 1983, reestablishing their self-governance through a constitution and five-member Tribal Council (AAA Native Arts 2025).

3.19.2 Regulatory Setting

3.19.2.1 California Native American Heritage Commission

In 1976, the California State Government passed AB 4239, establishing the Native American Heritage Commission as the primary government agency responsible for identifying and cataloging Native American cultural resources. As such, one of the NAHC's primary duties is to prevent irreparable damage to designated sacred sites, as well as prevent interference with the expression of Native American religion in California. The bill authorized the NAHC to act in order to prevent damage to and insure Native American access to sacred sites. The NAHC can request that the court issue an injunction for the site, unless it found evidence that public interest and necessity required otherwise. The NAHC has authority to identify a Most Likely Descendant when Native American human remains are discovered any place other than a dedicated cemetery. Most Likely Descendants are granted the legal authority to make recommendations regarding the treatment and disposition of the discovered remains. These recommendations, although they cannot halt work on the Project site, give Most Likely Descendants a means by which to ensure that the Native American human remains are treated in the appropriate manner.

3.19.2.2 California 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 in 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.

Consultation and correspondence with various culturally affiliated Tribal groups and agencies were conducted in accordance with Public Resources Code (PRC) Section 21080.3.1 (AB 52). On March 30, 2026, the County initiated environmental review under the California Environmental Quality Act (CEQA) for the proposed Surprise Valley Geothermal Exploration Project. The County sent a certified project notification letter to each a California Native American Tribe that is traditionally and culturally affiliated with the geographic area of the proposed Project, on March 30, 2026, pursuant to PRC Section 21080.3.1, notifying that the project was under review and to provide the Tribes 30 days from the receipt of the letter to request consultation on the project in writing. No responses were received requesting initiation of consultation under the provisions of AB 52.

3.19.2.3 Local

Modoc County General Plan (Conservation and Open Space Element)

The Modoc County General Plan states that the destruction of archeological resources has been an issue of increasing concern in recent years. The Conservation and Open Space Element of County's General Plan (Modoc County 2018) contains one goal, two policies, and one action item related to the protection and preservation of cultural resources as follows:

GOAL CO-1: To preserve, protect, and enhance the valuable natural, cultural, and historical resources of the County

- Policy CO Y: Develop a program to preserve and enhance historic and cultural building and places of significance.
- Policy CO AA: Minimize the loss of archaeological resources through the development review and approval process.
- Action CO G: Include consideration of archaeological history and cultural resources impacts in the review of any development proposal.

3.19.3 Impacts Analysis

3.19.3.1 Impacts Significance Criteria

TCR (a). Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. ***Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or***

ii. ***A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code § 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.***

3.19.3.2 Analytical Approach

This section evaluates potential impacts of the Project on tribal cultural resources, which are defined in Public Resources Code Section 21074(a)(1-2) as follows:

- Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
    - Included or determined to be eligible for inclusion in the CRHR.
    - Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.

- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.
- A cultural landscape that meets the criteria of subdivision (a) is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape.
- A historical resource described in Section 21084.1, a unique archaeological resource as defined in subdivision (g) of Section 21083.2, or a "non-unique archaeological resource" as defined in subdivision (h) of Section 21083.2 may also be a tribal cultural resource if it conforms with the criteria of subdivision (a).

3.19.3.3 Analysis of Checklist Questions

Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k):

ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

The County is required to comply with AB 52, and as such, has initiated consultation and sent letters inviting the identified Tribes to consult on the Project's potential to impact tribal cultural resources prior to construction activities. No responses were received requesting initiation of consultation under the provisions of AB 52.

Ground disturbing activities associated with excavation for new Project construction could have a potentially significant impact on tribal cultural resources, if present. As discussed in Section 3.6 above, the Applicant would implement MM CR-1, MM CR-2, MM CR-3, and MM-CR-4, along with TCR-1 to protect tribal cultural resources in the event of an unanticipated discovery during ground disturbing activities. Any required consultation would be completed prior to resuming construction activities within the designated buffer to avoid impacts to discovered tribal cultural resources to the extent feasible. Implementation of these mitigation measures would reduce potentially significant impacts resulting from inadvertent disturbance, damage, or discovery of tribal cultural resources; therefore, impacts for the Project would be **less than significant with mitigation with mitigation**.

3.20 Utilities and Service Systems

This section describes the existing utilities and service systems of the County; identifies applicable federal, state, and local regulations; and analyzes the potential impacts of the Project on utilities and service systems in Modoc County. Utilities and service systems encompass wastewater treatment facilities, stormwater drainage facilities, water supply and treatment, and solid waste disposal. The impacts analysis for public services which include fire protection, law enforcement, schools, parks, post office, and other resources designed for the health, safety, or enjoyment of the public is discussed in Section 3.16. Table 3.20-1 summarizes impacts on utility and service systems that could result from implementation of the Project.

Table 3.20-1. Summary of Utilities and Service Systems Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction of which could cause significant environmental effects?	No Impact	None Required
b) Have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years?	Less Than Significant	None Required
c) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?	No Impact	None Required
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	Less Than Significant	None Required
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	Less Than Significant	None Required

3.20.1 Existing Conditions

The Project is located in the Surprise Valley region of Modoc County north of Lake City. Modoc County is largely unincorporated, the only incorporated city within Modoc County being Alturas. The balance of the County is served by a variety of special districts and a few private utilities. Special districts are generally limited to single communities and provide single resources such as domestic or agricultural water supply, fire protection, or waste removal.

3.20.1.1 Utilities

Water and Sewer

Water and sewer services are limited in Modoc County. The City of Alturas has its own water and sewer system and in Modoc County, three water districts exist: Cedarville Water, Hot springs Valley Water and Newell Water. The nearest to the Project site is Cedarville Water that provides drinking water to the town of Cedarville which is approximately 10 miles south of the Project area. There is no water or sewer service to the Project area. All local residents and developments require well and septic for water and wastewater treatment.

Electric Power

The Project site is located within the Surprise Valley Electrification Corporation service area. The Project site would not be connected to the local power utilities due to the temporary and uncertainty of test wells. All power onsite will be produced by generators brought to the site during construction and testing. The generators used would range between 415 horsepower and 671 horsepower and run up to 24 hours per day.

Natural Gas

The Tuscarora Gas Transmission Company provides natural gas to the region through its operation of the Tuscarora Gas transmission pipeline, which transports natural gas originating in Alberta, Canada to northeastern California and Northern Nevada. The Project would not require natural gas for construction, operation, or decommissioning.

Solid Waste

The County owns and operates one Class III (non-hazardous) waste disposal facilities located near Alturas. The County operates eleven transfer stations throughout the region. The transfer station nearest the proposed Project site is Lake City. Waste from these stations is hauled to the Alturas Sanitary Landfill (SWIS # 25-AA-0001). The permitted volume of this facility is 1,600,000 cubic yards and 6,000 tons per year, with a remaining capacity of 176,931 cubic yards.

3.20.2 Regulatory Setting

This section describes the laws, policies, and regulations that pertain to the Project.

3.20.2.1 State

California Water Code

Water Code Sections 10656 and 10657 restrict state funding for agencies that fail to submit their urban water management plan to the Department of Water Resources. In addition, Water Code Section 10910 describes the WSA that must be undertaken for projects listed under PRC Section 21151.9, including an analysis of groundwater supplies. Water agencies are given 90 days from the start of consultation to provide a WSA to the CEQA lead agency. Water Code Section 10910 also specifies the circumstances for which a WSA was once prepared and would be required to obtain another

assessment. Water Code Section 10631 directs that contents of the urban water management plans include further information on future water supply projects and programs and groundwater supplies.

Water Quality Control Plan for the Lahontan Region

The Water Quality Control Plan for the Lahontan Region (Basin Plan) sets forth water quality standards and control measures for surface and groundwaters of north and south Lahontan Region. The Basin Plan designates beneficial uses for waterbodies and establishes water quality objectives, waste discharge prohibitions, and other implementation measures to protect those beneficial uses.

The Integrated Waste Management Act of 1989

The California Integrated Waste Management Act of 1989, also referred to as AB 939, set requirements for waste diversion including 25-percent diversion by 1995 and 50-percent diversion by 2000. Diversion was to be achieved following city and county implementation of a Source Reduction and Recycling Element where each city and county devised programs to reach the diversion goals. AB-341 was adopted in 2012 and requires 75-percent recycling by 2020.

3.20.3 Impacts Analysis

3.20.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to utilities and service systems in the County. The criteria listed below considers if the Project would:

a. require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

b. have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years?

c. result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?

d. generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

e. comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

3.20.3.2 Analytical Approach

Evaluation of Project impacts related to utilities and service systems in Modoc County relied on publicly available information obtained through publicly available data, Section 2.4.5 (Water Use), and Section 2.4.3 (Interim and Final Reclamation).

3.20.3.3 Analysis of Checklist Questions

Would the Project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Water Facilities

As described above, all water necessary for the construction, and testing would be obtained offsite from commercially available sources. During drilling operations, a minimum of 10,000 gallons of water would be kept on site and used as needed for construction activities and well testing, including grading and dust control. The water would be imported by truck as needed from offsite sources. Therefore, no new water infrastructure is required, and there would be **no impact**.

Wastewater

Construction of the proposed facilities would not generate/discharge any wastewater. Portable toilets would be brought on-site per California Code of Regulations, Title 8, Section 1526, Subchapter 4, Construction Safety Orders Article 3, General §1526, Toilets at Construction Jobsites and disposed of at the appropriate wastewater facility, resulting in no impact to RWQCB requirements. Therefore, no new wastewater infrastructure is required, and there would be **no impact**.

Electricity

As described in above, the Project site is located within the Surprise Valley Electrification Corp service area. The Project site would not be connected to the local power utilities due to the temporary nature of the Project. There are no existing electrical connections located at the well site. All power onsite will be produced by generators brought to the site during construction and testing. The generators used would range between 415 horsepower and 671 horsepower and run up to 24 hours a day. Therefore, no new electrical infrastructure is required, and there would be **no impact**.

Natural Gas

No natural gas facilities are located near the Project and no natural gas hookup is required for the Project. Therefore, no new natural gas infrastructure is required, and there would be **no impact**.

Telecommunications

Several companies provide wireless or cell phone services for the area. The Project would not require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, and there would be **no impact**.

Would the Project have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years?

Construction

As described in Section 2.4.4, the Project would obtain water for construction and decommissioning activities, including grading and dust control, from commercially available offsite sources. Up to 10,000 gallons per day (gpd), or 4.6 acre-feet per year, of water would be required for site preparation, construction, and reclamation. This water would be trucked in.

Drilling and Testing

As described in Section 3.11, water necessary for well drilling would be obtained from commercially available offsite sources. Approximately 100,000 gpd or 110.5 acre-feet per year, would be required for well testing activities. This water would be trucked in.

Decommissioning

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. The geothermal test wells will be abandoned in conformance with the well abandonment requirements of CalGEM. After decommissioning water use onsite related to the proposed Project would case.

The proposed Project is temporary in nature and would not result in a permanent increase in water use at the sites. Water use would be limited to the duration of construction testing and decommissioning/reclamation water would be purchased offsite from existing commercial sources. Therefore, the Project would have a **less than significant** impact to water supply.

> **Would the Project result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?**

As described in Section 3.20.1 above, the Project would produce very little wastewater. During construction, portable chemical sanitary facilities would be used by all construction personnel. These facilities would be serviced by a local contractor. In addition, all construction liquids would be disposed of in compliance with all appropriate local, state and federal disposal regulations. Therefore, **no impacts** to the wastewater treatment utility's service capacity would occur under the Project.

> **Would the Project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?**

As described in Section 3.20.1 above, the Project would generate a small amount of solid waste. Solid waste during construction would be disposed of in an approved solid waste disposal site in accordance with Modoc County Environmental Health Department requirements. Waste would be routinely collected and disposed of at an authorized landfill by a licensed disposal contractor. The Project would not generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. Therefore, potential impacts to solid waste service would be **less than significant**.

> **Would the Project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?**

Project construction waste generation would likely be limited to packaging for equipment and supplies, and construction personnel waste (i.e., wrappers, food waste). No hazardous solid waste would be generated as result of Project construction or operation. Operation of the proposed facilities would not generate any solid waste. All construction waste would be disposed of at the appropriate receiving facility, such as the Class III (non-hazardous) waste disposal facilities located near Alturas. Therefore, the Project would not violate any federal, state, or local solid wastes statutes or regulations, and potential impacts to solid waste regulations would be **less than significant**.

3.20.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. All abandonment and decommissioning activities would be short-term and utilities from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.20.3 above and would be **less than significant**.

3.21 Wildfire

This section describes the existing wildfire risk surrounding the Project site; identifies applicable federal state and local regulations; and analyzes impacts of wildfire attributed to the Project. Table 3.21-1 summarizes wildfire impacts that could result from implementation of the Project.

Table 3.21-1. Summary of Wildfire Resources Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	No Impact	None Required
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	No Impact	None Required
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	No Impact	None Required
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	No Impact	None Required

3.21.1 Existing Conditions

The Project site is located in the Surprise Valley region of unincorporated Modoc County. The surrounding land is primarily used for agricultural purposes, and open space. According to the Safety Element of the General Plan, Modoc County features examples of a wide range of challenging topography, fuels and weather (Modoc County, 2018). CalFire is responsible for providing fire

protection on all State Responsible Area (SRA) lands, which consists of about 70% of the County. The Lassen-Modoc-Plumas Unit is broken into battalions, including Battalion 3 (Bieber Battalion), located in the southwest corner of Modoc County and Battalion 4 (Alturas Battalion) located in the northeastern portion of Modoc County (Modoc County, 2018).

There are twelve local fire protection districts that serve various community areas throughout Modoc County. Each of the fire protection districts is a member of a Mutual Aid Agreement with CALFIRE. Each of the fire protection districts is a member of a Master Agreement that provides for assistance for fire and other emergency events that exceed the capacity of any individual district.

The Project site is located within the Lake City Fire Protection District. The Lake City Fire Department is a volunteer fire department located along North Steet in Lake City 1.8 miles south of the Project site (Figure 1.1-1). The Department's resources include eight volunteer fire fighters and six vehicles. The fire fighters meet on the first Thursday of each month for training (Modoc Local Agency Formation Commision, 2017). The Project site is located withing a Local Area Responsibility Zone and is not mapped by the CalFire Fire Hazard Severity Zone map. However, the Project is adjacent to areas classified as high or very high fire severity. The Project work areas are surrounded by irrigated fields and would not increase wildfire risk.

3.21.2 Regulatory Setting

3.21.2.1 State

Fire Codes and Guidelines

The California Fire Code (Title 24, Part 9 of the CCR) establishes regulations to safeguard against hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures, and premises. The Fire Code also establishes requirements intended to provide safety and assistance to firefighters and emergency responders during emergency operations. The provisions of the Fire Code apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure throughout the State of California. The Fire Code includes regulations regarding fire resistance-rated construction, fire protection systems such as alarm and sprinkler systems, fire services features such as fire apparatus access roads, means of egress, fire safety during construction and demolition, and wildland-urban interface areas.

3.21.2.2 Local

The Safety Element of the Modoc County General Plan includes information on local hazards which may impact wildfire. The Safety Element does not include any goals Policies or action items related to fire or police services and defers to the Modoc County Local Hazard Mitigation Plan (LHMP) (Modoc County, 2016). The Climate Change Element contains several goals, polices and action item wildfire which include the following:

> **Goal SE 1 -** To protect the public health and safety through limitation of development in hazardous areas.
>
> **Goal SE 2 -** Protect the community from risks posed by climate change

Goal SE 4 - Protect the community from the risks posed by wildfire

Policy SE A - The County should not permit new development on land which has been identified as environmentally unsound to support such development.

Policy SE B - Any development on hillsides should minimize topographic alteration. In any case, development should be restricted to slopes of 30% or less.

Policy SE C - New development should demonstrate the availability of adequate fire protection and suppression facilities.

Policy SE D - Recommendations within the state Fire Safe Guide should be implemented wherever practical in Modoc County.

Policy SE E - Urban and rural residential development should be discouraged in hillside areas lacking an adequate water supply or nearby available fire protection facilities

Policy SE F - Development should generally be discouraged in areas of high wildland fire hazard where vegetation management programs, including the creation and maintenance of fuel breaks to separate urban uses would result in unacceptable impacts on open space, scenic and ecological conditions.

Polic SE J - Industrial and commercial development should generally be discouraged in areas of high wildland fire or other hazard area.

Policy SE G - All urban and rural development, existing and proposed, should be provided with adequate water supply and fire protection facilities and services. Facilities serving hill area development should be adequate to provide both structural and wildland fire protection. The primary responsibility falls upon the owner and the developer.

Policy SE Q - The County shall require that open space within developed areas be designed and maintained to minimize fire hazards and ensure compatibility between development and any significant biological resources.

Policy SE U - Structures, features of structures, or uses which present an unacceptable risk of fire should be brought into conformance with applicable fire safety standards

Policy SE CC - New development shall provide and continually maintain adequate water supplies, access for adequate fire safety, street addressing and signage, vegetative clearance, evacuation, fuel modification and defensible space in accordance with Cal Fire, Fire Safe Regulations.

Action Item SE A - Zone or otherwise designate all areas within potential hazard areas so as to ensure safe development or appropriate mitigation measures.

Action Item SE B - Prepare a hillside development ordinance and implement same in the review and approval of development in slope areas.

Action Item SE D - Implement all appropriate recommendations for the Fire Safe Guide.

Action Item SE E - The County shall collaborate with CalFire and other fire agencies to develop a County Fire Code. This shall include fire protection plan requirements for development in very high fire hazard areas.

Action Item SE I - The County should collaborate with the California Department of Forestry and Fire Protection and local fire protection districts to inspect development projects to assure fire risks are minimized.

Action Item SE J - The County shall work with the local fire districts and the California Department of Forestry and Fire Protection to develop and implement an effective and environmentally sound weed abatement program and utilize the CDF defensible space standards and recommendations.

Action Item SE K - The County shall work with local fire districts and the California Department of Forestry and Fire Protection to use the Lassen-Modoc CalFire Unit Fire Plan as the standard to develop fire hazard evaluations, assessments of assets at risk, prioritization of hazard mitigation actions and implementation and monitoring components. This effort will include development and establishing regulations that comply with Title 14, CCR, Division 1.5, Chapter 7, Subchapter 2, Articles 1-5 (commencing with Section 1270) (SRA Fire Safe Regulations) and title 14, CCR, Division 1-5, Chapter 7, Subchapter 3, Article 3 (commencing with Section 1299.01 (Fire Hazard Reduction Around Buildings and Structures Regulations) for SRAs and/or VHFHZs.

Action Item SE L The County shall collaborate with the California Department of Forestry and Fire Protection and the appropriate interest groups, such as the Modoc County Fire Safe Council, to develop and maintain a Community Wildfire Prevention Plan. This will include programs that create wildfire defense zones, such as fuel breaks and staging areas for emergency services.

Action Item SE M The County shall implement policies and programs throughout the General Plan, such as the Circulation Element, to improve emergency access to high hazard/open space areas.

Action Item SE N The County recognizes that portions of the county are located in a Very High Fire Hazard Severity Zone and, therefore, will comply with relevant State regulations per Government Code Section 51175.

Action Item SE O The County shall work with the local fire districts and the California Department of Forestry and Fire Protection to identify and map substandard structures that pose a fire safety threat and coordinate and provide for appropriate fire hazard mitigation, such as rehabilitation or demolition

Action Item SE R The County shall implement all mitigation measures listed in the Modoc County Local Hazard Migration Plan adopted on February 14, 2017 and as updated from time to time

Action Item SE S The County shall collaborate with local fire districts and the California Department of Forestry and Fire Protection to develop an overall evacuation plan for catastrophic emergencies

Action Item SE T The County shall collaborate with local fire districts and the California Department of Forestry and Fire Protection to conduct periodic public outreach programs to implement the Modoc County Mitigation Plan. This program shall include assessment of and projection of current and future needs for service.

Action Item SE U The County shall collaborate with local fire districts and the California Department of Forestry and Fire Protection to develop a water supply fire protection plan that:

1. Prioritizes areas in need of water supply infrastructure.
2. Maintenance and long-term integrity of planned and existing water supply infrastructure.
3. Includes information on emergency service trainings and inter-agency preparedness coordination or mutual aid agreements.

Modoc County Local Hazard Mitigation Plan (LHMP)

Modoc County Local Hazard Mitigation Plan (LHMP) was updated in March 2016, and adopted by the County in 2017 (Modoc County, 2018). The purpose of the plan is to reduce or eliminate long-term risk to people and property from the identified hazards (Modoc County, 2016). The LHMP addresses a wide range of risks present in the county and provides mitigation measures to protect people and property. The plan includes risks associated with fire services conditions, generally in the County, none of which is directly relevant to the proposed Project.

3.21.3 Impacts Analysis

3.21.3.1 Impacts Significance Criteria

Modoc County reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to wildfire. The criteria listed below considers if the Project would:

a. Substantially impair an adopted emergency response plan or emergency evacuation plan?
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

3.21.3.2 Analytical Approach

Evaluation of Project impacts related to wildfire in Modoc County relied on publicly available information obtained through a desktop analysis. In addition, Safety Element of the General Plan was consulted for project impact potential.

3.21.3.3 Analysis of Checklist Questions

Would the Project substantially impair an adopted emergency response plan or emergency evacuation plan?

The Project does not conflict with any emergency response plan outlined by the or the OEP emergency response plan. Therefore, the Project would have **no impact** on emergency response or emergency evacuation plans outlined by the State or County.

Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

The Project area is located adjacent to High and Very High fire hazard severity zones, as designated by the County. However, there are no designated fire hazard severity zones within the Project site, which is surrounded by irrigated agricultural fields. Furthermore, the Project site is located on flat land designated for agricultural production, which does not pose a risk due to slope. However, the Project would not exacerbate wildfire risks associated with slope or prevailing winds and **no impact** would occur.

Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

The Project would require the construction of one access road though an existing agricultural area. No other installation of infrastructure is proposed. The work areas are surrounded by existing irrigated fields and maintenance of the proposed and improved roads is not likely to exacerbate fire risk. All infrastructure would comply with existing regulations and would not exacerbate fire risk; therefore, **no impacts** to infrastructure exacerbating wildfire risk would occur.

Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The Project area is not located within a landslide zone of probability identified by USGS (USGS 2019). As discussed in Section 3.11, the Project would not alter the existing drainage pattern surrounding the Project site and it would comply with regulations that reduce the potential for excess runoff waters from the Project site. The Project would not expose people or structures to significant risks as a result of runoff, post-fire instability, or drainage changes; therefore, **no impact** would occur.

3.21.4 Facility Decommissioning and Site Restoration

At the end of the Project's useful life, all equipment and facilities will be properly abandoned and dismantled. All abandonment and decommissioning activities would be short-term and wildfire risk from decommissioning equipment (e.g., cranes; excavators) would be similar to the construction impacts discussed in Section 3.21.3 above and would only operate on cleared bare soils. Therefore, there would be **less than significant** impacts from facility decommissioning and site restoration.

SECTION 4 Mandatory Findings of Significance

CEQA Guidelines Section 15065(a) requires a finding of significance if a project "has the potential to substantially degrade the quality of the environment." In practice, this is the same standard as a significant effect on the environment, which is defined in CEQA Guidelines Section 15382 as "a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the Project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." Below are discussions on potential impacts that may have a cumulative, indirect, and/or long-term impact, as provided by the Modoc County CEQA Checklist (2018).

4.1 Impact Analysis

a) Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, eliminate tribal cultural resources or eliminate important examples of the major periods of California history or prehistory?

As supported by the resource analysis in Section 3.5.3, the Project does not have the potential to substantially degrade the quality of the environment or threaten a biological community on the brink of extinction. All aspects of the proposed development site(s) have experienced prior disturbance (I.e., discing, plowing, etc.) and are either maintained for active agricultural cultivation. The Project will not disturb high quality habitat or directly impact a sensitive species, including Sandhill Crane. Further, given the disturbed nature of the Project sites, the chance of encountering an undocumented tribal cultural resource is very low (Section 3.19.3). Mitigation measure CR-3 (Unanticipated Discoveries Plan) will further minimize the potential for damaging a tribal cultural resource. Therefore, the Project will result in less than significant effects to these resources.

b) Does the Project have impacts that are individually limited, but cumulatively considerable?

This CEQA checklist identifies the geographic scope of the cumulative area of analysis as the extent of potential off-site impacts, including air, noise, and traffic. The extent of these impacts is discussed in each resource's respective section in the CEQA Checklist and as observed, none would result in a significant impact. In evaluating the potential cumulative impacts, the County considered whether the potential impacts from the Project, when considered together with the potential impacts from other closely related past, present, and reasonably foreseeable future projects, would be considerable or which compound or increase other environmental impacts. No reasonably foreseeable future projects were identified to be close (within 1 mile) of the proposed Project.

4.1.1.1 Air Quality and Greenhouse Gas Emissions

The Project is consistent and does not conflict with the applicable plans, policies, and regulations, and because the Project's incremental increase in GHG emissions is below the 1,100 $MTCO_2e$ per year

screening threshold for industrial projects, the Project's incremental increase in GHG emissions would result in less than significant cumulative effects.

4.1.1.2 Noise

Construction noise impacts would be temporary, and no other Projects are planned in close enough proximity to have a cumulative impact. Construction and Testing phase noise would be in line with the County General Plan (i.e., less than decibels) and as no other projects are in close proximity, the Project would not result in a significant cumulative effect.

4.1.1.3 Transportation

Construction of the proposed facilities may result in nominal and short-term increases in vehicle trips by construction workers and construction vehicles on area roadways. These trips would include construction workers commuting to and from the Project site, haul truck trips associated with the transfer and disposal of materials, and material and equipment deliveries. These trips would be temporary during construction and once the facilities are constructed, The Project would not contribute enough permanent vehicle trips to be cumulatively significant.

c) Does the Project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?

The Project does not pose a substantial adverse impact on human health or safety. No portion of the project involves extensive use or emission of hazardous materials or other byproducts which would cause substantial adverse effects on human beings, either directly or indirectly.

SECTION 5 References

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Appendix A

Air Quality and Greenhouse Gas Technical Report

Catalyst
ENVIRONMENTAL SOLUTIONS



Air Quality and Greenhouse Gas Technical Report

Surprise Valley Geothermal Exploration Project

Prepared for: Modoc County Planning Department

January 19, 2026

Innovative solutions for a complex world

Catalyst
ENVIRONMENTAL SOLUTIONS

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Attachment A. CalEEMod Air Quality and GHG Emission Data

SECTION 1 Introduction

Catalyst Environmental Solutions Corporation (Catalyst) has prepared this report to evaluate the potential for impacts related to air quality and greenhouse gas (GHG) resulting from implementation of the proposed Surprise Valley Geothermal Exploration Project (Project) in Modoc County, California. This report includes an evaluation of potential construction and operational air emissions and whether Project-induced emissions are in excess of standards established by the applicable local jurisdiction (i.e., Modoc County Air Pollution Control District). Site-specific construction and operations activity information used for air emissions models are based on information provided by ORMAT.

1.1 Project Overview

1.1.1 Project Location and Description

The Project entails the development of eleven geothermal exploration/test wells southwest of Upper Alkali Lake, and 1.85 miles north of Lake City within the Lake City-Surprise Valley 1 Known Geothermal Resources Area (KGRA) of Modoc County.

Proposed developments would be located within the Lake City USGS quadrangle in sections 12, 13, and 24 Township 44 north Range 15 east; on APN 026-080-018, APN 026-100-004, APN 026-100-014, APN 026-100-006, APN 026-100-007, and APN 026-100-008. The proposed development areas are leased to ORMAT by various private landowners.

Primary access to the general project area is provided by Surprise Valley Road which travels north and south through or adjacent to Project parcels. Existing agricultural roads stemming from Surprise Valley Road provide access to individual well pad development sites and will be improved as necessary to accommodate the proposed development. An additional access road will be constructed on APN 026-100-014 and APN 026-100-004 to provide access to the proposed well pads 43-13 and 82-13 and an additional access road to be constructed on APN 0226-100-006 from Surprise Vally Road to the proposed well pads 35-13 and 46-13. A new access road segment will also be constructed in APN 026-100-008 to provide access to proposed well pad 22-24.

The total project area of disturbance from the proposed development is approximately 39.49 acres as summarized in **Table 1**.

Table 1. Project Area of Disturbance Estimates

Facility	Disturbance (Acres)
Geothermal Exploration Wells (i.e., Well Pads)	37.18 acres
Improved Access Roads	0.2 acres
New Access Roads	2.11
TOTAL	**39.49 acres**

1.1.2 Geothermal Exploration/Test Wells

Eleven test/exploratory wells would explore areas of potentially viable geothermal resources, for future production well development. One test well will be developed on each of the following parcel's APN 026-080-018 and APN 026-100-004; three test wells on APN 026-100-014; two test wells on APN 026-100-006; and four test wells on APN 026-100-008.

During well installation, each well pad would accommodate a drilling rig, support equipment, portable bathroom, baker tanks, and project vehicles. Each well pad would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Each well would be drilled with a rotary drill rig similar to those used to drill oil and gas wells. The test wells would each be drilled and cased to a design depth of approximately 3,000 to 5,000 feet. Following the cementing of the surface casing, blowout prevention equipment (BOPE) would be installed. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic barite (barium sulfate) would be stored at each well pad (as appropriate for the type of material) for use in preventing uncontrolled well flow, as necessary.

Once the well is completed, a well head will be installed, and pressure and flow testing will be conducted. Well testing consists of flowing the well into baker tanks stationed on the well pad and monitoring geothermal fluid for temperatures, pressures, flow rates, chemistry and other parameters. Discharge from test wells would be captured in steal baker tanks and transported off site for disposal at an appropriate facility. No geothermal fluid would be discharged to the surrounding landscape. Successful test wells may be developed into commercial geothermal production wells in the future.

1.1.3 Access Roads

Existing farm roads currently serve as access roads to the majority of proposed well pad development sites. These existing access roads will be the primary ingress and egress to the well pad sites. New access roads will be developed to access the well pads on APN 026-100-004, APN 026-100-014, APN 026-100-006, and APN 026-100-008. Existing access roads may require improvements to accommodate transportation of well and drilling equipment. New and improved access roads would be constructed using a dozer and/or road grader for the Project. Existing access roads may require resurfacing to accommodate the import of drilling equipment. Access roads will be compacted with a roller-compactor and surfaced with gravel as needed. Improvements to existing access roads will be kept within the current road boundaries as feasible. Widening of access roads would only be done in areas where road width is less than 15 feet and is unable to accommodate drilling equipment.

Road construction techniques would vary depending on the specific site and existing road conditions. New roads are typically dozed or bladed following topography where possible. During rough grading the amount of cut and fill will be kept to a minimum while providing for drivability and maintenance. If the base material has adequate aggregate and composition to maintain a stable road surface only grading will be performed. Should additional aggregate/base be needed for stability, it would be laid in even lifts and compacted by grading and water equipment. All aggregate material needed for road construction or improvements will be sourced from local permitted aggregate mines.

1.1.4 Site Reclamation

Testing would determine if future geothermal energy development is feasible. If exploratory testing is successful, the exploration/test wells may be developed in full-size production wells for commercial geothermal energy generation. Any future action would be subject to CEQA review and permitting, as the scale of future development cannot be reasonably assumed prior to successful test well development.

Interim Reclamation would be conducted at the close of construction work of each well pad location, and be maintained throughout the testing period prior to final reclamation. Interim Reclamation will maintain the sites integrity for final reclamation and prevent degradation form the proposed project to the surrounding landscape.

Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas. Prior to final reclamation soil will be seeded and stabilized with an approved erosion control mix to prevent erosion. Disturbed well pad areas not required for use during testing will be stabilized similarly stabilized with an erosion control seed mixture. Temporary BMPs may be used at the Site to prevent soil erosion include the use of sandbags, crushed rock, and silt fence. These BMPs are used as and where needed, especially in areas that are undeveloped or in the process of being developed.

At the end of the permitted or useful life of the test well facilities and if testing yields negative results, no future geothermal energy developments would occur. The Applicant would prepare a Site Reclamation and Restoration Plan that establishes the plan and protocol for dismantling, removing, abandoning, transporting, and disposing of wells and associated equipment, as well as the plan for performing site restoration activities after the facilities are removed. Further, within three years of the cessation of testing, all equipment will be dismantled, all wells capped or abandoned as required by the County and CalGEM and the land involved be made compatible with the surrounding uses or as requested by the County Planning Director. A Bond, Letter of Credit, or other forms of security acceptable to Modoc County in addition to that of the amount set by CalGEM, would be filed with the County that guarantees restoration of the land to its condition prior to the permitted well pad development.

The general objective of the final reclamation phase is to return the site as close as possible to the conditions prior to geothermal development. Reclamation activities would be planned and conducted in accordance with County requirements.

1.1.5 Water Use and Source

Water required for facility construction activities and testing, including grading and dust control, will be imported by truck as needed from a permitted offsite source(s).

1.2 Construction Activities

The Suprise Vally geothermal exploration facilities would be developed on agricultural land currently dedicated to alfalfa production and would require earthwork for development. For the well pads, a 300-

foot by 300-foot (~90,000 square feet) area would be cleared and a chain-link security fence would be installed around each well pad construction site. Site preparation activities for the well pads would include clearing, earthwork, drainage and grading necessary for safe operations and for fire prevention. To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557). On-site soil that has been piled during excavation will be used as backfill material, as necessary.

Construction and testing of the proposed facilities is anticipated to occur over an approximate 28-month period, beginning in late 2026 or when permitting is completed. Project construction would include site preparation activities, but no demolition of existing structures/buildings will occur. **Table 2** below provides a breakdown of the proposed construction schedule by phase and duration.

Table 2. Project Construction Process/Phasing

Construction Phase	Construction Activity	Activity Duration	Phase Duration
Site Preparation	Construction Kick-off/Staging	1 week	5 months
	Site Clearing	1 week	
	Site Preparation/Rough Grading	2 weeks	
	Fine/Pad Grading	1 month	
	Well Pad Construction	3 months	
Well Drilling	Well Drilling and Completion	12 months	17 months
Flow Testing	Testing Phase	3 months	3 months
Reclamation	Well Head Removal/Well Abandonment/Site Restoration	2 months	3 month

ORMAT has estimated construction equipment and usage for the Project based on experience with similar projects as provided in **Table 3**. Similarly, based on construction activities associated with similar projects, ORMAT anticipates that up to 15 workers would be required for construction of Project components. Vehicle and truck trip generation rates for the Project provided in **Table 4** are estimated assuming roughly 2 trips/worker (to/from site) for a total of 30 trips, and 2 trips/vehicle (in/out) for vendor and haul trips. Trip lengths consist of default CalEEMod values.

Table 3. Project Construction Equipment List by Project Activity

Construction Phase	Equipment	Quantity	Engine Horsepower	No. Days Used	No. Hours Operated Per Day
Site Preparation (5 Months)	Heavy Duty Trucks	3	402	60	5
	Excavator	1	97	60	8
	Roller	2	200	60	8
	Light-Duty Truck	8	350	60	4
	Backhoe	1	97	60	8

Construction Phase	Equipment	Quantity	Engine Horsepower	No. Days Used	No. Hours Operated Per Day
	Rubber Tired Loader	1	203	60	8
	Grader	1	187	60	8
Well Drilling and (17 Months)	Light tower	2	27	105	12
	Drill Rig	1	500	210	24
	Rig Mud Pump	1	500	210	24
	Rig Generator	1	415	210	24
	Heavy Duty Trucks (Mob/Demob)	8	450	28	8
	Crane	2	231	28	5
	Backhoe	1	97	28	6
	Forklift	1	89	28	6
	Vacuum Truck	1	385	28	10
	Concrete Truck	1	428	4	4
	Concrete Pumper	1	100	4	4
	Light Duty Truck	4	350	28	4
Testing (3 Months)	Generator	1	671	90	24
	Light Tower (27 hp)	2	27	90	12
	Light Tower (9 hp)	2	9	90	12
	Pump (115 hp)	1	115	90	24
	Pump (415 hp)	1	415	90	24
	Light Duty Truck	1	350	90	4
Reclamation (3 Months)	Backhoe	1	97	35	8
	Grader	1	187	35	8

Table 4. Construction Vehicle Trips

Construction Phase	Trip Type	Number of One-Way Trips per Day[1]	One-Way Trip Length (miles)[2]
Site Preparation	Workers	30	11.9
	Vendor	104	9.0
	Haul	6	20
Well Drilling	Workers	30	11.9
	Vendor	10	9.0
	Haul	26	20
Testing	Workers	30	11.9
	Vendor	4	9.0
	Haul	4	20
Reclamation	Workers	6	11.9
	Vendor	4	9.0
	Haul	4	20

Notes:

1 All truck trips delivering construction materials are assigned to vendor deliveries. Truck trips associated with water deliveries are assigned to haul trips.

2 Trip lengths consist of default CalEEMod values with exception of vendors for delivery of Project equipment during construction.

1.3 Applicant Proposed Measures and Best Management Practices

- ORMAT shall submit a Construction Dust Control Plan and notify the Modoc County Air Pollution Control District (MCAPCD) 10 days prior to the start of any construction activities.
- Any equipment breakdown resulting in air emissions shall be reported to MCAPCD and promptly corrected (within 24 hours when possible).
- To minimize unnecessary emissions, Project equipment and worker vehicles shall be turned off when not in use and not left idling.
- Water shall be applied to the development site and during preparation and construction to control fugitive dust.
- Earth moving work shall be completed in phases (as necessary) to minimize the amount of disturbed area at one time.
- Construction vehicles and heavy equipment that use non-surfaced facility roads and areas will be restricted to 5 mph to control fugitive dust.
- During windy conditions, barriers shall be constructed and/or additional watering will occur to minimize fugitive dust.
- Vehicle access shall be restricted to the disturbance area via signage and/or fencing.
- Equipment shall be operated according to best practices and maintained according to design specifications.
- Construction equipment shall be equipped with an engine designation meeting the minimum requirements of EPA Tier 3 (Tier 3) if commercially available and feasible. If an engine meeting the minimum requirements of Tier 3 is not certified for a particular piece of equipment or not commercially available, then the equipment shall be either equipped with a Tier 2 engine or equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NO_X) and diesel particulate matter (DPM) to no more than Tier 2 levels. Prior to the issuance of a grading permit, ORMAT will submit a list of all construction equipment, including off road equipment, by make, model, year, horsepower, expected/actual hours of use, and EPA Tier level to the County Planning Department.

SECTION 2 Existing Conditions

The Project is located in the Modoc County within the Northeast Plateau Air Basin (NEPAB). The Modoc County portion of the NEPAB is under the jurisdiction of the Modoc County Air Pollution Control District (MCAPCD). The NEPAB encompasses the entirety of Modoc County, Siskiyou County, and Lassen County and is characterized by a high plateau landscape. Modoc County experiences a semi-arid climate with significant seasonal variation. Winters are cold, with temperatures often dropping below freezing, and snow is common, especially in higher elevations. Summers are typically warm to hot, with daytime temperatures frequently exceeding 90°F (32°C), although evenings can cool down considerably. The county's weather is influenced by its mountainous terrain and proximity to the Great Basin, leading to relatively dry conditions, with occasional rainfall in the spring and fall. The area's elevation, ranging from about 4,000 to over 7,000 feet, also contributes to temperature extremes and variable weather patterns. Emission sources in Modoc County are primarily associated with agriculture, transportation, and land management activities. Agricultural operations, including livestock farming and crop cultivation, contribute to methane and nitrous oxide (N_2O) emissions. Additionally, vehicles and machinery used in farming and transportation produce particulate matter (PM), nitrogen oxides (NO_X), and carbon dioxide (CO_2). Wildfires, which are common in the region during dry summer months, also contribute significantly to air pollution, releasing smoke and particulate matter into the atmosphere. The county's relatively low population density means that industrial emissions are minimal, but these natural and agricultural sources remain the primary contributors to air quality concerns.

The federal Clean Air Act (CAA), as amended, and the California Clean Air Act (CCAA) contain the primary provisions relating to air quality that apply to the Project. The U.S. Environmental Protection Agency (USEPA), California Air Resources Board (CARB), and regional air districts have issued rules to implement the federal and state Clean Air Acts. The USEPA uses “criteria pollutants" as indicators of air quality and has established for each of them a maximum concentration above which adverse effects on human health and the environment may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS). One set of limits (primary standard) protects health; another set of limits (secondary standard) is intended to prevent environmental and property damage. Under the CAA, the EPA has established NAAQS for seven criteria pollutants: ozone (O_3), respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), and sulfur dioxide (SO_2). California has established State Ambient Air Quality Standards for the same criteria pollutants, plus an additional three pollutants (visibility reducing particulates, sulfates, and hydrogen sulfide [H_2S]). States may have standards that are more restrictive than the federal thresholds, but they cannot be less restrictive. Although more stringent, the California standards have no specific dates for attainment, unlike federal standards. Under California law, designations are made by pollutant, rather than by averaging time. A geographic area that meets or exceeds the primary standard is called an attainment area; areas that do not meet the primary standard are called nonattainment areas.

2.1 Criteria Air Pollutants

A criteria air pollutant is any air pollutant for which ambient air quality standards (criteria) have been set by the USEPA (NAAQS) or CARB (CAAQS). The presence of these pollutants in ambient air is generally

due to numerous diverse and widespread sources of emissions, and air quality standards have been established for these pollutants to protect public health. Criteria pollutants include ozone (O_3), fine particulate matter ($PM_{2.5}$), respirable particulate matter (PM_{10}), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), sulfur dioxide (SO_2), visibility-reducing particles, sulfates, and hydrogen sulfide (H_2S).

Table 5 shows the state and federal ambient air quality standards while **Table 6** presents the attainment status of the NEPAB for the state and federal standards. As shown, Modoc County is currently designated as unclassified or attainment for all state and federal standards.

Table 5. State and Federal Ambient Air Quality Standards

Pollutant	Averaging Period	California Standard	Federal Standard
Ozone (O_3)	1 hour	0.09 ppm (177 µg/m^3)	Revoked
	8 hour	0.070 ppm (137 µg/m^3)	0.07 ppm (137 µg/m^3)
Respirable Particulate Matter (PM_{10})	24 hour	50 µg/m^3	150 µg/m^3
	Annual	20 µg/m^3	Revoked
Fine Particulate Matter ($PM_{2.5}$)	24 hour	--	35 µg/m^3
	Annual	12 µg/m^3	9 µg/m^3
Carbon Monoxide (CO)	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)
	8 hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3)
	Annual	0.030 ppm (56 µg/m^3)	0.053 ppm (100 µg/m^3)
Lead (Pb)	30 Day Average	1.5 µg/m^3	--
	Calendar Average	--	1.5 µg/m^3 (for certain areas)
	3-month (Rolling Average)	--	1.5
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3)
	3 hour	--	0.5 ppm (1300 µg/m^3)
	24 hour	0.04 ppm (105 µg/m^3)	0.14 ppm (for certain areas)

Pollutant	Averaging Period	California Standard	Federal Standard
	Annual	--	0.03 ppm (for certain areas)
Hydrogen Sulfide (H_2S)	1 Hour	0.03 ppm (42 µg/m^3)	--
Sulfates	24 hour	25 µg/m^3	--
Vinyl Chloride	24 hour	0.010 ppm (26 µg/m^3)	--
Visibility-Reducing Particles	8 hour	Extinction coefficient of 0.23 per kilometer (visibility of ten miles or more due to particles when relative humidity is less than 70 percent)	--

Notes: ppm = parts per million; ppb = parts per billion; mg/m^3 = milligram per cubic meter; µg/m^3 = micrograms per cubic meter; "--" = no standard.

Table 6. Modoc County Attainment Status

Pollutant	California Designation	Federal Designation
Ozone (O_3)	Attainment	Unclassified/Attainment
Respirable Particulate Matter (PM_{10})	Unclassified	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Attainment	Unclassified/Attainment
Carbon Monoxide (CO)	Unclassified	Unclassified/Attainment
Nitrogen Dioxide (NO_2)	Attainment	Unclassified/Attainment
Lead (Pb)	Attainment	Unclassified/Attainment
Sulfur Dioxide (SO_2)	Attainment	Unclassified/Attainment
Hydrogen Sulfide (H_2S)	Unclassified	No Federal Standards
Sulfates	Attainment	No Federal Standards
Visibility Reducing Particles	Unclassified	No Federal Standards

Source: CARB 2023

2.1.1 Ozone

O_3 is formed in the atmosphere by a series of complex chemical reactions and transformations in the presence of sunlight. Oxides of nitrogen (NO_X) and reactive organic gases (ROGs) are the principal constituents in these reactions. O_3 is a pungent, colorless, toxic gas and is a primary component of smog.

O_3 is known as a secondary pollutant because it is formed in the atmosphere through a complex series of chemical reactions, rather than emitted directly into the air. The major sources of NO_X in California are motor vehicles and other combustion processes. The major sources of ROGs in California are motor vehicles and the evaporation of chemical solvents and fuels.

O_3 is a strong irritating gas that can chemically burn and cause narrowing of airways, forcing the lungs and heart to work harder to provide oxygen to the body. People most likely to be affected by O_3 include the elderly, the young, athletes, and those who suffer from respiratory diseases such as asthma, emphysema, and chronic bronchitis.

2.1.2 PM_{10}

PM_{10}, or fugitive dust, consists of particulate matter (fine dusts and aerosols) that is ten microns or smaller in aerodynamic diameter. For reference, ten microns is about one-seventh the width of a human hair. When inhaled, particles larger than 10 microns are generally caught in the nose and throat and do not enter the lungs. PM_{10} gets into the large upper branches of the lungs just below the throat, where they are caught and removed (by coughing, spitting, or swallowing).

The primary sources of PM_{10} include dust, paved and unpaved roads, diesel exhaust, acidic aerosols, construction and demolition operations, soil and wind erosion, agricultural operations, residential wood combustion, and smoke. Secondary sources of PM_{10} include tailpipe emissions and industrial sources. These sources have different constituents and therefore, varying effects on health. Airborne particles absorb and adsorb toxic substances and can be inhaled and lodge in the lungs. Once in the lungs, the toxic substances can be absorbed into the bloodstream and carried throughout the body. PM_{10} concentrations tend to be lower during the winter months because meteorology greatly affects PM_{10} concentrations. During rainfall events, concentrations are relatively low, and on windy days, PM_{10} levels can be high. Photochemical aerosols, formed by chemical reactions with manmade emissions, may also influence PM_{10} concentrations.

Elevated ambient particulate levels are associated with premature death, an increased number of asthma attacks, reduced lung function, aggravation of bronchitis, respiratory disease, and cancer.

2.1.3 $PM_{2.5}$

$PM_{2.5}$ is a mixture of particulate matter (fine dusts and aerosols) that is 2.5 microns or smaller in aerodynamic diameter. For reference, 2.5 micrometers is approximately 1/30 the size of a human hair, so small that several thousand of these particles could fit on the period at the end of this sentence. $PM_{2.5}$ can travel into the deepest portions of the lungs where gas exchange occurs between the air and the bloodstream. These particles are very dangerous because the deepest portions of the lungs have no efficient mechanisms for removing them. If these particles are soluble in water, they pass directly into the bloodstream within minutes. If they are not soluble in water, they are retained deep in the lungs and can remain there permanently.

$PM_{2.5}$ particles are emitted from activities such as industrial and residential combustion processes, wood burning, and from diesel and gasoline-powered vehicles. They are also formed in the atmosphere from gases such as SO_2, NO_X, ammonia, and volatile organic compounds that are emitted from combustion activities, and then become particles as a result of chemical transformations in the air (secondary particles).

Exposure to $PM_{2.5}$ increases the risks of long-term disease, including chronic respiratory disease, cancer, and increased and premature death. Other effects include increased respiratory stress and disease, decreased lung function, alterations in lung tissue and structure, and alterations in respiratory tract defense mechanisms.

2.1.4 Carbon Monoxide

CO is a common colorless, odorless, highly toxic gas. It is produced by natural and anthropogenic combustion processes. The major source of CO in urban areas is incomplete combustion of carbon containing fuels (primarily gasoline, diesel fuel, and natural gas). However, it also results from combustion processes, including forest fires and agricultural burning. Over 80 percent of the CO emitted in urban areas is contributed by motor vehicles. Ambient CO concentrations are generally higher in the winter, usually on cold, clear days and nights with little or no wind. Low wind speeds inhibit horizontal dispersion, and surface inversions inhibit vertical mixing. Traffic-congested intersections have the potential to result in localized high levels of CO. These localized areas of elevated CO concentrations are termed CO “hotspots”. CO hotspots are defined as locations where ambient CO concentrations exceed the CAAQS (20 parts per million (ppm), 1-hour; 9 ppm, 8-hour).

When inhaled, CO does not directly harm the lungs; rather, it combines chemically with hemoglobin, the oxygen-transporting component of blood and diminishes the ability of blood to carry oxygen to the brain, heart, and other vital organs. Red blood cells have 220 times the attraction for CO than for oxygen. This affinity interferes with movement of oxygen to the body’s tissues. Effects from CO exposure include headaches, nausea, and death. High levels of CO in a concentrated area can result in asphyxiation.

2.1.5 Nitrogen Dioxide

NO_2 is formed in the atmosphere primarily by the rapid reaction of the colorless gas nitric oxide (NO) with atmospheric oxygen. It is a reddish-brown gas with an odor similar to that of bleach. NO_2 participates in the photochemical reactions that result in O_3. The greatest source of NO, and subsequently NO_2, is the high-temperature combustion of fossil fuels such as in motor vehicle engines and power plant boilers. NO_2 and NO are referred to collectively as NO_X.

NO_2 can irritate and damage the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections such as influenza. Negative health effects are apparent after exposure to NO_2 levels as low as 0.11 ppm for a few minutes. This level of exposure may elicit or alter sensory responses. Higher concentrations (0.45 - 1.5 ppm) may cause impaired pulmonary function, increased incidence of acute respiratory disease, and difficult breathing for both bronchitis sufferers and healthy persons.

2.1.6 Lead

Lead is a bluish-gray metal that occurs naturally in small quantities. Pure lead is insoluble in water. However, some lead compounds are water soluble. Lead and lead compounds in the atmosphere often come from fuel combustion sources, such as the burning of solid waste, coal, and oils. Historically, the largest source of lead in the atmosphere resulted from the combustion of leaded gasoline in motor vehicles. However, with the phase-out of leaded gasoline, concentrations of lead in the air have substantially decreased. Industrial sources of atmospheric lead include steel and iron factories, lead smelting and refining, and battery manufacturing. Atmospheric lead may also result from lead in entrained dust and dirt contaminated with lead.

Acute health effects of lead include gastrointestinal distress (such as colic), brain and kidney damage, and even death. Lead also has numerous chronic health effects, including anemia, central nervous system damage, reproductive dysfunction, as well as effects on blood pressure, kidney function, and vitamin D metabolism. The USEPA's Office of Air Quality Planning and Standards ranks lead as a "high concern" pollutant based on its severe chronic toxicity.

2.1.7 Sulfur Dioxide

SO_2 is a colorless gas with a sharp, irritating odor. It can react in the atmosphere to produce sulfuric acid and sulfates, which contribute to acid deposition and atmospheric visibility reduction. It also contributes to the formation of PM_{10}. Most of the SO_2 emitted into the atmosphere is from the burning of sulfur-containing fossil fuels by mobile sources, such as marine vessels and farm equipment, and stationary fuel combustion.

SO_2 irritates the mucous membranes of the eyes and nose, and may also affect the mouth, trachea, and lungs, causing sore throat, coughing, and breathing difficulties.

2.2 Toxic Air Contaminants

Toxic air contaminants (TACs), also referred to as hazardous air pollutants, are air pollutants (excluding O_3, CO, SO_2, and NO_2) that may reasonably be anticipated to cause cancer, developmental effects, reproductive dysfunction, neurological disorders, heritable gene mutations, or other serious or irreversible acute or chronic health effects in humans. TACs are regulated under different federal and state regulatory processes than O_3 and the other criteria air pollutants. Health effects of TACs may occur at extremely low levels, and it is typically difficult to identify levels of exposure that do not produce adverse health effects. TACs generally consist of four types: 1) organic chemicals such as benzene, dioxins, toluene, and perchloroethylene; 2) inorganic chemicals such as chlorine and arsenic; 3) fibers such as asbestos; and 4) metals such as mercury, cadmium, chromium, and nickel. These air contaminants are defined by the USEPA, the State of California, and other governmental agencies. Currently, more than 900 substances are regulated TACs under federal, state, and local regulations.

TACs are produced by a variety of sources, including industrial facilities such as refineries, chemical plants, chrome plating operations, and surface coating operations; commercial facilities such as dry cleaners and gasoline stations; motor vehicles, especially diesel-powered vehicles; and consumer products. TACs can be released as a result of normal industrial operations, as well as from accidental releases during process upset conditions.

Health effects from TACs vary with the type of pollutant, the concentration of the pollutant, the duration of exposure, and the exposure pathway. TACs usually get into the body through inhalation, though they can also be ingested or absorbed through the skin. Adverse effects on people tend to be either acute or chronic. Acute effects result from short-term, high levels of airborne toxic substances. These effects may include nausea, skin irritation, cardiopulmonary distress, and even death. Chronic effects result from long-term, low-level exposure to airborne toxic substances. Effects can range from relatively minor to life-threatening. Less serious chronic effects include skin rashes, dry skin, coughing throat irritation, and headaches. More serious chronic effects include lung, liver, and kidney damage; nervous system damage; miscarriages; genetic and birth defects; and cancer. Many TACs can have both carcinogenic and non-carcinogenic health effects.

2.3 Other Issues of Concern

2.3.1 Odors

Odors are substances in the air that pose a nuisance to nearby land uses such as residences, schools, daycare centers, and hospitals. Odors are typically not a health concern but can interfere with the use and enjoyment of nearby property. Odors may be generated by a wide variety of sources. The odor associated with decomposing organic material (such as plants removed from ponds and left to decay) may also be considered to be objectionable. Objectionable odors created by a facility or operation may cause a nuisance or annoyance to adjacent populations.

2.3.2 Fugitive Dust

Fugitive dust refers to solid particulate matter that becomes airborne because of wind action and human activities. Fugitive dust particles are mainly soil minerals, but can also be sea salt, pollen, spores, tire particles. About half of fugitive dust particles (by weight) are larger than 10 microns and settle quickly. Fugitive dust particles 10 microns or smaller (i.e., PM_{10}) can remain airborne for weeks.

The primary sources of fugitive dust are grading and excavation operations associated with road and building construction, aggregate mining and processing operations, and sanitary landfill operations. Unpaved roadways are also a large source of fugitive dust. Other sources of fugitive dust include demolition activities, unpaved roadway shoulders, vacant lots, material stockpiles, abrasive blasting operations, and off-road vehicle use. The amount of fugitive dust created by such activities is dependent largely on the type of soil, type of operation taking place, size of the area, degree of soil disturbance, soil moisture content, and wind speed.

When fugitive dust particles are inhaled, they can travel easily to the deep parts of the lungs and may remain there, causing respiratory illness, lung damage, and even premature death in sensitive people. Fugitive dust may also be a nuisance to those living and working nearby. Dust blown across roadways can lead to traffic accidents by reducing visibility. Fugitive dust can soil and damage materials and property, such as fabrics, vehicles, and buildings. Particulates deposited on agricultural crops can lower crop quality and yield. Additionally, fugitive dust can lead to the spread of San Joaquin Valley Fever, a potential health hazard caused by a fungus that lives in certain soil types throughout California.

2.4 Greenhouse Gas

Recent significant changes in global climate patterns have been associated with global warming, an average increase in the temperature of the atmosphere near Earth's surface. Global warming has been attributed to the accumulation of greenhouse gas (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.

The standard state definition of GHG includes six substances: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulfur hexafluoride (SF_6) (CARB 2014). Tropospheric O_3 (a short-lived, not-well-mixed gas) and black carbon are also important climate pollutants. CO_2 is the most abundant GHG, and collectively CO_2, CH_4, and N_2O amount to 80 percent of GHG effects.

For each GHG, a global warming potential (GWP) has been calculated to reflect how long emissions remain in the atmosphere and how strongly energy is absorbed on a per-kilogram basis relative to CO_2. GWP is a metric that indicates the relative climate forcing of a kilogram of emissions when averaged over the period of interest (both 20-year and 100-year horizons are used for the GWPs shown in **Table 7**). To account for this higher potential, emissions of other GHGs are frequently expressed in the equivalent of CO_2, denoted as CO_2e. CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect.

Table 7. Global Warming Potential for Selected Greenhouse Gases

Pollutant	Lifetime (Years)	Global Warming Potential (20-Year)	Global Warming Potential (100-Year)
Carbon Dioxide	100	1	1
Nitrous Oxide	121	264	265
Nitrogen Triflouride	500	12,800	16,100
Sulfur Hexafluoride	3,200	17,500	23,900
Perfluorocarbons	3,000-50,000	5,000-8,000	7,000-11,000
Black Carbon	days to weeks	270-6,200	100-1,700
Methane	12	84	28
Hydrofluorocarbons	Uncertain	100-11,000	100-12,000

Source: CARB 2014

The primary effect of rising global concentrations of atmospheric GHG is a rise in the average global temperature of approximately 0.2 degrees Celsius per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling using emission rates shows that further warming is likely to occur given the expected rise in global atmospheric GHG

concentrations from innumerable sources of GHG emissions worldwide, which would induce further changes in the global climate system during the current century.

Scientific understanding of the fundamental processes responsible for global climate change has improved over the past decade. However, there remain significant scientific uncertainties. For example, uncertainties exist in predictions of local effects of climate change, occurrence of extreme weather events, and effects of aerosols, changes in clouds, shifts in the intensity and distribution of precipitation, and changes in oceanic circulation. Due to the complexity of the climate system, the uncertainty surrounding the implications of climate change may never be eliminated. Because of these uncertainties, there continues to be significant debate as to the extent to which increased concentrations of GHGs have caused or would cause climate change, and with respect to the appropriate actions to limit and/or respond to climate change. In addition, it may not be possible to link specific development projects to future specific climate change impacts, though estimating project-specific impacts is possible.

2.5 Sensitive Receptors

Some population groups, such as children, the elderly, and acutely and chronically ill persons are considered more sensitive to air pollution than others. Sensitive receptor locations typically include residential areas, hospitals, elder-care facilities, rehabilitation centers, daycare centers, and parks. The Project site is in a rural area surrounded by agricultural fields.

The closest residence is located approximately 650 feet to the northwest of the southern-most well site (Well 22-24). One other residence is within 1,000 feet of a test well site, located approximately 850 feet southwest from Well 43-13. No other sensitive receptors are located within 1,000 feet of Project components.

SECTION 3 Regulatory Framework

Federal, state, and local regulations and policies that may apply to the proposed Project emissions are described below.

3.1 Federal

3.1.1 Clean Air Act

The Federal Clean Air Act (CAA), passed in 1970 and last amended in 1990, is the primary federal law that governs air quality. The Federal CAA delegates primary responsibility for clean air to the U.S. EPA. The U.S. EPA develops rules and regulations to preserve and improve air quality and delegates specific responsibilities to state and local agencies. Under the act, the U.S. EPA has established the NAAQS for six criteria air pollutants that are pervasive in urban environments and for which state and national health-based ambient air quality standards have been established. Ozone, CO, NO_2, SO_2, Pb, and PM (Including both PM_{10}, and $PM_{2.5}$) are the six criteria air pollutants. Ozone is a secondary pollutant, nitrogen oxides (NO_X) and volatile organic compounds (VOCs) are of particular interest as they are precursors to ozone formation. In addition, national standards exist for Pb. The NAAQS standards are set at levels that protect public health with a margin of safety and are subject to periodic review and revision.

The Federal CAA requires U.S EPA to designate areas as attainment, nonattainment, or maintenance (previously nonattainment and currently attainment) for each criteria pollutant based on whether the NAAQS have been achieved. The federal standards are summarized above in **Table 5**.

3.1.2 Mandatory Reporting of Greenhouse Gases (Title 40, Part 98 of the Code of Federal Regulations)

Under Subpart DD, owners and operators of electric power system facilities with a total nameplate capacity that exceeds 17,820 lbs (7,838 kg) of sulfur hexafluoride (SF_6) and/or perfluorocarbons (PFCs) must report emissions of SF_6 and/or PFCs from the use of electrical transmission and distribution equipment. Owners and operators are required to collect emissions data, calculate GHG emissions, and follow the specified procedures for quality assurance, missing data, recordkeeping, and reporting per the requirements of 40 CFR Part 98 Subpart DD – Electric Transmission and Distribution Equipment Use.

3.2 State

3.2.1 California Clean Air Act

The California Clean Air Act (CCAA) was adopted by CARB in 1988. The CCAA is responsible for meeting the state requirements of the Federal CAA and for establishing the CAAQS. CARB oversees the functions of local air pollution control districts and air quality management districts, which, in turn, administer air quality activities at the regional and county levels. The CCAA, as amended in 1992, requires all air districts of the state to achieve and maintain the CAAQS by the earliest practical date.

The CCAA requires CARB to designate areas within California as either attainment or nonattainment for each criteria pollutant based on whether the CAAQS have been achieved. Under the CCAA, areas are designated as nonattainment for a pollutant if air quality data shows that a state standard for the pollutant was violated at least once during the previous 3 calendar years. As shown in **Table 5**, the CAAQS are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

Exceedances that are affected by highly irregular or infrequent events are not considered violations of a state standard and are not used as a basis for designating areas as nonattainment.

3.2.2 California State Implementation Plan

The CAA mandates that the state submit and implement a State Implementation Plan (SIP) for areas not meeting the NAAQS. These plans must include pollution control measures that demonstrate how the standards will be met. State law makes CARB the lead agency for all purposes related to the SIP.

Local air districts and other agencies prepare SIP elements and submit them to CARB for review and approval. CARB then forwards SIP revisions to the U.S. EPA for approval and publication in the Federal Register. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items which are included in the California SIP.

3.2.3 Toxic Air Contaminants Regulation

Toxic Air Contaminant (TAC) sources include industrial processes, dry cleaners, gasoline stations, paint and solvent operations, and fossil fuel combustion sources (i.e., Diesel Particulate Matter [DPM]).

In August 1998, CARB identified DPM emissions from diesel-fueled engines as a TAC. In September 2000, CARB approved a comprehensive diesel risk reduction plan to reduce emissions from both new and existing diesel fueled engines and vehicles. The goal of the plan is to reduce diesel PM_{10} (inhalable particulate matter) emissions and the associated health risk by 75 percent in 2010 and by 85 percent by 2020. The plan identified 14 measures that target new and existing on-road vehicles (e.g., heavy duty trucks and buses, etc.), off-road equipment (e.g., graders, tractors, forklifts, sweepers, and boats), portable equipment (e.g., pumps, etc.), and stationary engines (e.g., stand-by power generators, etc.).

3.2.4 Executive Order S-3-05

On June 1, 2005, Executive Order S-3-05 set the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels. It calls for the Secretary of CalEPA to be responsible for coordination of state agencies and progress reporting.

3.2.5 Executive Order B-30-15

In April 2015, Governor Edmund Brown issued an Executive Order establishing a statewide GHG reduction goal of 40 percent below 1990 levels by 2030. The emission reduction target acts as an interim goal between the AB 32 goal (i.e., achieve 1990 emission levels by 2020) and Governor Brown's Executive Order S-03-05 goal of reducing statewide emissions 80 percent below 1990 levels by 2050. In

addition, the Executive Order aligns California's 2030 GHG reduction goal with the European Union's reduction target (i.e., 40 percent below 1990 levels by 2030) that was adopted in October 2014.

3.2.6 Assembly Bill 32 (AB 32)

In September 2006, the California Global Warming Solutions Act of 2006, also known as AB 32, was signed into law. AB 32 focuses on reducing GHG emissions in California and requires CARB to adopt rules and regulations that would achieve GHG emissions equivalent to statewide levels in 1990 by 2020. CARB initially determined that the total statewide aggregated GHG 1990 emissions level and 2020 emissions limit was 427 $MMTCO_2e$. The 2020 target reduction was estimated to be 174 $MMTCO_2e$.

To achieve the goal, AB 32 mandates that CARB establish a quantified emissions cap, institute a schedule to meet the cap, implement regulations to reduce statewide GHG emissions from stationary sources, and develop tracking, reporting, and enforcement mechanisms to ensure that reductions are achieved.

3.2.7 Senate Bill 32 (SB 32)

Senate Bill (SB) 32, signed September 8, 2016, updates AB 32 to include an emissions reduction goal for the year 2030. Specifically, SB 32 requires the state board to ensure that statewide GHG emissions are reduced to 40 percent below the 1990 level by 2030. The new plan, outlined in SB 32, involves increasing renewable energy use, imposing tighter limits on the carbon content of gasoline and diesel fuel, putting more electric cars on the road, improving energy efficiency, and curbing emissions from key industries.

3.2.8 Assembly Bill 1279 (AB 1279)

AB 1279, the California Climate Crisis Act, passed on September 16, 2022, requires that the state achieve net zero GHG emissions as soon as possible, but no later than 2045. In addition, AB 1279 requires the state to achieve and maintain net negative GHG emissions and ensure that by 2045, statewide anthropogenic GHG emissions are reduced to at least 85% below the 1990 levels. The bill requires updates to the scoping plan (once every five years) to implement various policies and strategies that enable carbon dioxide removal solutions and carbon capture, utilization, and storage technologies.

3.2.9 Senate Bill 375 (SB 375)

Acknowledging the relationship between land use planning and transportation sector GHG emissions, Senate Bill (SB) 375 was passed by the State Assembly on August 25, 2008, and signed by the Governor on September 30, 2008. This legislation links regional planning for housing and transportation with the GHG reduction goals outlined in AB 32. Reductions in GHG emissions would be achieved by, for example, locating employment opportunities close to transit.

Under SB 375, each Metropolitan Planning Organization (MPO) would be required to adopt a Sustainable Community Strategy (SCS) to encourage compact development that reduce passenger vehicle miles traveled (VMT) and trips so that the region will meet a target, created by CARB, for reducing GHG emissions. If the SCS is unable to achieve the regional GHG emissions reduction targets, then the MPO is required to prepare an alternative planning strategy that shows how the GHG emissions

reduction target could be achieved through alternative development patterns, infrastructure, and/or transportation measure.

3.2.10 Climate Change Scoping Plan

In 2008, CARB approved the original Climate Change Scoping Plan as required by AB 32. Subsequently, CARB approved updates to the Climate Change Scoping Plan in 2014 (First Update) and 2017 (2017 Update), with the 2017 Update considering SB 32 (adopted in 2016) in addition to AB 32. In December 2022, CARB approved the final version of California's 2022 Climate Change Scoping Plan (2022 Scoping Plan Update), which outlines the proposed framework of action for achieving California's new AB 1279 2045 GHG target: an 85 percent reduction in GHG emissions by 2045 relative to 1990 levels. The original Climate Change Scoping Plan proposed a "comprehensive set of actions designed to reduce overall carbon GHG emissions in California, improve our environment, reduce our dependence on oil, diversify our energy sources, save energy, create new jobs, and enhance public health. The original Climate Change Scoping Plan identified a range of GHG reduction actions that included direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms, such as a cap-and-trade system, and an AB 32 implementation fee to fund the program. The 2022 Scoping Plan Update focuses on strategies for reducing California's dependency on petroleum to provide customers with clean energy options that address climate change and support clean sector jobs. SB 350 and other regulations are expected to decarbonize the electricity sector over time.

3.2.11 California Green Building Standards (CALGreen Code)

The California Green Building Standards Code, referred to as CALGreen, was added to Title 24 as Part 11, first in 2009 as a voluntary code, which then became mandatory effective on January 1, 2011 (as part of the 2010 California Building Standards Code). The most recent update, 2025 CALGreen, became effective as of January 1, 2026 and includes mandatory minimum environmental performance standards for all ground-up new construction of residential and non-residential structures. It also includes voluntary tiers with stricter environmental performance standards for these same categories of residential and non-residential buildings. Local jurisdictions must enforce the minimum mandatory CALGreen standards and may adopt additional amendments for stricter requirements. Compliance with Title 24 is enforced through the building permit process.

3.3 Regional

3.3.1 Modoc County Air Pollution Control District

The MCAPCD is the agency responsible for monitoring air quality, as well as planning, implementing, and enforcing programs designed to attain and maintain state and federal ambient air quality standards in the district. MCAPCD is responsible for regulating stationary sources of air emissions in Modoc County. Stationary sources that have the potential to emit air pollutants into the ambient air are subject to the Rules and Regulations adopted by MCAPCD. MCAPCD is responsible for establishing stationary source permitting requirements.

3.3.2 Modoc County Air Pollution Control District Rules and Regulations

MCAPCD has the authority to adopt and enforce regulations dealing with controls for specific types of sources, emissions or hazardous air pollutants, and New Source Review. The MCAPCD Rules and Regulations are part of the SIP and are separately enforceable by the USEPA.

Rule 2:0 – Permits Required. The construction, installation, modification, replacement, and operation of any equipment which may emit or control air contaminants require MCAPCD permits.

Rule 207 – New and Modified Stationary Source Review. Establishes preconstruction review

Rule 4.1 – Visible Emissions. Sets limits for release or discharge of emissions into the atmosphere, other than uncombined water vapor, that are dark or darker in shade as designated as No. 2 on the Ringelmann Chart (i.e., scale for measuring the apparent density or opacity of smoke) or obscure an observer's view to a degree equal to or greater than smoke does as compared to No. 2 on the Ringelmann Chart, for a period or aggregated period of more than three minutes in any hour.

Rule S3 – Significance Level. Rule S3 of Regulation I sets forth limitations on emissions of pollutants from new or modified stationary sources.

3.3.3 Modoc County General Plan

The Modoc County General Plan serves as the overall guiding policy for the County and contains goals, objectives, policies and/or programs to conserve the natural environment of Modoc County, including air quality and GHGs. However, the Modoc County General Plan does not contain any goals, objectives, policies or programs that directly pertain to air quality or GHGs at the project-level.

SECTION 4 Environmental Impacts

4.1 Methodology

This impacts analysis evaluates the potential for the Project and its varying components (described in **Section 1.0**) to impact the air quality resource within the Project area and GHGs.

Construction of the Project was assumed to commence in the fourth quarter of 2026 and was estimated to take up to 28 months to complete. The Project would result in short-term emissions of air pollutants associated with construction and testing operations. Construction emissions would include exhaust from the operation of conventional construction equipment, on-road emissions from employee vehicle trips and haul truck trips, fugitive dust as a result of grading and vehicle travel on paved and unpaved surfaces.

Construction emissions were estimated using the latest version of California Emissions Estimator Model (CalEEMod), version 2022.1. CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operation of a variety of land use projects. The model utilizes widely accepted federal and state models for emission estimates and default data from sources such as U.S. EPA AP-42 emission factors, CARB vehicle emission models, and studies from California agencies such as the California Energy Commission (CEC). CalEEMod inputs for construction and testing activities consist of the data provided for the construction schedule detailed in **Table 2**, offroad equipment operations detailed in **Table 3** and vehicle miles traveled detailed in **Table 4** above. Default CalEEMod inputs were used for modeling where Project-specific details were not readily ascertainable (e.g., fleet mix and trip length).

4.2 Thresholds of Significance

As noted above, Modoc County is in attainment or unclassified for all criteria air pollutants and the MCAPCD has not adopted CEQA significance thresholds for project-level review. The MDAPCD has not established formal quantitative or qualitative CEQA thresholds for criteria pollutants or GHG emissions through a public rulemaking process, but CEQA permits the lead agency to establish a project-specific threshold of significance if backed by substantial evidence, until such time as a formal threshold is approved.

However, for the purposes of assessing air quality impacts in CEQA documents, MCAPCD Rule 2.8e (Standards for Permits to Construct), which contains thresholds for operational emissions from new stationary sources, is commonly used as a significance threshold for project-level review. Although these stationary source emissions thresholds do not directly apply to land use and infrastructure projects, they provide a reference point for levels of emissions that would trigger MCAPCD requirements for best available control technology and/or mitigation offsets. Per Rule 2.8e, criteria air pollutants from the operation of stationary sources are considered significant if they exceed the following thresholds:

- 250 pounds per day for NO_X, reactive organic gases (ROG), PM_{10}, $PM_{2.5}$, SO_X

- 2,500 pounds per day for carbon monoxide (CO)

In using MCAPCD Rule 2.8e as a threshold in this document, the Lead Agency is exercising its discretion to formulate CEQA significance criteria based in part on the MCAPCD rules, as they reflect the best available expert judgment regarding what constitutes significant levels of air pollution within the NEPAB and Modoc County.

The MCAPCD does not have numeric thresholds for GHG emissions. However, the nearby Sacramento Air Quality Management District and Placer County Air Pollution Control District establish a bright-line GHG threshold of 1,100 metric tons carbon dioxide equivalent ($MTCO_2e$) per year for the construction and operational phase of the project, as supported by substantial evidence. In addition, total construction GHG emissions resulting from a project are typically amortized over a period of 30 years and added to operational GHG emissions to account for their contribution to GHG emissions over the lifetime of a project.

4.3 Project Impacts and Mitigation Measures

4.3.1 Air Quality

Impact a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

As noted in **Table 6** above, the NEPAB, including Modoc County, is listed as "attainment" or "unclassified" for all the federal and state ambient air quality standards. Due to the excellent air quality in the NEPAB, the MCAPCD has not prepared any non-attainment air quality plans for the purpose of ensuring compliance with NAAQS and CAAQS. As such, the proposed Project would not conflict or obstruct implementation of an applicable air quality plan. Therefore, the proposed Project would result in no impact with respect to this impact criteria.

Impact b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

The Project would emit criteria pollutants from the use of combustion sources such as diesel off-road equipment (e.g., tractors, cranes, generators, etc.), and on-road mobile sources associated with construction-related vehicle travel. Impacts to air quality would also occur during Project construction as a result of soil disturbance and fugitive dust emissions. Construction emissions vary from day-to-day depending on the number of workers, number, and types of active heavy-duty vehicles and equipment, level of activity, the prevailing meteorological conditions, and the length over which these activities occur.

Project construction is anticipated to take up to 28 months. For the purposes of this analysis, short-term construction emissions were determined utilizing the latest version of the CalEEMod model (version 2022.1) based on the assumptions described in **Section 1.2** and utilizing CalEEMod defaults for calendar year average equipment emission factors as opposed to tier-specific rates (e.g., Tier 3) (refer to Attachment A for emission model results). The total unmitigated emissions generated during Project construction are shown in **Table 8**.

Table 8. Unmitigated Project Construction-Generated Emissions

Criteria Pollutants	Emissions (lbs/day)[1]					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	20.17	174.1	200.6	0.54	107.0	11.69
Threshold	***250***	***250***	***2500***	***250***	***250***	***250***
Exceed Threshold?	No	No	No	No	No	No

Source: CalEEMod Results in Attachment A

Notes:

[1] Emissions are representative of the maximum daily output (i.e., maximum of summer or winter results).

The MCAPCD's application of significance levels for criteria air pollutants is relevant to the determination of whether a project's individual emissions would have a cumulatively significant impact on air quality. As summarized in **Table 8**, the Project's unmitigated daily mitigated construction emissions would not exceed the MCAPCD thresholds. Therefore, the Project's potential to result in a cumulatively considerable net increase of any criteria pollutant during construction is considered less than significant.

Impact c. Would the project expose sensitive receptors to substantial pollutant concentrations?

As summarized in **Section 2.5** above, the nearest sensitive land use to the Project area is a single-family residence located approximately 650 feet from the nearest Project well. Construction of the Project would result in temporary, short-term project-generated emissions of DPM, ROG, NO_X, CO, PM_{10}, and $PM_{2.5}$ from the exhaust of offroad, heavy-duty diesel equipment and construction-related truck traffic The NEPAB is designated as attainment or unclassified for all state and federal air quality standards. As summarized above and shown in **Table 8**, the Project would not exceed the MCAPCD significance thresholds for construction emissions. The health effects associated with O_3 are generally associated with reduced lung function. Because the Project would not involve construction activities that would result in O_3 precursor emissions (ROG or NO_X) in excess of the MCAPCD thresholds, the Project is not anticipated to substantially contribute to regional O_3 concentrations and the associated health impacts.

CO tends to be a localized impact associated with congested intersections. In terms of adverse health effects, CO competes with oxygen, often replacing it in the blood, reducing the blood's ability to transport oxygen to vital organs. The results of excess CO exposure can include dizziness, fatigue, and impairment of central nervous system functions. The Project would not involve activities that would result in CO emissions in excess of the MCAPCD thresholds. Thus, the Project CO emissions during construction would not contribute to the health effects associated with this pollutant.

Particulate matter (PM_{10} and $PM_{2.5}$) contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Particulate matter exposure has been linked to a variety of problems, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing. Particulate exhaust emissions from diesel-fueled engines (i.e., DPM) were identified as a TAC by CARB in 1998. For construction-type activity, DPM is the primary TAC of concern. PM_{10} exhaust is considered a surrogate for DPM as all diesel exhaust is considered to be DPM. The Project would not generate emissions of

PM_{10} or $PM_{2.5}$ that would exceed the MCAPCD's thresholds, and thus are not expected to cause any increase in related health effects for these pollutants.

Additionally, fugitive dust can lead to the spread of San Joaquin Valley Fever (Valley Fever), a potential health hazard caused by a fungus that lives in certain soil types throughout California. The California Department of Public Health- Occupational Health Branch and the Division of Occupational Safety and Health of the Department of Industrial Relations (Cal/OSHA) provides recommendations to limit risk from Valley Fever. Applicant-proposed BMPs to reduce fugitive dust, including development and implementation of a Dust Control Plan, water applied to the development site and during preparation and construction to control fugitive dust, and minimizing disturbance areas (see **Section 1.3**) are consistent with those recommended to limit risk to Valley Fever. For example, Cal/OSHA recommends the adoption of site plans and work practices that reduce worker exposure. Cal/OSHA further provides that measures that may be implemented include, but are not limited to, the following: minimize the area of soil disturbed; use of water or other soil stabilizer to reduce airborne dust; stabilize all spoils piles by tarping or other methods; cleaning tools, equipment, and vehicles before transporting offsite. These measures and work practices will be implemented at the Project site pursuant to compliance with measures included in the Project Dust Control Plan. As such, construction activities associated with the Project are not expected to cause any increase in Valley Fever to workers or sensitive receptors in the area.

In summary, Project construction would not result in a potentially significant contribution to regional concentrations of pollutants and would not result in a significant contribution to the adverse health impacts associated with those pollutants. Impacts would be less than significant.

Impact d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Geothermal fluid can release various non-condensable gases such as H_2S. Hot water, steam, particulate, and/or gases that could emanate from a typical geothermal well during drilling, testing, and cleanout in the Known Geothermal Resource Area could contain several minerals and other naturally occurring chemicals. However, most of these chemicals are present only in trace amounts and would not pose a health hazard to the surrounding environment. H_2S emissions would be the most important non-condensable gas from a health-risk and odor nuisance standpoint. The potential exists that this gas and other non-condensable gases may be emitted intermittently on a short-term and temporary basis during drilling. During well cleanout and flow testing, geothermal fluids would likely be pumped into large tanks. H_2S may temporarily be released from the geothermal fluid for several hours to up to 30 days during these activities. The local H_2S emissions during these activities could produce an objectionable "rotten egg" odor in the immediate vicinity of each well. However, these concentrations would not be expected to pose a health hazard and would not reach far beyond the vicinity of the wells under normal conditions. In addition, potential H_2S emissions resulting from these activities would be temporary at each well development site and would occur for a relatively short period of several hours to up to 45 days at each well site.

Construction of the Project components would also result in short-term diesel exhaust emissions from on-site heavy-duty equipment and from material deliveries and debris removal, which could result in the

creation of objectionable odors. These activities would be temporary or periodic, and spatially dispersed, and any associated odors would dissipate quickly from the sources.

The closest sensitive receptor to the Project site is a resident located approximately 650 feet from the southernmost well site. Therefore, given the temporary nature of construction and testing activities and the lack of sensitive receptors in the immediate vicinity of Project components, odor nuisances that would be associated with the Project construction and testing activities are expected to be negligible and impacts would be less than significant.

4.3.2 Greenhouse Gas

Impact a. Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction of the proposed Project would generate GHG emissions over a 28-month construction period. Exhaust emissions would result from construction equipment and machinery as well as from vehicular traffic generated by construction activities. Construction and operation GHG emissions were estimated using SCAQMD's CalEEMod 2022.1 model (refer to Attachment A) based on assumptions detailed in **Section 1.2**, including the Project's construction schedule and testing activities. Short-term construction and testing emissions (e.g., off-road equipment and vehicle trips) associated with the proposed Project were evaluated. For all GHG emissions assumptions and calculations, see Attachment A. Based on the results of this modeling, construction emissions would result in a maximum of 7,369 $MTCO_2e$ per year. Total project GHG emissions for construction are shown in **Table 9**.

Table 9. Estimated Project Construction GHG Emissions

Construction Year	GHG ($MTCO_2e$/year)
2026	448
2027	7,369
2028	5,305
2029	0.98
TOTAL	**13,123**

Source: CalEEMod Results in Attachment A

As summarized in **Table 9**, total GHG construction emissions would be approximately 13,123 $MTCO_2e$. In accordance with industry standard, the total GHG emissions from construction were amortized (i.e., averaged annually) over a 30-year timeframe, with a resulting annual emission of 437.4 $MTCO_2e$ per year.

As summarized in **Section 4.2**, the MCAPCD do not have numeric thresholds for GHG emissions for CEQA. Per CEQA Guidelines Section 15064(h)(3), a project's incremental contribution to a cumulative impact can be found not cumulatively considerable if the project will comply with an approved plan or mitigation program that provides specific requirements that will avoid or substantially lessen the cumulative problem within the geographic area of the project. To qualify, such a plan or program must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency. Examples of such programs include a "air quality attainment or maintenance plan

and/or plans or regulations for the reduction of greenhouse gas emissions." Put another way, CEQA Guidelines Section 15064(h)(3) allows a lead agency to make a finding of less than significance for GHG emissions if a project complies with regulatory programs to reduce GHG emissions.

In the absence of any adopted numeric threshold, the significance of the proposed project's GHG emissions is evaluated consistent with CEQA Guidelines Section 15064.4(b) by considering whether the proposed project complies with applicable plans, policies, regulations, and requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. Accordingly, the proposed Project is evaluated against the CARB Scoping Plan. Measures included in the CARB Scoping Plan would indirectly address GHG emission levels associated with construction activities, including the phasing-in of cleaner technology for diesel engine fleets (including construction equipment) and the development of a low-carbon fuel standard. Policies formulated under the mandate of AB 32 that apply to construction-related activity either directly or indirectly, are assumed to be implemented statewide and would affect the Project should those policies be implemented before construction begins. Specifically, implementation of AB 32 control measures for reduced vehicle emissions would decrease GHG emissions from the Project. In addition, the Project is in support of a potential future renewable energy project which supports the GHG reduction measures to increase renewable and zero-carbon energy generation including installation of utility scale solar and geothermal energy as a particular focus of the Scoping Plan GHG Reduction Measure E-3 (Renewable Portfolio Standard).

Although not directly applicable to the proposed project, the proposed project would not conflict with population growth projections of the Modoc County Regional Transportation Plan (Modoc County Transportation Commission 2019), or its goals associated with GHG reductions. Specifically, the Project would not contribute to population growth outside of those projections. As such, the Project would be consistent with the current land use designation for the Project site and would not create housing or otherwise lead to substantial unplanned population growth in the vicinity and is considered consistent with the GHG reduction goals of the Regional Transportation Plan.

The plan consistency analysis demonstrates that the Project is consistent with plans, policies, regulations and GHG reduction actions/strategies outlined in CARB's Scoping Plan and Modoc County Regional Transportation Plan. As the proposed Project would not conflict with applicable plans, policies, and regulations adopted for the purpose of reducing emissions of GHGs, the proposed project's impacts related to GHG emissions would be less than significant. Further, based on the results of the quantitative analysis as described above, the Project would result in 437.4 $MTCO_2e$ emissions per year (with construction emissions amortized over 30 years). These emissions are significantly less than the bright-line threshold of 1,100 $MTCO_2e$ per year often used for projects in nearby air districts. Because the Project is consistent and does not conflict with the applicable plans, policies, and regulations, and because the Project's incremental increase in GHG emissions is below the 1,100 $MTCO_2e$ per year *de minimis* threshold for industrial projects, the Project's incremental increase in GHG emissions of 437.4 $MTCO_2e$ per year (construction emissions amortized over 30 years) would be less than significant.

Impact b. Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

As described above, California has enacted several pieces of legislation that relate to GHG emissions and climate change, much of which sets aggressive goals for GHG reductions within the state. The first and most far-reaching is AB 32, now followed by SB 32 and AB 1279, in which CARB must ensure that statewide anthropogenic GHG emissions are reduced to at least 85% below the 1990 levels by 2045. While AB 32 establishes control measures that would apply to light, medium, and heavy-duty vehicles, and the proposed project would operate those types of vehicles, these measures are being implemented at the state level and the proposed Project would not interfere with the implementation of the control measures. Implementation of AB 32 control measures for reduced vehicle emissions would decrease GHG emissions from the Project. Accordingly, the proposed Project would be conducted in compliance with applicable plans, policies and regulations adopted for the purpose of reducing the

SECTION 5 References

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Attachment A CalEEMod Air Quality and GHG Emissions Data

Surprise Valley Detailed Report

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3.1. Site Preparation (2026) - Unmitigated

3.3. Site Preparation (2027) - Unmitigated

3.5. Well Drilling (2027) - Unmitigated

3.7. Well Drilling (2028) - Unmitigated

3.9. Well Testing (2028) - Unmitigated

3.11. Reclamation (2028) - Unmitigated

3.13. Reclamation (2029) - Unmitigated

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

4.3. Area Emissions by Source

4.3.1. Unmitigated

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

5. Activity Data

5.1. Construction Schedule

5.2. Off-Road Equipment

5.2.1. Unmitigated

5.3. Construction Vehicles

5.3.1. Unmitigated

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

5.5. Architectural Coatings

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

5.6.2. Construction Earthmoving Control Strategies

5.7. Construction Paving

5.8. Construction Electricity Consumption and Emissions Factors

5.9. Operational Mobile Sources

5.9.1. Unmitigated

5.10. Operational Area Sources

5.10.1. Hearths

5.10.2. Architectural Coatings

5.10.3. Landscape Equipment

5.11. Operational Energy Consumption

5.11.1. Unmitigated

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

5.13. Operational Waste Generation

5.13.1. Unmitigated

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

5.16.2. Process Boilers

5.17. User Defined

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

5.18.2. Sequestration

5.18.2.1. Unmitigated

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

6.2. Initial Climate Risk Scores

6.3. Adjusted Climate Risk Scores

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

7.2. Healthy Places Index Scores

7.3. Overall Health & Equity Scores

7.4. Health & Equity Measures

7.5. Evaluation Scorecard

7.6. Health & Equity Custom Measures

8. User Changes to Default Data

8.1. Justifications

8.3. Land Use

8.4. Construction

8.4.1. Construction Phases

8.4.4. Dust from Material Movement

8.4.6. Trips and VMT

8.4.7. On-Road Fugitive Dust

8.5. Operations

8.5.2. Area Sources

8.5.2.2. Consumer Products

8.5.4. Water and Waste Water

8.5.5. Solid Waste

8.5.6. Refrigerants

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Surprise Valley
Construction Start Date	10/1/2026
Operational Year	2029
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.50000
Precipitation (days)	64.6000
Location	41.68441394812427, -120.20901942111112
County	Modoc
City	Unincorporated
Air District	Modoc County APCD
Air Basin	Northeast Plateau
TAZ	131
EDFZ	0-C
Electric Utility	Surprise Valley Electrification Corporation
Gas Utility	Tuscarora
App Version	2022.1.1.37

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Heavy Industry	1,720.18	1000sqft	39.4899	0.00000	0.00000	0.00000	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	24.2443	20.1726	173.708	200.541	0.53614	4.24323	72.0183	76.2615	3.90691	7.31161	11.2185	—	49,376.9	49,376.9	1.91794	0.72355	4.67760	49,645.2
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	24.2371	20.1717	174.099	200.623	0.53614	4.24323	105.942	106.953	3.90691	10.7606	11.6948	—	49,363.2	49,363.2	1.92145	0.72554	0.23924	49,627.6
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	21.4965	17.8965	153.934	177.055	0.47762	3.77271	59.7903	63.5630	3.47401	6.08863	9.56263	—	44,260.6	44,260.6	1.71086	0.68646	2.09458	44,510.0
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.92310	3.26612	28.0930	32.3126	0.08717	0.68852	10.9117	11.6002	0.63401	1.11117	1.74518	—	7,327.84	7,327.84	0.28325	0.11365	0.34678	7,369.14

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	24.2443	20.1726	173.708	200.541	0.53614	4.24323	72.0183	76.2615	3.90691	7.31161	11.2185	—	49,376.9	49,376.9	1.91748	0.72355	4.67760	49,645.2

2028	23.1609	19.2761	167.504	199.144	0.52477	3.67704	72.0183	75.6953	3.38599	7.31161	10.6976	—	49,336.5	49,336.5	1.91794	0.72298	4.32068	49,604.2
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	4.89414	4.12231	34.7017	31.4966	0.12769	1.01088	105.942	106.953	0.93415	10.7606	11.6948	—	14,830.4	14,830.4	0.46919	0.60239	0.23924	15,021.9
2027	24.2371	20.1717	174.099	200.623	0.53614	4.24323	105.942	106.874	3.90691	10.7606	11.6217	—	49,363.2	49,363.2	1.92145	0.72554	0.21901	49,627.6
2028	23.1622	19.2740	167.875	199.205	0.52477	3.67726	72.0183	75.6956	3.38621	7.31161	10.6978	—	49,323.1	49,323.1	1.92125	0.72364	0.11200	49,586.9
2029	0.48164	0.40629	4.02482	4.21519	0.01234	0.10756	13.9587	14.0663	0.09952	1.41685	1.51637	—	1,492.27	1,492.27	0.04611	0.06975	0.02018	1,514.22
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.88459	0.74545	6.17501	5.64172	0.02299	0.18200	15.7447	15.9267	0.16818	1.60406	1.77224	—	2,670.78	2,670.78	0.08412	0.10845	0.71875	2,705.93
2027	21.4965	17.8965	153.934	177.055	0.47762	3.77271	59.7903	63.5630	3.47401	6.08863	9.56263	—	44,260.6	44,260.6	1.71086	0.68646	2.09458	44,510.0
2028	15.7342	13.0794	118.057	139.575	0.34800	2.47431	38.9949	41.4692	2.27826	3.96873	6.24699	—	31,871.9	31,871.9	1.24397	0.45529	1.18246	32,039.9
2029	0.00188	0.00159	0.01559	0.01643	0.00005	0.00042	0.04505	0.04547	0.00039	0.00459	0.00497	—	5.84301	5.84301	0.00018	0.00027	0.00132	5.93016
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.16144	0.13604	1.12694	1.02961	0.00420	0.03321	2.87340	2.90662	0.03069	0.29274	0.32343	—	442.179	442.179	0.01393	0.01796	0.11900	447.997
2027	3.92310	3.26612	28.0930	32.3126	0.08717	0.68852	10.9117	11.6002	0.63401	1.11117	1.74518	—	7,327.84	7,327.84	0.28325	0.11365	0.34678	7,369.14
2028	2.87150	2.38698	21.5455	25.4725	0.06351	0.45156	7.11656	7.56813	0.41578	0.72429	1.14008	—	5,276.76	5,276.76	0.20595	0.07538	0.19577	5,304.56
2029	0.00034	0.00029	0.00285	0.00300	0.00001	0.00008	0.00822	0.00830	0.00007	0.00084	0.00091	—	0.96738	0.96738	0.00003	0.00005	0.00022	0.98181

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Area	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Water	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Waste	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Area	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Water	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Waste	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Area	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Water	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Waste	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Area	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Water	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Waste	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3. Construction Emissions Details

3.1. Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Roa Equipment	4.52034	3.79834	26.6792	27.8028	0.10156	0.95911	—	0.95911	0.88238	—	0.88238	—	10,995.1	10,995.1	0.44601	0.08920	—	11,032.8
Dust From Material Movement	—	—	—	—	—	—	0.55990	0.55990	—	0.06174	0.06174	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Roa d Equipm ent	0.81384	0.68385	4.80331	5.00559	0.01828	0.17268	—	0.17268	0.15886	—	0.15886	—	1,979.55	1,979.55	0.08030	0.01606	—	1,986.34
Dust From Material Movement	—	—	—	—	—	—	0.10080	0.10080	—	0.01112	0.01112	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Roa d Equipm ent	0.14853	0.12480	0.87660	0.91352	0.00334	0.03151	—	0.03151	0.02899	—	0.02899	—	327.737	327.737	0.01329	0.00266	—	328.862
Dust From Material Movement	—	—	—	—	—	—	0.01840	0.01840	—	0.00203	0.00203	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.18223	0.16051	0.19141	1.91773	0.00000	0.00000	26.5561	26.5561	0.00000	2.68220	2.68220	—	282.214	282.214	0.01847	0.01053	0.02616	285.839
Vendor	0.17689	0.14931	6.79118	1.68776	0.02070	0.04370	69.8859	69.9296	0.04370	7.10603	7.14973	—	3,107.96	3,107.96	0.00459	0.43242	0.19333	3,237.13
Hauling	0.01468	0.01415	1.03983	0.08836	0.00542	0.00807	8.94055	8.94862	0.00807	0.91065	0.91872	—	445.093	445.093	0.00013	0.07024	0.01975	466.047
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03209	0.02842	0.02807	0.32785	0.00000	0.00000	3.94082	3.94082	0.00000	0.39878	0.39878	—	51.3773	51.3773	0.00297	0.00190	0.07855	52.0950
Vendor	0.03599	0.03061	1.16511	0.29273	0.00373	0.00787	10.3754	10.3833	0.00787	1.05844	1.06631	—	559.709	559.709	0.00083	0.07785	0.58101	583.511
Hauling	0.00267	0.00257	0.17852	0.01555	0.00098	0.00145	1.32766	1.32912	0.00145	0.13572	0.13718	—	80.1462	80.1462	0.00002	0.01265	0.05919	83.9744
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00586	0.00519	0.00512	0.05983	0.00000	0.00000	0.71920	0.71920	0.00000	0.07278	0.07278	—	8.50610	8.50610	0.00049	0.00031	0.01300	8.62492
Vendor	0.00657	0.00559	0.21263	0.05342	0.00068	0.00144	1.89351	1.89494	0.00144	0.19317	0.19460	—	92.6662	92.6662	0.00014	0.01289	0.09619	96.6069
Hauling	0.00049	0.00047	0.03258	0.00284	0.00018	0.00027	0.24230	0.24256	0.00027	0.02477	0.02503	—	13.2691	13.2691	< 0.000005	0.00209	0.00980	13.9029

3.3. Site Preparation (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.42108	3.71494	24.4004	27.6608	0.10154	0.87969	—	0.87969	0.80931	—	0.80931	—	10,993.0	10,993.0	0.44592	0.08918	—	11,030.7

Dust From Material Movement	—	—	—	—	—	—	0.55990	0.55990	—	0.06174	0.06174	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.41529	0.34896	2.29201	2.59828	0.00954	0.08263	—	0.08263	0.07602	—	0.07602	—	1,032.61	1,032.61	0.04189	0.00838	—	1,036.15
Dust From Material Movement	—	—	—	—	—	—	0.05259	0.05259	—	0.00580	0.00580	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07579	0.06368	0.41829	0.47419	0.00174	0.01508	—	0.01508	0.01387	—	0.01387	—	170.961	170.961	0.00693	0.00139	—	171.547
Dust From Material Movement	—	—	—	—	—	—	0.00960	0.00960	—	0.00106	0.00106	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.16574	0.15257	0.17365	1.76371	0.00000	0.00000	26.5561	26.5561	0.00000	2.68220	2.68220	—	276.863	276.863	0.01780	0.01053	0.02401	280.470

Vendor	0.17460	0.14472	6.29435	1.54290	0.02070	0.04370	69.8859	69.9296	0.04370	7.10603	7.14973	—	3,045.71	3,045.71	0.00459	0.43242	0.17646	3,174.87
Hauling	0.01455	0.01151	0.97250	0.08651	0.00542	0.00807	8.94055	8.94862	0.00807	0.91065	0.91872	—	436.028	436.028	0.00013	0.06759	0.01854	456.193
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01532	0.01421	0.01304	0.15739	0.00000	0.00000	2.05608	2.05608	0.00000	0.20806	0.20806	—	26.2987	26.2987	0.00149	0.00099	0.03749	26.6681
Vendor	0.01619	0.01381	0.56489	0.13955	0.00194	0.00410	5.41324	5.41735	0.00410	0.55223	0.55634	—	286.148	286.148	0.00043	0.04062	0.27588	298.540
Hauling	0.00139	0.00109	0.08704	0.00796	0.00051	0.00076	0.69269	0.69345	0.00076	0.07081	0.07157	—	40.9619	40.9619	0.00001	0.00635	0.02896	42.8833
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00280	0.00259	0.00238	0.02872	0.00000	0.00000	0.37524	0.37524	0.00000	0.03797	0.03797	—	4.35405	4.35405	0.00025	0.00016	0.00621	4.41520
Vendor	0.00295	0.00252	0.10309	0.02547	0.00035	0.00075	0.98792	0.98867	0.00075	0.10078	0.10153	—	47.3751	47.3751	0.00007	0.00672	0.04568	49.4266
Hauling	0.00025	0.00020	0.01588	0.00145	0.00009	0.00014	0.12642	0.12656	0.00014	0.01292	0.01306	—	6.78171	6.78171	< 0.000005	0.00105	0.00479	7.09981

3.5. Well Drilling (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	23.9915	19.9553	169.106	198.336	0.51064	4.20407	—	4.20407	3.86774	—	3.86774	—	46,904.1	46,904.1	1.90263	0.38053	—	47,065.0
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	23.9915	19.9553	169.106	198.336	0.51064	4.20407	—	4.20407	3.86774	—	3.86774	—	46,904.1	46,904.1	1.90263	0.38053	—	47,065.0

Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	20.8365	17.3310	146.867	172.254	0.44349	3.65120	—	3.65120	3.35911	—	3.35911	—	40,735.8	40,735.8	1.65242	0.33048	—	40,875.6
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.80266	3.16291	26.8032	31.4363	0.08094	0.66634	—	0.66634	0.61304	—	0.61304	—	6,744.28	6,744.28	0.27358	0.05472	—	6,767.43
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.17098	0.15191	0.11841	1.70495	0.00000	0.00000	26.5561	26.5561	0.00000	2.68220	2.68220	—	290.145	290.145	0.01384	0.01053	0.92445	294.553
Vendor	0.01701	0.01436	0.56365	0.13779	0.00199	0.00420	6.71980	6.72400	0.00420	0.68327	0.68747	—	292.954	292.954	0.00044	0.03959	0.65477	305.417
Hauling	0.06477	0.05101	3.92070	0.36169	0.02350	0.03497	38.7424	38.7773	0.03497	3.94614	3.98111	—	1,889.79	1,889.79	0.00057	0.29291	3.09839	1,980.19
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.16574	0.15257	0.17365	1.76371	0.00000	0.00000	26.5561	26.5561	0.00000	2.68220	2.68220	—	276.863	276.863	0.01780	0.01053	0.02401	280.470
Vendor	0.01679	0.01392	0.60523	0.14836	0.00199	0.00420	6.71980	6.72400	0.00420	0.68327	0.68747	—	292.857	292.857	0.00044	0.04158	0.01697	305.276
Hauling	0.06305	0.04987	4.21418	0.37487	0.02350	0.03497	38.7424	38.7773	0.03497	3.94614	3.98111	—	1,889.45	1,889.45	0.00057	0.29291	0.08033	1,976.84
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.14165	0.13136	0.12056	1.45523	0.00000	0.00000	19.0102	19.0102	0.00000	1.92367	1.92367	—	243.153	243.153	0.01374	0.00914	0.34661	246.569
Vendor	0.01439	0.01228	0.50220	0.12406	0.00173	0.00365	4.81250	4.81615	0.00365	0.49095	0.49460	—	254.392	254.392	0.00038	0.03611	0.24527	265.408

Hauling	0.05576	0.04381	3.48724	0.31910	0.02041	0.03037	27.7530	27.7834	0.03037	2.83711	2.86748	—	1,641.15	1,641.15	0.00050	0.25439	1.16037	1,718.13
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02585	0.02397	0.02200	0.26558	0.00000	0.00000	3.46936	3.46936	0.00000	0.35107	0.35107	—	40.2568	40.2568	0.00227	0.00151	0.05738	40.8222
Vendor	0.00263	0.00224	0.09165	0.02264	0.00032	0.00067	0.87828	0.87895	0.00067	0.08960	0.09026	—	42.1176	42.1176	0.00006	0.00598	0.04061	43.9414
Hauling	0.01018	0.00800	0.63642	0.05824	0.00372	0.00554	5.06492	5.07046	0.00554	0.51777	0.52331	—	271.711	271.711	0.00008	0.04212	0.19211	284.456

3.7. Well Drilling (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	22.9242	19.0722	163.125	197.071	0.51075	3.63810	—	3.63810	3.34705	—	3.34705	—	46,915.3	46,915.3	1.90309	0.38062	—	47,076.3
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	22.9242	19.0722	163.125	197.071	0.51075	3.63810	—	3.63810	3.34705	—	3.34705	—	46,915.3	46,915.3	1.90309	0.38062	—	47,076.3
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	12.4984	10.3983	88.9369	107.444	0.27846	1.98351	—	1.98351	1.82483	—	1.82483	—	25,578.5	25,578.5	1.03758	0.20752	—	25,666.3

Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.28095	1.89768	16.2310	19.6085	0.05082	0.36199	—	0.36199	0.33303	—	0.33303	—	4,234.81	4,234.81	0.17178	0.03436	—	4,249.34
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.15715	0.13873	0.10921	1.58130	0.00000	0.00000	26.5561	26.5561	0.00000	2.68220	2.68220	—	284.881	284.881	0.01384	0.00987	0.84328	289.011
Vendor	0.01480	0.01414	0.52893	0.12651	0.00199	0.00398	6.71980	6.72378	0.00398	0.68327	0.68725	—	286.372	286.372	0.00044	0.03959	0.59214	298.773
Hauling	0.06477	0.05101	3.74014	0.36513	0.01204	0.03497	38.7424	38.7773	0.03497	3.94614	3.98111	—	1,849.90	1,849.90	0.00057	0.29291	2.88527	1,940.09
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.16045	0.14006	0.15656	1.63206	0.00000	0.00000	26.5561	26.5561	0.00000	2.68220	2.68220	—	271.828	271.828	0.01714	0.01053	0.02187	275.416
Vendor	0.01458	0.01192	0.56896	0.13620	0.00199	0.00420	6.71980	6.72400	0.00420	0.68327	0.68747	—	286.311	286.311	0.00044	0.03959	0.01537	298.135
Hauling	0.06305	0.04987	4.02388	0.36628	0.01204	0.03497	38.7424	38.7773	0.03497	3.94614	3.98111	—	1,849.67	1,849.67	0.00057	0.29291	0.07475	1,937.04
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08568	0.07492	0.07030	0.84609	0.00000	0.00000	11.9338	11.9338	0.00000	1.20760	1.20760	—	149.875	149.875	0.00826	0.00574	0.19853	151.990
Vendor	0.00795	0.00759	0.29645	0.07149	0.00109	0.00229	3.02109	3.02338	0.00229	0.30820	0.31049	—	156.118	156.118	0.00024	0.02158	0.13953	162.695
Hauling	0.03500	0.02750	2.09134	0.19563	0.00656	0.01906	17.4222	17.4413	0.01906	1.78102	1.80009	—	1,008.52	1,008.52	0.00031	0.15969	0.67749	1,056.80
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01564	0.01367	0.01283	0.15441	0.00000	0.00000	2.17793	2.17793	0.00000	0.22039	0.22039	—	24.8134	24.8134	0.00137	0.00095	0.03287	25.1637
Vendor	0.00145	0.00138	0.05410	0.01305	0.00020	0.00042	0.55135	0.55177	0.00042	0.05625	0.05666	—	25.8471	25.8471	0.00004	0.00357	0.02310	26.9361
Hauling	0.00639	0.00502	0.38167	0.03570	0.00120	0.00348	3.17956	3.18303	0.00348	0.32504	0.32852	—	166.973	166.973	0.00005	0.02644	0.11217	174.965

3.9. Well Testing (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	18.2477	15.0841	157.148	182.915	0.36178	2.73628	—	2.73628	2.51738	—	2.51738	—	28,146.7	28,146.7	1.14175	0.22835	—	28,243.3
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	18.2477	15.0841	157.148	182.915	0.36178	2.73628	—	2.73628	2.51738	—	2.51738	—	28,146.7	28,146.7	1.14175	0.22835	—	28,243.3
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.99962	2.47957	25.8326	30.0682	0.05947	0.44980	—	0.44980	0.41382	—	0.41382	—	4,626.86	4,626.86	0.18769	0.03754	—	4,642.73
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.54743	0.45252	4.71445	5.48745	0.01085	0.08209	—	0.08209	0.07552	—	0.07552	—	766.029	766.029	0.03107	0.00621	—	768.658

Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.15715	0.13873	0.10921	1.58130	0.00000	0.00000	26.5561	26.5561	0.00000	2.68220	2.68220	—	284.881	284.881	0.01384	0.00987	0.84328	289.011
Vendor	0.00592	0.00565	0.21157	0.05060	0.00080	0.00159	2.68792	2.68951	0.00159	0.27331	0.27490	—	114.549	114.549	0.00018	0.01584	0.23685	119.509
Hauling	0.00996	0.00785	0.57541	0.05617	0.00185	0.00538	5.96037	5.96575	0.00538	0.60710	0.61248	—	284.601	284.601	0.00009	0.04506	0.44389	298.475
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.16045	0.14006	0.15656	1.63206	0.00000	0.00000	26.5561	26.5561	0.00000	2.68220	2.68220	—	271.828	271.828	0.01714	0.01053	0.02187	275.416
Vendor	0.00583	0.00477	0.22758	0.05448	0.00080	0.00168	2.68792	2.68960	0.00168	0.27331	0.27499	—	114.525	114.525	0.00018	0.01584	0.00615	119.254
Hauling	0.00970	0.00767	0.61906	0.05635	0.00185	0.00538	5.96037	5.96575	0.00538	0.60710	0.61248	—	284.564	284.564	0.00009	0.04506	0.01150	298.006
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02583	0.02259	0.02120	0.25510	0.00000	0.00000	3.59814	3.59814	0.00000	0.36410	0.36410	—	45.1883	45.1883	0.00249	0.00173	0.05986	45.8262
Vendor	0.00096	0.00091	0.03575	0.00862	0.00013	0.00028	0.36435	0.36463	0.00028	0.03717	0.03745	—	18.8283	18.8283	0.00003	0.00260	0.01683	19.6216
Hauling	0.00162	0.00128	0.09701	0.00907	0.00030	0.00088	0.80814	0.80903	0.00088	0.08261	0.08350	—	46.7811	46.7811	0.00001	0.00741	0.03143	49.0204
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00471	0.00412	0.00387	0.04656	0.00000	0.00000	0.65666	0.65666	0.00000	0.06645	0.06645	—	7.48144	7.48144	0.00041	0.00029	0.00991	7.58706
Vendor	0.00017	0.00017	0.00652	0.00157	0.00002	0.00005	0.06649	0.06654	0.00005	0.00678	0.00683	—	3.11724	3.11724	< 0.000005	0.00043	0.00279	3.24857
Hauling	0.00030	0.00023	0.01770	0.00166	0.00006	0.00016	0.14749	0.14765	0.00016	0.01508	0.01524	—	7.74515	7.74515	< 0.000005	0.00123	0.00520	8.11588

3.11. Reclamation (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44643	0.37512	3.37760	3.80079	0.00969	0.10816	—	0.10816	0.09951	—	0.09951	—	1,049.22	1,049.22	0.04256	0.00851	—	1,052.82
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07164	0.06020	0.54200	0.60991	0.00156	0.01736	—	0.01736	0.01597	—	0.01597	—	168.368	168.368	0.00683	0.00137	—	168.946
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01307	0.01099	0.09892	0.11131	0.00028	0.00317	—	0.00317	0.00291	—	0.00291	—	27.8752	27.8752	0.00113	0.00023	—	27.9709
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03209	0.02801	0.03131	0.32641	0.00000	0.00000	5.31122	5.31122	0.00000	0.53644	0.53644	—	54.3656	54.3656	0.00343	0.00211	0.00437	55.0832
Vendor	0.00583	0.00477	0.22758	0.05448	0.00080	0.00168	2.68792	2.68960	0.00168	0.27331	0.27499	—	114.525	114.525	0.00018	0.01584	0.00615	119.254

Hauling	0.00970	0.00767	0.61906	0.05635	0.00185	0.00538	5.96037	5.96575	0.00538	0.60710	0.61248	—	284.564	284.564	0.00009	0.04506	0.01150	298.006
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00504	0.00441	0.00414	0.04981	0.00000	0.00000	0.70249	0.70249	0.00000	0.07109	0.07109	—	8.82248	8.82248	0.00049	0.00034	0.01169	8.94703
Vendor	0.00094	0.00089	0.03490	0.00842	0.00013	0.00027	0.35568	0.35595	0.00027	0.03628	0.03655	—	18.3800	18.3800	0.00003	0.00254	0.01643	19.1544
Hauling	0.00158	0.00125	0.09470	0.00886	0.00030	0.00086	0.78890	0.78976	0.00086	0.08065	0.08151	—	45.6673	45.6673	0.00001	0.00723	0.03068	47.8532
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00092	0.00080	0.00076	0.00909	0.00000	0.00000	0.12821	0.12821	0.00000	0.01297	0.01297	—	1.46066	1.46066	0.00008	0.00006	0.00193	1.48128
Vendor	0.00017	0.00016	0.00637	0.00154	0.00002	0.00005	0.06491	0.06496	0.00005	0.00662	0.00667	—	3.04302	3.04302	< 0.000005	0.00042	0.00272	3.17123
Hauling	0.00029	0.00023	0.01728	0.00162	0.00005	0.00016	0.14397	0.14413	0.00016	0.01472	0.01488	—	7.56074	7.56074	< 0.000005	0.00120	0.00508	7.92265

3.13. Reclamation (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.43758	0.36769	3.19155	3.80588	0.00969	0.10050	—	0.10050	0.09246	—	0.09246	—	1,048.93	1,048.93	0.04255	0.00851	—	1,052.53
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipm	0.00171	0.00144	0.01249	0.01490	0.00004	0.00039	—	0.00039	0.00036	—	0.00036	—	4.10541	4.10541	0.00017	0.00003	—	4.11950
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00031	0.00026	0.00228	0.00272	0.00001	0.00007	—	0.00007	0.00007	—	0.00007	—	0.67970	0.67970	0.00003	0.00001	—	0.68203
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02879	0.02642	0.02776	0.30140	0.00000	0.00000	5.31122	5.31122	0.00000	0.53644	0.53644	—	53.4025	53.4025	0.00330	0.00211	0.00397	54.1165
Vendor	0.00557	0.00451	0.21396	0.05121	0.00080	0.00168	2.68712	2.68880	0.00168	0.27331	0.27499	—	111.697	111.697	0.00018	0.01584	0.00555	116.426
Hauling	0.00970	0.00767	0.59154	0.05670	0.00185	0.00538	5.96037	5.96575	0.00538	0.60710	0.61248	—	278.233	278.233	0.00009	0.04330	0.01067	291.149
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00011	0.00010	0.00009	0.00112	0.00000	0.00000	0.01713	0.01713	0.00000	0.00173	0.00173	—	0.21138	0.21138	0.00001	0.00001	0.00026	0.21439
Vendor	0.00002	0.00002	0.00080	0.00019	< 0.000005	0.00001	0.00867	0.00868	0.00001	0.00088	0.00089	—	0.43720	0.43720	< 0.000005	0.00006	0.00036	0.45604
Hauling	0.00004	0.00003	0.00221	0.00022	0.00001	0.00002	0.01924	0.01926	0.00002	0.00197	0.00199	—	1.08902	1.08902	< 0.000005	0.00017	0.00070	1.14023
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00002	0.00002	0.00002	0.00020	0.00000	0.00000	0.00313	0.00313	0.00000	0.00032	0.00032	—	0.03500	0.03500	< 0.000005	< 0.000005	0.00004	0.03549
Vendor	< 0.000005	< 0.000005	0.00015	0.00003	< 0.000005	< 0.000005	0.00158	0.00158	< 0.000005	0.00016	0.00016	—	0.07238	0.07238	< 0.000005	0.00001	0.00006	0.07550

Hauling	0.00001	0.00001	0.00040	0.00004	< 0.000005	< 0.000005	0.00351	0.00352	< 0.000005	0.00036	0.00036	—	0.18030	0.18030	< 0.000005	0.00003	0.00012	0.18878

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Mobile source emissions results are presented in Sections 2.6. No further detailed breakdown of emissions is available.

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000

Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	—	0.00000

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.00000	0.00000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipm Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Remove	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	10/1/2026	2/17/2027	5.00000	100.0000	—
Well Drilling	Building Construction	2/18/2027	7/17/2028	7.00000	516.000	—
Well Testing	Building Construction	7/19/2028	10/10/2028	5.00000	60.0000	—
Reclamation	Building Construction	10/11/2028	1/2/2029	5.00000	60.0000	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Off-Highway Trucks	Diesel	Average	3.00000	5.00000	402.000	0.38000
Site Preparation	Excavators	Diesel	Average	1.000000	5.00000	97.0000	0.38000
Site Preparation	Rollers	Diesel	Average	2.00000	8.00000	200.000	0.38000
Site Preparation	Off-Highway Trucks	Diesel	Average	8.00000	4.00000	350.000	0.38000
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.000000	8.00000	97.0000	0.37000
Site Preparation	Rubber Tired Loaders	Diesel	Average	1.000000	8.00000	203.000	0.36000
Site Preparation	Graders	Diesel	Average	1.000000	8.00000	187.000	0.41000
Well Drilling	Generator Sets	Diesel	Average	2.00000	12.0000	27.0000	0.74000
Well Drilling	Bore/Drill Rigs	Diesel	Average	1.000000	24.0000	500.000	0.50000
Well Drilling	Pumps	Diesel	Average	1.000000	24.0000	500.000	0.74000

Well Drilling	Generator Sets	Diesel	Average	1.000000	24.0000	415.000	0.74000
Well Drilling	Off-Highway Trucks	Diesel	Average	8.00000	8.00000	450.000	0.38000
Well Drilling	Cranes	Diesel	Average	2.00000	5.00000	231.000	0.29000
Well Drilling	Tractors/Loaders/Backhoes	Diesel	Average	1.000000	6.00000	97.0000	0.37000
Well Drilling	Forklifts	Diesel	Average	1.000000	6.00000	89.0000	0.20000
Well Drilling	Off-Highway Trucks	Diesel	Average	1.000000	10.00000	385.000	0.38000
Well Drilling	Off-Highway Trucks	Diesel	Average	1.000000	4.00000	428.000	0.38000
Well Drilling	Other Material Handling Equipment	Diesel	Average	1.000000	4.00000	100.0000	0.40000
Well Drilling	Off-Highway Trucks	Diesel	Average	4.00000	4.00000	350.000	0.38000
Well Testing	Generator Sets	Diesel	Average	1.000000	24.0000	671.000	0.74000
Well Testing	Generator Sets	Diesel	Average	2.00000	12.0000	27.0000	0.74000
Well Testing	Generator Sets	Diesel	Average	2.00000	12.0000	9.00000	0.74000
Well Testing	Pumps	Diesel	Average	1.000000	24.0000	115.000	0.74000
Well Testing	Pumps	Diesel	Average	1.000000	24.0000	415.000	0.74000
Well Testing	Off-Highway Trucks	Diesel	Average	1.000000	4.00000	350.000	0.38000
Reclamation	Tractors/Loaders/Backhoes	Diesel	Average	1.000000	8.00000	97.0000	0.37000
Reclamation	Graders	Diesel	Average	1.000000	8.00000	187.000	0.41000

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	Worker	30.0000	11.9200	LDA,LDT1,LDT2
Site Preparation	Vendor	104.000	9.03000	HHDT,MHDT
Site Preparation	Hauling	6.00000	20.0000	HHDT
Site Preparation	Onsite truck	—	—	HHDT

Well Drilling	Worker	30.0000	11.9200	LDA,LDT1,LDT2
Well Drilling	Vendor	10.00000	9.03000	HHDT,MHDT
Well Drilling	Hauling	26.0000	20.0000	HHDT
Well Drilling	Onsite truck	—	—	HHDT
Well Testing	Worker	30.0000	11.9200	LDA,LDT1,LDT2
Well Testing	Vendor	4.00000	9.03000	HHDT,MHDT
Well Testing	Hauling	4.00000	20.0000	HHDT
Well Testing	Onsite truck	—	—	HHDT
Reclamation	Worker	6.00000	11.9200	LDA,LDT1,LDT2
Reclamation	Vendor	4.00000	9.03000	HHDT,MHDT
Reclamation	Hauling	4.00000	20.0000	HHDT
Reclamation	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	56,243.0	0.00000	18.4200	0.00000	0.00000

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00000	453.209	0.03300	0.00400
2027	0.00000	453.209	0.03300	0.00400
2028	0.00000	453.209	0.03300	0.00400
2029	0.00000	453.209	0.03300	0.00400

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Total all Land Uses	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

5.10. Operational Area Sources

5.10.1. Hearths

Land Use	Hearth Type	Unmitigated (number)	Mitigated (number)
General Heavy Industry	Wood Fireplaces	0	0
General Heavy Industry	Gas Fireplaces	0	0
General Heavy Industry	Propane Fireplaces	0	0
General Heavy Industry	Electric Fireplaces	0	0
General Heavy Industry	No Fireplaces	0	0
General Heavy Industry	Conventional Wood Stoves	0	0
General Heavy Industry	Catalytic Wood Stoves	0	0
General Heavy Industry	Non-Catalytic Wood Stoves	0	0

General Heavy Industry	Pellet Wood Stoves	0	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0.00000	0.00000	0.00000	0.00000	—

5.10.3. Landscape Equipment

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
General Heavy Industry	0.00000	453.209	0.0330	0.0040	0.00000

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
General Heavy Industry	0.00000	0.00000

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
General Heavy Industry	0.00000	0.00000

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
General Heavy Industry	Other commercial A/C and heat pumps	R-410A	2,088.00	0.00000	4.00000	4.00000	18.0000

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

5.16.2. Process Boilers

5.17. User Defined

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	35.6100	annual days of extreme heat
Extreme Precipitation	3.25000	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	17.3900	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	4	0	0	N/A
Sea Level Rise	N/A	N/A	N/A	N/A

Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	0	0	0	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	4	1	1	4
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	1	1	1	2
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	55.3827
AQ-PM	0.42315
AQ-DPM	0.02489
Drinking Water	20.4946
Lead Risk Housing	63.4909
Pesticides	41.8621
Toxic Releases	0.80020
Traffic	0.13750
Effect Indicators	—
CleanUp Sites	0.00000
Groundwater	35.0158
Haz Waste Facilities/Generators	0.00000
Impaired Water Bodies	33.1583
Solid Waste	86.5063
Sensitive Population	—
Asthma	45.0523
Cardio-vascular	25.5484
Low Birth Weights	—
Socioeconomic Factor Indicators	—
Education	38.8509
Housing	20.6337
Linguistic	—
Poverty	79.6608
Unemployment	—

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	—
Employed	—
Median HI	—
Education	—
Bachelor's or higher	—
High school enrollment	—
Preschool enrollment	—
Transportation	—
Auto Access	—
Active commuting	—
Social	—
2-parent households	—
Voting	—
Neighborhood	—
Alcohol availability	—
Park access	—
Retail density	—
Supermarket access	—
Tree canopy	—
Housing	—
Homeownership	—
Housing habitability	—
Low-inc homeowner severe housing cost burden	—
Low-inc renter severe housing cost burden	—

Uncrowded housing	—
Health Outcomes	—
Insured adults	—
Arthritis	0.0
Asthma ER Admissions	70.2
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	0.0
Cognitively Disabled	60.3
Physically Disabled	5.4
Heart Attack ER Admissions	21.9
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	0.0
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.6
SLR Inundation Area	0.0

Children	84.0
Elderly	5.2
English Speaking	0.0
Foreign-born	0.0
Outdoor Workers	16.6
Climate Change Adaptive Capacity	—
Impervious Surface Cover	95.0
Traffic Density	0.0
Traffic Access	0.0
Other Indices	—
Hardship	0.0
Other Decision Support	—
2016 Voting	0.0

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	21.0000
Healthy Places Index Score for Project Location (b)	—
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

8.1. Justifications

Screen	Justification
Land Use	Total area of disturbance for seven well pads, new and improved roads
Construction: Construction Phases	Per project construction schedule provided 1/14/2026
Construction: Off-Road Equipment	Per project information developed 1/22/2025
Construction: Dust From Material Movement	• 18” of aggregate per well pad is approximately 5,000 yd3 per pad • 4” of aggregate over road surfaces (total 2.31 acres = 100,624 ft2) is approximately 1,243 yd3
Construction: Trips and VMT	Per project info developed 1/22/2025
Construction: On-Road Fugitive Dust	Unpaved surfaces limited to project site access roads from main road - assume 95% paved.
Operations: Consumer Products	No operations
Operations: Architectural Coatings	No long-term operations
Operations: Water and Waste Water	No long-term operations
Operations: Solid Waste	No long-term operations
Operations: Refrigerants	No long-term operations

8.3. Land Use

Model Parameter	Units	Default Value	New Value
Building Area	sq. ft	1,720,180	0.00000
Landscape Area	sq. ft	—	0.00000
Special Landscape Area	sq. ft	—	0.00000

8.4. Construction

8.4.1. Construction Phases

Phase Type	Phase Name	Model Parameter	Default Value	New Value
Site Preparation	Site Preparation	Start Date	12/11/2026	10/1/2026
Site Preparation	Site Preparation	End Date	1/22/2027	2/17/2027
Site Preparation	Site Preparation	Work Days per Phase	30.0000	100.0000

8.4.4. Dust from Material Movement

Phase Name	Model Parameter	Units	Default Value	New Value
Site Preparation	Material Imported	Cubic Yards	—	56,243.0
Site Preparation	Material Exported	Cubic Yards	—	0.00000
Site Preparation	Material Import/Export Phased?	—	—	Yes
Site Preparation	Total Acres Graded	acres	50.0000	18.4200

8.4.6. Trips and VMT

Phase Name	Trip Type	Model Parameter	Default Value	New Value
Site Preparation	Worker	One-Way Trips per Day	42.5000	30.0000
Site Preparation	Hauling	One-Way Trips per Day	70.3100	6.00000
Well Drilling	Worker	One-Way Trips per Day	0.00000	30.0000
Well Drilling	Vendor	One-Way Trips per Day	0.00000	10.00000
Well Drilling	Hauling	One-Way Trips per Day	0.00000	26.0000
Well Testing	Worker	One-Way Trips per Day	0.00000	30.0000
Well Testing	Vendor	One-Way Trips per Day	0.00000	4.00000
Well Testing	Hauling	One-Way Trips per Day	0.00000	4.00000
Reclamation	Worker	One-Way Trips per Day	0.00000	6.00000
Reclamation	Vendor	One-Way Trips per Day	0.00000	4.00000
Reclamation	Hauling	One-Way Trips per Day	0.00000	4.00000

8.4.7. On-Road Fugitive Dust

Phase Name	Model Parameter	Units	Default Value	New Value
Site Preparation	Worker Trip Paved	%	100.0000	95.0000
Site Preparation	Vendor Trip Paved	%	100.0000	95.0000
Site Preparation	Hauling Trip Paved	%	100.0000	95.0000
Well Drilling	Worker Trip Paved	%	100.0000	95.0000
Well Drilling	Vendor Trip Paved	%	100.0000	95.0000
Well Drilling	Hauling Trip Paved	%	100.0000	95.0000
Well Testing	Worker Trip Paved	%	100.0000	95.0000
Well Testing	Vendor Trip Paved	%	100.0000	95.0000
Well Testing	Hauling Trip Paved	%	100.0000	95.0000
Reclamation	Worker Trip Paved	%	100.0000	95.0000
Reclamation	Vendor Trip Paved	%	100.0000	95.0000
Reclamation	Hauling Trip Paved	%	100.0000	95.0000

8.5. Operations

8.5.2. Area Sources

8.5.2.2. Consumer Products

Model Parameter	Units	Default Value	New Value
General Category	lb/sqft/day	0.00002	0.00000
City Park/Golf Course Pesticides/Fertilizers	lb/sqft/day	< 0.000005	0.00000
Parking Degreaser	lb/sqft/day	< 0.000005	0.00000

8.5.4. Water and Waste Water

Land Use	Model Parameter	Units	Default Value	New Value
General Heavy Industry	Indoor Water	gal/year	397,791,625	0.00000

8.5.5. Solid Waste

Land Use	Model Parameter	Units	Default Value	New Value
General Heavy Industry	Solid Waste Generation Rate	ton/1000sqft/yr	1.24000	0.00000

8.5.6. Refrigerants

Land Use	Equipment Type	Model Parameter	Units	Default Value	New Value
General Heavy Industry	Other commercial A/C and heat pumps	Quantity	kg/1000sqft	0.30000	0.00000

Appendix B

Biological Resources Technical Report

Catalyst
ENVIRONMENTAL SOLUTIONS



Biological Study Report

Surprise Valley Geothermal Exploration Project

Prepared for:

TSS Consultants

Prepared by:

Catalyst Environmental Solutions

March 12, 2026

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SECTION 1 Introduction

The purpose of this biological study report (BSR) is to identify and characterize sensitive biological resources likely to occur on the project site, including the suitability of habitat for special-status plants and animals, sensitive natural communities, the presence of special-status plants and animals, and potentially jurisdictional waters and wetlands. This report contains the findings of the general biological resources survey, botanical survey, and aquatic resources investigation. This BSR is intended to serve as a baseline study and initial discussion of potential impacts to assist in the preparation of subsequent environmental documentation. This BSR also provides recommendations for avoidance, minimization, and mitigation of potential impacts to sensitive resources, which can be used to inform future environmental documentation and decision-making.

Catalyst Environmental Solutions (Catalyst) is an environmental consulting firm with extensive experience throughout California. All field work associated with this project was performed by Catalyst lead biologist Donald Burk and Catalyst botanist Katy Pate. GIS analysis, tables, and figures were prepared by Catalyst GIS Analyst Hannah Raab. Technical review and editing of the report was provided by Catalyst Senior Ecologist Emily Merickel.

SECTION 2 Project Location and Description

Ormat Surprise Valley LLC plans to drill up to 11 geothermal test wells on nine well pads southwest of Upper Alkali Lake and 1.85 miles north of Lake City within the Surprise Valley region of Modoc County to determine if a commercially viable geothermal system is present. As shown in **Figure 1 in Appendix E**, the study area is within Sections 12, 13, and 24, Township 44 North, Range 15 East, and Section 18, Township 44 North, Range 16 East, as depicted on the U.S. Geological Survey's (USGS) Lake City 7.5-minute quadrangle. The test wells and access roads will be developed on Modoc County Assessor's APN 026-080-018; APN: 026-100-004; APN 026-100-014; APN 026-100-006; and APN 026-100-008. Elevations in the study area range from about 4,450 to 4,700 feet (1355 to 1435 meters) above mean sea level. Primary access to the general Project area is provided by Surprise Valley Road which travels north and south through or adjacent to Project parcels. Existing agricultural roads stemming from Surprise Valley Road provide access to individual well pad development sites and will be improved as necessary to accommodate the proposed development.

The biological study area consisted of the potential well sites, their associated access road corridors, and a revised access route to an existing well site (**Figure 2 in Appendix E**). The total area surveyed includes approximately 115 acres, which is larger than the final Project Area design (39.5 acres; **Table 1**) to provide flexibility in siting the proposed facilities.

Project implementation will include improvement or construction of access roads, construction of pads to accommodate the drill rig and planned operations, and development of the geothermal bore holes. Steps involved in each of these tasks are outlined below. Construction phasing and equipment is provided in **Tables 1 and 2** below.

2.1 Project Facilities

2.1.1 Geothermal Test Wells

To evaluate the potential for a commercially viable geothermal resource, the Applicant proposes to develop up to 11 geothermal test wells on nine well pads. During well installation, each well pad would accommodate a drilling rig, support equipment, portable bathroom, baker tanks, and project vehicles. Each well pad would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Stormwater runoff from undisturbed areas around the constructed drill pads would be directed into ditches surrounding the drill pad and back onto undisturbed ground, consistent with BMPs for storm water identified in "Drilling and Operating Geothermal Wells in California" (CalGem PR7S). The site would be graded to prevent fugitive stormwater runoff off the well pad and has been designed to withstand a 100-year storm event.

Each well would be drilled with a rotary drill rig similar to those used to drill oil and gas wells. The test wells would each be drilled and cased to a design depth of approximately 3,000 to 5,000 feet. Following the cementing of the surface casing, blowout prevention equipment (BOPE) would be installed. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic

barite (barium sulfate) would be stored at each well pad (as appropriate for the type of material) for use in preventing uncontrolled well flow, as necessary.

Once the well is completed, a well head will be installed, and pressure and flow testing will be conducted. Well testing will consist of flowing the well into baker tanks stationed on the well pad and monitoring geothermal fluid for temperatures, pressures, flow rates, chemistry and other parameters. Discharge from test wells will be captured in steal baker tanks and transported off site for disposal at an appropriate facility. No geothermal fluid would be discharged to the surrounding landscape. Total discharge from each well will be variable based on geothermal resources found and longevity of testing required. Successful test wells may be developed into commercial geothermal production wells in the future.

The test wells and associated facilities would be temporary, and the pads and access roads would be fully reclaimed at the conclusion of testing phase.

2.1.2 Access Roads

Existing unimproved (farm roads, gravel/dirt) roads would serve as the primary ingress and egress to the well pad sites. These existing access roads may require resurfacing to accommodate the import of drilling equipment. Three new access roads totaling 1.2 miles would be developed, stemming from Surprise Valley Road (Figure 2).

Access roads will be compacted with a roller-compactor and surfaced with gravel as needed. Improvements to existing access roads would be kept within the current road boundaries as feasible. Widening of access roads would only be done in areas where road width is less than 15 feet and is unable to accommodate drilling equipment.

Road construction techniques will vary depending on the specific site and existing road conditions. New roads are typically dozed or bladed following the existing topography where possible. During rough grading, the amount of cut and fill will be kept to a minimum while providing for drivability and maintenance. If the base material has adequate aggregate and composition to maintain a stable road surface only grading will be performed. Should additional aggregate/base be needed for stability, it will be laid in even lifts and compacted by grading and water equipment. All aggregate material needed for road construction or improvements will be sourced from local permitted aggregate mines.

Constructed access roads crossing existing drainages may require installation of culverts depending on the final approved access route(s). Any necessary culvert work would include the appropriate agency consultation, including USACE.

2.2 Project Construction

The Project would impact up to 39.5 acres (**Table 1**). The site would undergo interim reclamation after initial well pad development, and final reclamation at the conclusion of the testing phase to return the Project site to a similar state as present conditions (e.g., agricultural production for alfalfa/hay).

Table 1. Project Disturbance from Geothermal Exploration

Proposed Development	Disturbance Area (Acres)
New Access Road	2.1
Improvements to Existing Access Roads	0.2
Well Pads	37.2
Well Testing	0
TOTAL	**39.5**

2.2.1 Site Preparation

The Suprise Valley geothermal exploration facilities would be developed on agricultural land currently dedicated to alfalfa production. Site preparation activities for the well pads would include clearing, earthwork, drainage and grading necessary for safe operations and for fire prevention. Clearing would include removal of organic material, stumps, brush and slash, which would either be removed and taken to an appropriate dump site or left onsite. Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas.

To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557). On-site soil that has been piled during excavation will be used as backfill material, as necessary. Only soil that is free of debris and deleterious matter would be used as backfill material. The proposed facilities would be placed on shallow-spread footers and wall footers to support the structures. All site preparation and fill placement activities will be monitored by a qualified geotechnical engineer to detect undesirable materials and/or site conditions that may arise during site preparation.

2.2.2 Well Installation

The test wells would be completed at depths between 1,000 and 4,000 feet, with an average of approximately 3,500 feet deep. Casing depth would vary depending on the total depth of the well but would comply with BLM Geothermal Resources Operational Order No. 2 and CalGem requirements. After the well is completed, an industrial grate would be placed over the well to prevent people and/or wildlife from falling in, and the entire well pad would be enclosed with an eight-foot chain link security fence and personnel access gates. During normal well field operations, total geothermal fluid production rates are expected to be approximately 15,150 gallons per minute (gpm) at 280°F.

2.2.3 Access Roads

Up to 1.2 miles of new access road are proposed for development to provide access to the well pads. The road corridors would be cleared of vegetation, bladed, graded, and gravel would be deposited and

rolled to provide drivable roadways. The total estimated area of permanent surface disturbance associated with access road development would be approximately 2.1 acres (1.2 miles x 15-foot disturbance width).

Existing farm roads currently serve as access roads to the majority of proposed well pad development sites. These existing access roads will be the primary ingress and egress to the well pad sites. New access roads will be developed to access the well pads on APN 026-100-004, APN 026-100-014, APN 026-100-006, and APN 026-100-008. Existing access roads may require improvements to accommodate transportation of well and drilling equipment. New and improved access roads would be constructed using a dozer and/or road grader for the Project. Existing access roads may require resurfacing to accommodate the import of drilling equipment. Access roads will be compacted with a roller-compactor and surfaced with gravel as needed. Improvements to existing access roads will be kept within the current road boundaries as feasible. Widening of access roads would only be done in areas where road width is less than 15 feet and is unable to accommodate drilling equipment.

Road construction techniques would vary depending on the specific site and existing road conditions. New roads are typically dozed or bladed following topography where possible. During rough grading the amount of cut and fill will be kept to a minimum while providing for drivability and maintenance. If the base material has adequate aggregate and composition to maintain a stable road surface only grading will be performed. Should additional aggregate/base be needed for stability, it would be laid in even lifts and compacted by grading and water equipment. All aggregate material needed for road construction or improvements will be sourced from local permitted aggregate mines. Constructed access roads crossing existing drainages may require installation of culverts. Culvert installation would follow BLM design criteria and would be constructed pursuant to standards established in the BLM Gold Book.

2.2.4 Water Use and Source

Water required for well drilling would typically average 50,000 gallons per day (gpd). This water would be trucked in daily from an existing local and permitted source. Approximately 100,000 gpd would be needed for flow testing which would also be trucked in. All test fluids would be captured in baker tanks, removed from the site, and disposed of at the appropriate waste disposal facility.

2.2.5 Construction Equipment

Heavy construction equipment, including drill rigs, drilling equipment, semi-truck trailers, flatbed trucks, forklifts, excavators/bulldozers, roller, and cranes would be used to deliver and place the drilling/testing equipment on the Project site. Smaller powered hand tools, such as drills, compressors, and welding equipment would also be used. Employee vehicles would be used to transport workers to the site and parked at the designated parking locations. During construction, noise emissions will be periodic and temporary, depending on the use of heavy equipment. Smaller hand tools will be used consistently during the construction phase. During the drilling phase (17 months) and testing phase (3 months), some components (e.g., drills, pumps, and generators) would run continuously (24-hrs per day) (Table 2).

The Applicant has estimated construction equipment and usage for the Project based on experience with similar projects as provided in **Table 2**. Similarly, based on construction activities associated with

similar projects, the Applicant anticipates that up to 15 workers would be required for construction of the well pads, wells, and access roads. Vehicle and truck trip generation rates for the Project provided in **Table 3** are estimated assuming roughly 2 trips/worker (to/from site) for a total of 30 trips, and 2 trips/vehicle (in/out) for vendor and haul trips. Trip lengths consist of default CalEEMod values.

Table 2. Project Construction Equipment List by Project Activity.

Construction Phase	Equipment	Quantity	No. Days Used	No. Hours Operated Per Day
Site Preparation (5 Months)	Heavy Duty Trucks	3	60	5
	Excavator	1	60	8
	Roller	2	60	8
	Light-Duty Truck	8	60	4
	Backhoe	1	60	8
	Rubber Tired Loader	1	60	8
	Grader	1	60	8
Well Drilling (17 Months)	Light tower	2	105	12
	Drill Rig	1	210	24
	Rig Mud Pump	1	210	24
	Rig Generator	1	210	24
	Heavy Duty Trucks (Mob/Demob)	8	28	8
	Crane	2	28	5
	Backhoe	1	28	6
	Forklift	1	28	6
	Vacuum Truck	1	28	10
	Concrete Truck	1	4	4
	Concrete Pumper	1	4	4
	Light Duty Truck	4	28	4
Testing (3 Months)	Generator	1	90	24
	Light Tower (27 hp)	2	90	12
	Light Tower (9 hp)	2	90	12
	Pump (115 hp)	1	90	24
	Pump (415 hp)	1	90	24

	Light Duty Truck	1	90	4
Reclamation (3 Months)	Backhoe	1	35	8
	Grader	1	35	8

Table 3. Construction Vehicle Trips

Construction Phase	Trip Type	Number of One-Way Trips per Day[1]	One-Way Trip Length (miles)[2]
Site Preparation	Workers	30	11.9
	Vendor	104	9.0
	Haul	6	20
Well Drilling	Workers	30	11.9
	Vendor	10	9.0
	Haul	26	20
Testing	Workers	30	11.9
	Vendor	4	9.0
	Haul	4	20
Reclamation	Workers	6	11.9
	Vendor	4	9.0
	Haul	4	20

Notes:

1 All truck trips delivering construction materials are assigned to vendor deliveries. Truck trips associated with water deliveries are assigned to haul trips.

2 Trip lengths consist of default CalEEMod values with exception of vendors for delivery of Project equipment during construction.

2.2.6 Workforce

Up to 15 construction workers are anticipated to be on-site to develop the well pads and access roads. Up to 15 workers are also expected to be on the site during flow testing.

2.2.7 Construction and Testing Schedule

Construction and testing of the proposed facilities is anticipated to occur over an approximate 28-month period, beginning in late 2026 or when permitting is completed. Project construction would include site preparation activities, but no demolition of existing structures/buildings is needed. **Table 4** below provides a breakdown of the proposed construction schedule by phase and duration.

Table 4. Construction Phases and Durations by Activity.

Construction Phase	Construction Activity	Activity Duration	Phase Duration
Site Preparation	Construction Kick-off/Staging	1 week	5 months
	Site Clearing	1 week	
	Site Preparation/Rough Grading	2 weeks	
	Fine/Pad Grading	1 month	
	Well Pad Construction	3 months	
Well Drilling	Well Drilling and Completion	12 months	17 months
Flow Testing	Testing Phase	3 months	3 months
Reclamation	Well Head Removal/Well Abandonment/Site Restoration	2 months	3 months
		Total Duration	**28 months**

2.3 Well Testing

One or more short-term flow test(s) of each well drilled would likely be conducted to estimate geothermal reservoir productivity. Each test, lasting approximately three to five days, would consist of flowing the well into portable steel (Baker) tanks while monitoring geothermal fluid temperatures, pressures, flow rates, chemistry, and other parameters. Each short-term flow test is expected to discharge approximately 1.5 million gallons of geothermal fluid per well. No uncontained surface discharges would occur.

2.4 Interim and Final Reclamation

Testing would determine if future geothermal energy development is feasible. If exploratory testing is successful, the exploration/test wells may be developed in full-size production wells for commercial geothermal energy generation. Any future action would be subject to CEQA review and permitting, as the scale of future development cannot be reasonably assumed prior to successful test well development.

Interim reclamation would be conducted at the close of construction work of each well pad location and would be maintained throughout the testing period prior to final reclamation. Interim reclamation will maintain the sites' integrity for final reclamation and prevent degradation from the proposed project to the surrounding landscape.

Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas. Prior to final reclamation soil will be seeded and stabilized with an approved erosion control mix to prevent erosion.

Disturbed well pad areas not required for use during testing will be stabilized similarly stabilized with an erosion control seed mixture. Temporary BMPs may be used at the Site to prevent soil erosion include the use of sandbags, crushed rock, and silt fence. These BMPs are used as and where needed, especially in areas that are undeveloped or in the process of being developed.

At the end of the permitted or useful life of the test well facilities and if testing yields negative results, no future geothermal energy developments would occur. The Applicant would prepare a Site Reclamation and Restoration Plan that establishes the plan and protocol for dismantling, removing, abandoning, transporting, and disposing of wells and associated equipment, as well as the plan for performing site restoration activities after the facilities are removed. Further, within three years of the cessation of testing, all equipment will be dismantled, all wells capped or abandoned as required by the County and CalGEM and the land involved be made compatible with the surrounding uses or as requested by the County Planning Director. A Bond, Letter of Credit, or other forms of security acceptable to Modoc County in addition to that of the amount set by CalGEM, would be filed with the County that guarantees restoration of the land to its condition prior to the permitted well pad development.

The general objective of the final reclamation phase is to return the site as close as possible to the conditions prior to geothermal development. Reclamation activities would be planned and conducted in accordance with County requirements.

2.5 Applicant Proposed Measures and Best Management Practices

All Project and contractor personnel will be informed of the Applicant's policy regarding environmental protection, safety plans, and emergency response protocols. Collectively, these measures minimize unintended impacts and events as result of facility construction and operation. Applicant Proposed Measures (AMPs) and Best Management Practices (BMPs) relevant to biological resources are included below.

2.5.1 Wildlife

- Speed limits of 10 mph will be observed on the site in order to minimize dust, avoid collision, and incidental mortality of local wildlife.
- Cap any pipes and small gaps to prevent wildlife from becoming trapped inside. Inspect pipes or other similar spaces for signs of wildlife activity before permanently closing any space.
- Provide ramps or jump outs for wildlife or cover trenches and pits greater than 6 inches deep to prevent wildlife from becoming trapped. Inspect any pits or trenches daily.
- Secure all waste materials. Seal any trash cans or dumpsters to prevent wildlife from entering these containers. Do not leave food or other trash on the Project Site that may attract wildlife.
- Use of chemicals, fuels, lubricants, or biocides shall be in compliance with all local, state, and federal regulations. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other state and federal legislation.
- Use only native, insecticide-free plants for habitat restoration and enhancement actions. If plants are grown via contract, use grow specifications that limit harmful pesticide residues.

- Protect pollinators and their habitats from pesticides, including insecticides, fungicides, and herbicides. If pesticides are used in areas with flowering plants, lessen their potential harm by adhering to the following guidance:
    - Avoid the use of neonicotinoids or other systemic insecticides, including coated seeds due to their ecosystem persistence, systemic nature, and toxicity to pollinators (Xerces Systemic Insecticides List [Xerces Society 2026]).
    - Avoid the use of insecticides that target lepidopterans (e.g., moths and butterflies), including biological pesticides (IRAC 2011).
- Use targeted application methods, avoid large-scale broadcast applications, and take precautions to limit off-site movement (e.g., wind drift, discharge from surface water flows).
- If pesticides are used for vector control treatments (e.g., mosquitoes), avoid treatment unless monitoring indicates that the species and numbers exceed a public health threshold. For any mosquito treatments, first employ prevention steps such as reducing standing water. Where possible, draw mosquitoes away from sensitive sites (e.g., using dry ice traps) to limit treatment effects in sensitive habitat areas.

2.5.2 Vegetation

- Vegetation control, including invasive species eradication, will be implemented to prevent growth under or near the proposed facilities.

2.5.3 Surface and Groundwater Quality

- A Water Quality Management Plan (WQMP) will be prepared for both the construction and testing phases of the Project. The WQMP will include numerous “good housekeeping” and preventative maintenance, employee training, safe handling/storage, and spill response measures to prevent and minimize any unintended releases.
- The site will be designed and prepared to provide adequate stormwater conveyance and/or infiltration.
- Any spills or unintended releases of chemicals used during Project construction and/or operation will be cleaned up with the appropriate materials (i.e., absorbent pads, foams/gels) and the affected area remediated to prevent contact with groundwater resources.
- No vehicle fueling or maintenance will take place on exposed soil.

2.5.4 Air Quality

- The Applicant shall submit a Construction Dust Control Plan and notify the MCAPCD 10 days prior to the start of any construction activities.
- Any equipment breakdown resulting in air emissions shall be reported to MCAPCD and promptly corrected (within 24 hours when possible).
- To minimize unnecessary emissions, Project equipment and worker vehicles shall be turned off when not in use and not left idling.
- Water shall be applied to the development site and during preparation and construction to control fugitive dust.
- Earth moving work shall be completed in phases (as necessary) to minimize the amount of disturbed area at one time.

- Construction vehicles and heavy equipment that use non-surfaced facility roads and areas will be restricted to 10 mph to control fugitive dust.
- During windy conditions, barriers shall be constructed and/or additional watering will occur to minimize fugitive dust.
- Vehicle access shall be restricted to the disturbance area via signage and/or fencing.
- Equipment shall be operated according to best practices and maintained according to design specifications.
- Construction equipment shall be equipped with an engine designation of EPA Tier 3 (Tier 3) if commercially available and feasible. If a Tier 3 engine is not certified for a particular piece of equipment or not commercially available, then the equipment shall be either equipped with a Tier 2 engine or equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 levels. Prior to the issuance of a grading permit, the Applicant will submit a list of all construction equipment, including off road equipment, by make, model, year, horsepower, expected/actual hours of use, and EPA to the County Planning Department.

2.5.5 Waste Management

- Workers will be required to properly dispose of all refuse and trash to prevent any litter on the Project site.
- During construction, portable chemical sanitary facilities will be used by all construction personnel. These facilities will be serviced by a local contractor.
- All construction wastes, liquid and solid, will be disposed of in compliance with all appropriate local, state, and federal disposal regulations.
- Solid wastes will be disposed of in an approved solid waste disposal site in accordance with Modoc County Environmental Health requirements. Waste will be routinely collected and disposed of at an authorized landfill by a licensed disposal contractor.

2.5.6 Fire Prevention

An Emergency Response Plan covering possible emergencies (e.g. blow-outs, major fluid spills, impacts due to earthquakes, and other emergencies) shall be maintained. At least one Emergency Coordinator, responsible for coordinating all emergency response measures, will be on call and able to quickly reach the Project at all times. The Emergency Coordinator shall be thoroughly familiar with all aspects of the Emergency Response Plan and have the authority to commit the resources needed to carry out the contingency plan. Adequate personnel and equipment shall be available to respond to emergencies and to ensure compliance with use permit conditions, including appropriate first aid employee training and other provisions during Project construction and operation. All construction equipment will be equipped with exhaust spark arresters.

In addition, Safety Data Sheets for all known chemicals of concern will be maintained and available to workers and first responders. Personnel will not be allowed to smoke outside of designated areas and a list of emergency phone numbers will be available onsite. In addition to the above-described actions, the following standards will also be applied:

- Adequate firefighting equipment (i.e., a shovel, a pulaski, standard fire extinguisher[s], and an ample water supply) will be kept readily available at each active construction site.

- Vehicle catalytic converters (on vehicles that enter and leave the construction site on a regular basis) will be inspected often and cleaned of all flammable debris.
- All cutting/welding torch use, electric-arc welding, and grinding operations will be conducted in an area free from vegetation. An ample water supply and shovel will be on hand to extinguish any fires created from sparks. At least one person in addition to the cutter/welder/grinder will be at the work site to promptly detect fires created by sparks.
- A survey and analysis of the proposed fire suppression and detection equipment will be performed by a certified fire protection engineer to evaluate the proposed fire response system's performance. An evaluation of the proposed fire suppression and detection equipment in conjunction with existing equipment will also occur. A full report of findings will be provided to Lake City Fire Protection District for review.
- An approved automatic fire detection system shall be installed as per the California Fire Code as adopted by the Modoc County Code §15.01.020. All fire detection systems shall be installed and maintained to the current fire code and regulations adopted by Modoc County.
- Fire Department access roads and gates will be in accordance with the current fire code adopted by Modoc County and the facility will maintain a Knox Box or a similar, Department-approved device for Site access.

2.5.7 Noise

- Diesel equipment used for drilling shall have hospital-type mufflers. Well venting and testing at these wells shall be accompanied by the use of an effective muffling device or "silencer".

SECTION 3 Methods

3.1 Records Review

For the purposes of this project, special-status species are defined as those species listed as endangered, threatened, proposed for listing or candidates for listing under the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA); and/or classified by CDFW as species of special concern (SSC), watch list (WL), or fully protected (FP). Special-status plant species are those listed under the ESA, CESA, or assigned a California Rare Plant Rank (CRPR).

Records reviewed for this evaluation consisted of California Natural Diversity Data Base (CNDDB; CDFW 2025a; CDFW 2025b) records for special-status plants, animals, and natural communities (see **Appendix A, Table 1**); California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (see **Appendix A, Table 2**); U.S. Fish and Wildlife Service (USFWS) records for federally listed, proposed, and Candidate plant and animal species under jurisdiction of the USFWS (see Appendix A); soils records maintained by the U.S. Department of Agriculture's Natural Resources Conservation Service (USDA 2026), and National Wetlands Inventory (NWI) maps (USFWS 2026). The National Marine Fisheries Service (NMFS) records were also checked, but the agency does not maintain a species list for the project quadrangle because Surprise Valley is not accessible to anadromous fish. The CNDDB records search covered a five-mile radius around the project site. This entailed review of records for portions of the Lake City, Davis Creek, Fort Bidwell, Cedarville, Sugar Hill, Payne Peak, and Boyd Hot Springs quadrangles. CNPS and USFWS records were searched for the Lake City quadrangle, in which all project facilities will be located. CDFW "essential connectivity area" data from the California Essential Habitat Connectivity Project (CDFW 2025c) was also reviewed. Mule deer range was reviewed using CDFW data for Region 1 (CDFW 2024). NWI maps were reviewed for the study area boundary and immediately surrounding lands and are depicted in **Figure 3 in Appendix E** and NRCS soils are depicted in **Figures 4-6 in Appendix E**. CNDDB records results are shown in **Figure 7 in Appendix E**. Essential habitat connectivity areas are shown in **Figure 15 in Appendix E**.

3.2 Field Reconnaissance

To determine the presence/absence of special-status plant and animal species, Catalyst biologists conducted botanical and wildlife surveys on May 29-30, and July 8-10, 2025. Botanical surveys were conducted generally following CDFW's 2018 "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities" although survey timing did not align with flowering or fruiting for all potential species. Some of the special-status species potentially occurring in the study area would not have been evident at the time the fieldwork was conducted. However, determination of their potential presence could generally be made based on observed habitat characteristics. When possible, vegetation communities were classified into alliances described in the Manual of California Vegetation (MCV; Sawyer et al. 2009). Communities that did not fit into established alliances are described qualitatively.

General biological baseline reconnaissance was conducted via pedestrian and driving surveys using binoculars as-needed. The potential for special-status plants and animals to occur on the Project Site based on desktop review and site survey are presented in **Appendix A, Table 3**.

Potential wetlands and waters were investigated utilizing the methods outlined in the USACE Wetland Delineation Manual (USACE 1987) and the Arid West Supplement (USACE 2008) based on three wetland parameters: wetland hydrology, hydric soils, and dominant hydrophytic vegetation.

During the May visit, six of the proposed well sites were surveyed. Additional well sites were added to the study area prior to the July surveys. Although all 11 proposed well sites were visited in July, several had already been mowed for hay production or were actively being grazed by cattle. Therefore, the extent of survey coverage for the individual well sites ranged from two intensive visits for some sites to only one cursory post-mowing visit for other sites. The access road to the existing wellhead on the west side of Surprise Valley Road was also surveyed only in July. Approximately 40 hours of field time were expended to cover the approximately 115-acre survey area.

Representative photographs of the study area are provided in **Appendix D**.

SECTION 4 Results

Results of desktop reviews for special-status species occurrence are provided in **Appendix A** and **Appendix B**.

A list of plant species observed in the study area is included in **Appendix C.** Noxious weed species were recorded when encountered and are highlighted in the list of plants in **Appendix C**. Wildlife species observed included:

- American coot (*Fulica americana*)
- American crow (*Corvus brachyrhynchos*)
- American robin (*Turdus migratorius)*
- Brewer's blackbird (*Euphagus cyanocephalus*)
- Brown-headed cowbird (*Molothrus ater*)
- Bullock's oriole (*Icterus bullockii*)
- California ground squirrels (*Otospermophilus beecheyi*)
- California quail (*Callipepla californica*)
- Eurasian collared-dove (*Streptopelia decaocto*)
- European starling (*Sturnus vulgaris*)
- Gadwall (*Mareca strepera*)
- Gray flycatcher (*Empidonax wrightii*)
- Greater sandhill crane (*Antigone canadensis tabida*)
- House sparrow (*Passer domesticus*)
- Killdeer (*Charadrius vociferus*)
- Mallard (*Anas platyrhynchos*)
- Mourning dove (*Zenaida macroura*)
- Mule deer (*Odocoileus hemionus*)
- Red-tailed hawk (*Buteo jamaicensis*)
- Red-winged blackbird (*Agelaius phoeniceus*)
- Savannah sparrow (*Passerculus sandwichensis*)
- Sierran tree frog (*Pseudacris sierra*)
- Turkey vulture (*Cathartes aura*)
- Western meadowlark *(Sturnella neglecta*)
- Willet (*Tringa semipalmata*)
- Wilson's snipe (*Gallinago delicata*)

Representative photos of the site are provided in **Appendix D**. Mapped results of desktop review and field survey data are provided in **Appendix E**.

4.1 Natural Communities

When possible, vegetation communities were classified into alliances described in the MCV (Sawyer et al. 2009). Communities that did not fit into established alliances are described qualitatively. Only one vegetation community, western juniper woodland, fit the description of an established alliance in the MCV (Sawyer et al. 2009). As much of the wet meadow vegetation community in the study area was mowed during the survey windows or used for agricultural purposes, these communities are described by their functional traits and species present. Western juniper woodlands are not ranked as sensitive natural communities by CDFW (CDFW 2025b).

Natural terrestrial communities identified in the study area during the field surveys include juniper woodland and wet meadow. Other terrestrial communities (semi-natural or non-natural) observed during the field study consist of cropland and pasture. Modified streams are also present in and adjacent

to the study areas. Each of the communities is briefly described below. Sensitive natural communities are limited to the wet meadows and streams. Sites not mapped as wet meadows or streams were found to be of low sensitivity.

4.1.1 Western Juniper Woodland (*Juniperus occidentalis* Woodland Alliance)

Western juniper woodland is identified on the California Natural Communities List as Alliance 89.400.00. Neither the alliance nor any of its five associations are listed as sensitive on the California Natural Community List (CDFW 2025b). Juniper woodland habitats are characterized as open to dense aggregations of junipers (California, Utah, or western) in the form of arborescent shrubs or small trees. Associated species may include white fir, (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), ponderosa pine (*Pinus ponderosa*), whitebark pine (*Pinus albicaulis*), singleleaf pinyon pine (*Pinus monophylla*). Shrub species typically associated with juniper habitats include antelope bitterbrush (*Purshia tridentata*), California buckwheat (*Eriogonum fasciculatum*), wax currant (*Ribes cereum*), gray horsebrush (*Tetradymia canescens*), green Mormon-tea (*Ephedra viridis*), sickle-leaf mountain-mahogany (*Cercocarpus ledifolius*), big sagebrush (*Artemisia tridentata*), black sagebrush (*Artemisia nova*). Typical forbs and grasses include Sandberg's bluegrass (*Poa secunda*), bighead clover (*Trifolium macrocephalum*), Idaho fescue (*Festuca idahoensis*), one-spike oatgrass (*Danthonia unispicata*), bottlebrush squirreltail (*Elymus elymoides*), and bluebunch wheatgrass (*Pseudoroegneria spicata*).

Juniper woodland habitats can be found from sea level to above 10,000 feet, but maximum development is from 2,450 to 4,900 feet. Juniper woodland habitats may occur on virtually all exposures and slopes, but are most often on level to gently rolling terrain. Junipers may be found on soils ranging from rocky and well drained to drier or poorly drained.

Juniper berries are an important food source for many species of wintering birds. Juniper foliage is also consumed by several mammals and may be an important food source for some of these animals, especially during harsh winters.

Portions of the study area are within western juniper woodland. The community is best developed along the access road to the existing wellhead west of Surprise Valley Road. In this location, ponderosa pines are co-dominant with western junipers. An open shrub layer is present, with species including antelope bitterbrush, bitter cherry (*Prunus emarginata*), and sickle-leaf mountain-mahogany (*Cercocarpus ledifolius*). Common herbaceous species include bulbous bluegrass (*Poa bulbosa*), rye (*Secale cereale*), Scotch thistle (*Onopordum acanthium*), and woolly mullein (*Verbascum thapsus*). The western juniper woodland community also slightly encroaches into Well Pad 22-24, and borders portions of the access roads to Well Pads 22-24, 33-13, and 45-12.

4.1.2 Wet Meadow

The wet meadows present in the study area do not fit within an established alliance in the MCV. For the purposes of analysis, the wet meadows in the study area are considered sensitive natural communities. The single most important characteristic of a wet meadow is its hydrology. Seasonality and reliability of yearly water inflows and outflows largely determine the vegetational stability of wet meadows. Therefore, wet meadow habitats exist indefinitely unless the hydrologic regimes are altered. Wet meadows generally have a simple structure consisting of a dense layer of grasses and grass-like species;

trees and shrubs are typically absent. Canopy cover is dense (60-100%). Wet meadows support a great variety of plant species; important genera common to wet meadows throughout the state include *Agrostis, Carex, Danthonia, Juncus, Salix,* and *Scirpus* (Mayer and Laudenslayer 1988).

Elk (*Cervus canadensis*) and mule deer may feed in wet meadows, seeking forbs and palatable grasses. Wet meadows are generally too saturated to provide suitable habitat for small mammals. However, in late summer, small mammals may visit wet meadows that have dried. Waterfowl, especially mallard ducks, frequent streams flowing through wet meadows. Yellow-headed blackbird (*Xanthocephalus xanthocephalus*) and red-winged blackbird occasionally nest in wet meadows with tall vegetation and with adequate water to discourage predators. The striped racer (*Masticophis lateralis lateralis*) is the common snake of wet meadows in the Sierra Nevada and Cascade Range. Various frog species are abundant in wet meadows throughout California (Mayer and Laudenslayer 1988).

The wet meadows in the study area are supported by a high water table as well as surface runoff from snowmelt, which is spread over the landscape through irrigation ditches. Characteristic plant species in the on-site wet meadows include Baltic rush (*Juncus balticus*), Nebraska sedge (*Carex nebrascensis*), Olney's bulrush (*Schoenoplectus americanus*), meadow foxtail (*Alopecurus pratensis*), and arrowgrass (*Triglochin maritima*). The lowermost wet meadows tend to support species adapted for alkaline conditions. Alkaline depressions are present adjacent to well pad 82-13; the dominant plants in these unique habitats are saltgrass (*Distichlis spicata*), salt-marsh bird's-beak (*Cordylanthus maritimus*), and horned sea blite (*Suaeda calceoliformis*).

Generally speaking, wet meadow habitat in the project area receives irrigation in the early season. Once the vegetation reaches maturity, the irrigation water is diverted to allow the site to dry out. The grass is then cut, dried, and baled as hay. Irrigation is then restored and continues until the end of snowmelt. After the hay has been removed, cattle are introduced and are allowed to graze until the end of the season.

The wet meadow community is abundant in the project vicinity and covers nearly the entirety of three proposed well pads (82-13, 81-24, and 46-13). Additionally, as further discussed below, potential wet meadow wetlands are present on other well pad sites (43-13, 35-13) but the wetland assessment could not be completed because the vegetation had been mowed prior to our site visit (see Section 4.7 below).

4.1.3 Riverine/Streams

Riverine/stream habitat is characterized by intermittent or perennially flowing water. Riverine habitat includes rivers and streams (creeks). These are considered sensitive natural communities for the purposes of this Project. In inland areas, small streams converge to form larger streams; larger streams converge to form rivers, which discharge into the ocean. In coastal areas, many streams discharge directly into the ocean. Streams and rivers typically exhibit distinct microhabitats, such as pools, riffles, and runs.

Riverine habitat may be utilized by a variety of fish and wildlife species. Pools and backwater areas also provide breeding habitat for amphibians. Waterfowl forage for aquatic plants and invertebrates in slow-moving sections of riverine habitat. Small mammals such as beaver, river otter, and muskrat may build

nests in or along riverine habitat. Riverine systems may also provide spawning and rearing habitat for various fish species. Numerous species of macroinvertebrates occur in riverine habitats, often beneath submerged rocks (e.g., stoneflies, mayflies, and caddisflies), in mud (e.g., clams and mussels), or at the water surface (e.g., water striders, backswimmers, water boatmen, and mosquito larvae). Stream habitats are often further enriched by the presence of vegetation along their banks. Overhanging trees and shrubs provide shade and contribute to a decrease in water temperatures. Additionally, roots from trees and fallen vegetation within the stream increase habitat complexity and bank stability, and provide shelter for rearing fish, amphibians, and invertebrates.

In the study area, riverine habitat is represented by small intermittent streams. The streams are fed primarily be snowmelt in the Warner Mountains. The streams are diverted for irrigation when they reach the western edge of the Surprise Valley. The streams dry shortly after the last of the snow melts.

4.1.4 Dryland Grain Crops/Dry Pasture

This land cover type is not described in the MCV but includes agricultural lands used for grain crops and grazing. Cropland habitat is characterized by a lack of conformity with regular habitat stages, instead being regulated by the crop cycle which is either annual or perennial. The cropland habitat in the study area consists of dryland grain fields. The seeds are planted in the fall or early spring by drilling in rows, which produces a solid stand with nearly 100 percent cover. The crop is then harvested in the summer. Dry pasture habitat consists of unirrigated grazing land in a variety of habitats, including woodlands, shrublands, and grasslands. In the study area, high-intensity grazing has resulted in the removal of most of the palatable vegetation and an increased density of weedy species. Dryland crop habitats and dry pasture habitats are of low value to wildlife species and are not considered as sensitive natural communities.

4.2 Special-Status Plants

Review of the U.S. Fish and Wildlife Service species lists (see Appendix B) for the study area identified one federally listed plant species, Greene's tuctoria (*Tuctoria greenei*), as potentially being affected by the proposed project. The study area does not contain designated critical habitat for any federally listed plant species. No suitable habitat is present for Greene's tuctoria in the study area (**Appendix A, Table 3**).

A review of CNDDB records showed that two special-status plants, desert popcornflower (*Plagiobothrys salsus*; CRPR 2B.2), and hairy marsh hedge-nettle (*Stachys pilosa*; CRPR 2B.3), have been reported in or adjacent to the study area. In June 1961, a dense stand of desert popcornflower was observed in a shallow ditch on what was Phipp's Ranch, on the west side of Surprise Valley. One occurrence of hairy marsh hedge-nettle was reported in August 1995, along County Road 13.

CNDDB records also show that 26 special-status plants have been reported within a five-mile radius of the project site (**Appendix A, Table 3**). Rationale for the potential for special-status plant species to occur in the study area is provided in **Appendix B, Table 2**. These findings are based on the general habitat requirements of the species and the results of the botanical survey. Of these, the following species are present or have potential to be present:

- Aleppo avens (*Geum aleppicum*; CRPR 2B.2), potentially present
- Desert popcornflower, present
- Hairy marsh hedge-nettle, potentially present
- Rosy orthocarpus (*Orthocarpus bracteosus*; CRPR 2B.2), potentially present

Additionally, Great Basin downingia (*Downingia laeta*; CRPR 2B.2) was detected in the study area during the botanical survey. This species was not included in the CNPS or CNDDB data review (**Appendix A, Tables 1-2**).

Two special status species were observed in the project area during the botanical survey: desert popcornflower and Great Basin downingia . It is possible that these two species could be present at other locations in the study area that could not be surveyed in July 2025 (e.g., well sites that were added to the study area after completion of the May 2025 field survey and were mowed). Likewise, three other species, hairy marsh hedge-nettle, Aleppo avens, and rosy orthocarpus, could potentially have been present in the study area but were not observed due to the changes in survey boundaries and/or mowing and grazing that occurred prior to the July 2025 survey. Botanical survey results of special-status plants are shown in **Figures 8-14 in Appendix E**.

4.2.1.1 Desert Popcornflower (CRPR 2B.2)

Desert popcornflower (*Plagiobothrys salsus*) is an annual herb that occurs in moist saline or alkaline mudflats and marshes at elevations between 600 and 1410 meters. The flowering period extends from March to July (occasionally to August); therefore, surveys were conducted during the flowering period for this species. The species occurs only in the Great Basin Province, and ranges from southeastern Oregon to southern Nevada. Within California, the species has been observed in Inyo and Mono counties and in the Surprise Valley region of Modoc County. The California Natural Diversity Base lists only five records within California, with two records being from Modoc County. The California Consortium of Herbaria reports about 15 collections of the species in California, with nine in Modoc County. Most of the Modoc County records are from Middle Alkali Lake and Surprise Valley Hot Springs.

Desert popcornflower was observed at four locations in the general study area. Two of the locations are adjacent to the proposed pad for Well 82-13 (**Figure 9 in Appendix E**). About 75 plants were observed south of the pad location as currently proposed, with approximately 25 plants also detected immediately east of the proposed pad. These plants were observed in short-grass habitat along the upper fringes of alkaline depressions. Additional plants are expected to occur to the east, but the surveyor did not have access to the area.

Desert popcornflower was also observed immediately east of the proposed pad for Well 81-24 (**Figure 13 in Appendix E**). This occurrence is in a depression that supports sustained ponding. Over 50 plants were observed in and around the depression. The species was also observed immediately south of County Road 13 between Well Sites 41-24 (**Figure 12 in Appendix E**) and 81-24 (**Figure 13 in Appendix E**). This population is outside the project study area and was observed only from the fenceline. The population is in an area with active steam vents and is the largest of the four populations observed, with an estimated 500 to 1,000 individuals visible from County Road 13.

4.2.1.2 Great Basin Downingia (CRPR 2B.2)

Great Basin downingia is an annual herb that occurs in ditches, ponds, streams, and vernal pools. The species is found between 4,000 and 7,200 feet in elevation. The flowering period extends from May through July; therefore, surveys were conducted during the flowering period for this species. The species occurs throughout the Great Basin Province, from south-central Canada, into Montana, Wyoming, Idaho, Oregon, Nevada, and California. In California, the species is known only from the Modoc Plateau Region. The California Natural Diversity Base lists 19 records within California, with two records being from Modoc County and the remainder from Lassen County. The California Consortium of Herbaria reports about 25 collections of the plant in California, with four in Modoc County.

Great Basin downingia was observed at two locations in the general study area. A small population was observed south of the proposed pad for Well 82-13 (**Figure 9 in Appendix E**), where it co-occurs with desert popcornflower in short-grass habitat surrounding alkaline depressions. Another population was observed immediately east of the proposed pad for Well 81-24 (**Figure 13 in Appendix E**), where it also co-occurs with desert popcornflower. Both populations consist of roughly 100 individuals.

4.2.1.3 Hairy Marsh Hedge-Nettle (CRPR 2B.3)

Hairy marsh hedge-nettle is a perennial herb that occurs in mesic sites within Great Basin scrub, and meadow/seep habitats, particularly along streams, ditches, and ponds. The species is found between 2,500 and 5,000 feet in elevation. The flowering period extends from June through August, with most populations blooming in July or August. While July 2025 surveys were technically conducted during the flowering period for this species, several of the study sites were mowed prior to our July survey, and it is therefore possible that this late-blooming plant species could have been present but was not detected during the field survey.

Hairy marsh hedge-nettle was observed along County Road 13 on August 1, 1995. The exact location of the observation is unclear. The coordinates given on the herbarium sheet (CAS 794043) are 41° 40’ 11”N, 120° 4’ 0”W, which is on the east side of Upper Alkali Lake and conflicts with the collection site description on the herbarium sheet label. However, it is plausible that the actual longitude is 120° 12’ 04”W, which would place the collection on the north-south leg of County Road 13 about 375 meters (1,235 feet) south of the current project study area. Nonetheless, suitable habitat is present in the study area and hairy marsh hedge-nettle has a very high potential to be present.

4.2.1.4 Aleppo Avens (CRPR 2B.2)

Aleppo avens, an herbaceous perennial, grows in meadows within Great Basin scrub and lower montane coniferous forest. The species is reported between 1,400 and 5,000 feet in elevation. The flowering period extends from June through August. While July 2025 surveys were technically conducted during the flowering period for this species, several of the study sites were mowed prior to our July survey, and it is therefore possible that this late-blooming plant species could have been present but was not detected during the field survey. CNDDB records show that the species has been reported from nine locations within the state. Four of the populations are in Modoc County, with the nearest being about four miles from the project site. Although not previously reported in the Surprise Valley, suitable habitat is present and the species has a moderate potential to occur in the study area.

4.2.1.5 Rosy Orthocarpus (CRPR 2B.1)

Rosy orthocarpus is an annual herb that occurs in moist meadows and seeps. The species is found between 1,640 and 6,562 feet in elevation. The flowering period extends from June through August. While July 2025 surveys were technically conducted during the flowering period for this species, several of the study sites were mowed prior to our July survey, and it is therefore possible that this late-blooming plant species could have been present but was not detected during the field survey. The California Consortium of Herbaria (CCH) shows only two collections of this species in Modoc County: in 1904 and 1979. Review of these and some 200 other CCH records indicates that the species has not been collected from alkaline sites. The species has a low to moderate potential to occur in the study area.

4.3 Special-Status Wildlife

Review of the USFWS species list for the study area (**Appendix B**) identified the following animal species as potentially being affected by the proposed project: California condor (*Gymnogyps californianus*), yellow-billed cuckoo (*Coccyzus americanus*), northwestern pond turtle *(Actinemys marmorata*), monarch butterfly (*Danaus plexippus*), and Suckley's cuckoo bumble bee (*Bombus suckleyi*). These species are either federally listed or proposed for federal listing. The USFWS species list does not identify designated critical habitat in the study area for any federally listed animal species. Of these, monarch butterfly was determined to have the potential to occur in the study area based on the presence of suitable habitat including larval host plants (showy milkweed [*Asclepias speciosa*]) adjacent to a planned road corridor. Given the presence of milkweed, the monarch butterfly may be present. Northwestern pond turtle may occur based on the presence of suitable pond habitat nearby. Rationale for the potential for special-status animal species to occur in the study area is provided in **Appendix A, Table 3**. These findings are based on the general habitat requirements of the species and the results of the biological survey.

Review of CNDDB records showed that four special-status animal species, American badger (CDFW SSSC[1]; *Taxidea taxus*), greater sandhill crane (CESA[2] Threatened, CDFW FP[3]; *Antigone canadensis tabida*), northern leopard frog (CDFW SSSC; *Lithobates pipiens*), and prairie falcon (CDFW WL[4]; *Falco mexicanus*) have been reported in the study area (**Table 2 in Appendix A**). No suitable nesting habitat is present to support prairie falcons in the study area and the species is not expected to occur. Records for American badger are historical (1916) and suitable habitat is no longer present (see **Table 3 in Appendix A**). Records for northern leopard frog are also historic (1926), but suitable habitat remains present. Greater sandhill cranes were observed during the biological survey. Two additional special-status animals have been reported within a five-mile radius of the project site: American goshawk (CDFW SSSC; *Astur atricapillus*), and Swainson's hawk (CESA Threatened; *Buteo swainsoni*). Rationale for the potential for special-status animal species to occur in the study area is provided in **Appendix B, Table 3**.

[1] SSSC = CDFW Species of Special Concernt
[2] CESA = California Endangered Species Act
[3] FP = CDFW Fully Protected
[4] WL = CDFW Watch List

Additionally, showy milkweed was detected at some sites. Milkweed is the host plant for the monarch butterfly, which is proposed for federal listing as Threatened. Other special-status wildlife species that could potentially be present in the study area include Swainson's hawk, northwestern pond turtle, and northern leopard frog. Special-status species that are known to occur or have the potential to occur in the study area are addressed in more detail below.

4.3.1 Greater Sandhill Crane (CESA Threatened, CDFW Fully Protected)

The greater sandhill crane is a California Endangered Species Act (CESA) threatened species as well as a CDFW "fully protected" (FP) species. The FP listing status provides more protection for the species than does state or federal listing as rare, threatened, or endangered. The FP classification was established in the 1960s and prohibited the taking, possession, or killing of the designated species at any time except for scientific research. Various narrow exemptions to the FP requirements have been carved out in the past. Most recently and most broadly, in 2023, the state legislature enacted SB 147, which allows for incidental take of FP species for certain categories of projects; wind energy projects, solar photovoltaic projects, and associated transmission lines were included in the exemptions, which extend through 2033. However, geothermal energy projects were not exempted. Therefore, unless additional legislation is passed that exempts the proposed project or geothermal projects as a class, the FP status will remain in effect. "Take" of sandhill cranes is prohibited. No incidental take permits (ITPs) would be issued for this species.

Greater sandhill cranes nest in remote parts of large freshwater wetland habitats, often near grain fields. Nests generally consist of large mounds of vegetation in shallow water. Shallow islands bordered by tules and cattails are ideal nesting sites, though natural hummocks or muskrat houses may also be used as nest sites. In California, breeding is confined primarily to the northeastern portion of the state. Courtship begins in April and the peak brooding period is from May until July, with nesting completed by late August and young fledging by early or mid-September. The incubation period is about 30 days; the young can fly about 70 days after hatch.

The Surprise Valley is an important breeding site for greater sandhill cranes (Littlefield 1989). Non-breeding subadults also rely on this area for foraging.

Greater sandhill cranes were detected during both field visits. During the May survey, cranes were heard but rarely seen. The adults may have been on nests incubating eggs nearby as the survey was conducted during the breeding season. During the July visit, several pairs of cranes were observed foraging on and near the study sites. No nests were observed on the study sites, but the nests are expected to be located within 0.5 miles or closer to most or all of the well sites based on the field observations.

Examples of take of greater sandhill cranes could include mortality of adult or juvenile cranes, or their eggs, due to disturbance from construction noise, lighting, or human activity. Injury or mortality resulting in take could occur if cranes are startled, resulting in collisions with vehicles or power lines.

Greater sandhill cranes are very sensitive to human disturbance when nesting (e.g., April – August). Pacific Gas & Electric Company (2015) has prepared species-specific buffer recommendations to ensure that its work activities do not adversely affect nesting birds. The recommended standard buffer for sandhill crane nests is 500 feet between April and August; if work must occur within 500 feet of an

active nest, consultation with CDFW is advised. This recommendation does not constitute agency policy but is a reasonable guide as to how noise-generating activities may affect nesting birds. Other organizations have adopted different standards. For example, the Final South Sacramento Habitat Conservation Plan (County of Sacramento et al., 2018) establishes a 0.5-mile buffer from nesting sandhill cranes; if work must be conducted within the buffer, then implementation of mitigation measures is recommended (i.e., creating a visual barrier between the work site and nest, daily biological monitoring throughout the roosting season). Beedy (n.d.) notes that sandhill cranes may be sensitive to human disturbance within a mile of a nest site.

Greater sandhill cranes were observed or heard on or near numerous well sites, including Well Sites 45-12, 82-13, 33-13, 33A-13, 43-13, 35-13, and 46-13. Suitability for nesting is low at Well Sites 31-24, 41-24 and 81-24 due to disturbance from road proximity; however, these sites could support foraging. Greater sandhill cranes are unlikely to occur at Well Site 22-24 and the existing wellhead access route due to habitat unsuitability; however, these sites are within the nesting buffer for the species.

4.3.2 Swainson's Hawk (CESA Threatened)

In northeastern California, Swainson's hawks nest in open riparian habitat, oak savannahs, and juniper-sage flats, and forages in adjacent grasslands, croplands, and pastures. Breeding occurs from late March to late August, with peak activity in late May through July. Eggs hatch in about 28 days and the young fledge 28 to 35 days after hatching.

As the study vicinity contains groves of trees adjacent to extensive meadows and pastures, suitable nesting and foraging habitat for Swainson's hawks is present. Swainson's hawks are known to be active in the Surprise Valley area. Although we did not observe the hawks or nests during our surveys, iNaturalist records show that foraging Swainson's hawks were observed on the southwestern end of Upper Alkali Lake in May 2025 (iNaturalist 2026a-b). Nesting likely occurs in scattered trees along the western edge of the Surprise Valley bottomlands. Well sites 45-12 and 22-24 contain scattered trees that could support nesting and extensive nesting habitat is present along Surprise Valley Road. Given the known presence of Swainson's hawks in the general area and the presence of suitable nest trees, Swainson's hawks could potentially nest in or near the study area in future years and are very likely to forage throughout the study sites.

Swainson's hawks are very sensitive to human disturbance when nesting. Pacific Gas & Electric Company (2015) has prepared species-specific buffer recommendations to ensure that its work activities do not adversely affect nesting birds. The recommended standard buffer for Swainson's hawk nests is 1,320 to 2,640 feet (¼ to ½ mile); if work must occur within the buffer zone, consultation with CDFW is advised. This recommendation does not constitute agency policy but is a reasonable guide as to how noise-generating activities may affect nesting birds. Because the hawk is CESA-listed, issuance of an ITP by CDFW may be required if work occurs within the designated buffer zone around an active Swainson's hawk nest.

4.3.3 Northwestern (Western) Pond Turtle (Federally Proposed - Threatened, CDFW Species of Special Concern)

The USFWS proposed to list the northwestern pond turtle as threatened in 2023 (USFWS 2023). Northwestern pond turtles require both aquatic and terrestrial habitats. They use permanent and seasonal aquatic habitats (Western Pond Turtle Range-wide Conservation Coalition 2020). Northwestern pond turtles are found in permanent or semi-permanent aquatic habitats from sea level to approximately 6,000 feet in elevation. These turtles prefer ponds or slow-flowing streams with deep pools. The presence of suitable basking sites is an important habitat component for western pond turtles. Basking sites may include partially submerged logs, rocks, mats of floating vegetation, or open mud banks. In the fall, western pond turtles leave aquatic sites and overwinter in uplands, returning to the aquatic sites in the spring.

Mating typically occurs in late April or early May but may occur year-round. Females emigrate from their aquatic habitat to an upland location to nest and deposit between one and 13 eggs. Females may lay more than one clutch a year, but they most commonly deposit eggs between May and August. The northwestern pond turtle usually nests on sandy banks near water or in fields with sunny spots. Nests are generally constructed within 500 feet of a waterbody but may be up to 1,500 feet away. Hatchlings stay in the nest after hatching until spring, following a similar pattern to the adults' overwintering. Given this life cycle, pond turtles can be present in upland areas nearly year-round.

Review of CNDDB and iNaturalist records show that the northwestern pond turtle has not previously been reported in the Surprise Valley but has been observed within 10 miles of the project site (iNaturalist 2026c). Northwestern pond turtles were not observed during the field surveys but could be present, with the most suitable habitat being the permanent pond just east of Well Site 43-13 (**Figure 10 in Appendix E**).

Northwestern pond turtles can be affected by construction activities that result in discharge of sediments or pollutants to aquatic habitat. Mortality of turtles could occur via inadvertent collisions with vehicles or machinery, and mortality of eggs can occur due to inadvertent crushing or smothering of nest sites. Impacts to northwestern pond turtles can be avoided and minimized by conducting pre-construction clearance surveys, halting work within 50 feet of turtles if found, relocating turtles to outside of the work area if found, erecting temporary exclusionary fencing between the pond and the work areas, and biological monitoring during construction.

4.3.4 Northern Leopard Frog (CDFW Species of Special Concern)

The northern leopard frog is found throughout North America but is uncommon and localized in California. Historic populations in California existed at scattered locations below 6,500 ft in the far northeastern part of the state in Siskiyou and Modoc counties, in the northern Owens Valley, and possibly near Lake Tahoe. Since the 1970s, northern leopard frogs seem to have disappeared from most of their historic range. Northern Leopard Frogs are absent and possibly extirpated from about 95 percent of their historical range in California. Recent records are from one national wildlife refuge near the Oregon border and in the Owens Valley, northwest of Bishop. Most of the habitat previously inhabited in the Modoc and Owens Valley regions have been severely altered by agriculture and grazing, and introduced predators such as bullfrogs, crayfish, and exotic fishes may have negatively affected

populations (Nafis 2026). Because so little is known of the current distribution of northern leopard frog, the species is considered as having the potential to occur based on historic distribution and habitat suitability.

This highly aquatic species occurs in permanent ponds, swamps, marshes, and slow-moving streams in many habitat types. Important habitat requirements include shoreline cover, and submerged/emergent aquatic vegetation. In California, breeding and egg laying occur from December to June depending on local conditions. Females deposit up to 6,000 eggs in clusters that are attached to vegetation in shallow water. Eggs normally hatch within three weeks, and the tadpoles metamorphose in two to four months. Juveniles may disperse up to a mile from their breeding site, but only during or following rains. Dispersal is very sporadic; most adults have a very small home range (less than 40 feet). In colder climates, adults hibernate on the bottoms of ponds (Morey n.d.).

Northern leopard frog has been collected once in the Surprise Valley, in 1926. The collection site is thought to be in the immediate vicinity of the current project. Although leopard frogs were not observed, the study area includes a pond near Well Site 43-13 (**Figure 10 in Appendix E**) that could support the species.

Northern leopard frogs and their eggs can be affected by construction activities that result in discharge of sediments or pollutants to aquatic habitat. Mortality of frogs could occur via inadvertent collisions with vehicles or machinery. Impacts to northern leopard frogs can be avoided and minimized by conducting pre-construction clearance surveys, halting work within 50 feet of frogs if found, relocating frogs to outside of the work area or halting work until the frog has left the area if found, erecting temporary exclusionary fencing between the pond and the work areas, and biological monitoring during construction.

4.3.5 Monarch Butterfly (Federally Proposed – Threatened)

The USFWS proposed to list the monarch butterfly as a threatened species and designate critical habitat under the Endangered Species Act of 1973, as amended (ESA) on December 12, 2024 (USFWS 2024). Species proposed for federal listing, such as the monarch butterfly, are not protected by the "take" prohibitions of the federal ESA until the rule to list is finalized. However, federal agencies must confer with the US Fish and Wildlife Service (or NMFS for anadromous fish) if their actions will jeopardize the continued existence of a proposed species.

The monarch butterfly is not currently listed by, proposed for listing, or a candidate for listing by the State of California. However, the California legislature recently enacted AB 1319, which establishes that if the federal government withdraws protections for a federally listed or candidate species (including species proposed for federal listing), then the state will treat that species as a provisional candidate species. Under state law, candidate species are given full protection under the state ESA. The butterfly may also receive protection under Section 15380 of the State CEQA Guidelines, which provides that, regardless of formal listing status, a species must be treated as if it were listed if meets the criteria for “rare” or “endangered.” The butterfly appears to meet the definition of “rare” as defined in Section 15380(b)(2)(B).

Monarch butterflies are reliant on milkweed species (*Asclepias* sp.) for breeding. Adults migrate from their overwintering sites in coastal California in February and March and reach the northern limit of their North American range in California, Oregon, Washington, Idaho, and Nevada, in early to mid-June. Eggs are laid singly on milkweed plants within their breeding range. Once hatched, larvae reach the adult stage in 20 to 35 days; adults typically live 2 to 5 weeks. Several generations are produced within one season, with the last generation beginning migration to their overwintering range in August and September, where they live between 6 and 9 months before migrating north.

A patch consisting of 50 to 100 stems of showy milkweed (*Asclepias speciosa*) was observed during the July survey in an unmown vegetative strip adjacent to the planned access road to Well 82-13 (**Figure 9 in Appendix E**). The plants extend to about 40 feet from the proposed road corridor. Milkweeds are an herbaceous perennial species and the plants emerge late in the season. Milkweeds were not observed during the May survey and may not have been identifiable that early in the season. Because some of the proposed well sites and access roads were identified after the May survey and had been mowed before the July survey, it is possible that other populations of the plant are present but were not detected. Given the documented presence of milkweeds in at least one location, it is possible that the monarch butterfly could utilize the project site as summer breeding habitat.

4.4 Wildlife Movement Corridors and Nursery Sites

While the study area is not within designated critical habitat for listed species, it is within an area mapped as "essential connectivity area" (ECA) for wildlife by the California Essential Habitat Connectivity Project (CDFW 2025c). ECAs represent large, relatively natural habitat blocks and areas important to maintaining ecological integrity at the broadest scale. The study area is within the Warner Mountains – Mount Bidwell/Larkspur Hills ECA in the Modoc Plateau Ecoregion (**Figure 15 in Appendix E**). The ECA covers 595,069.75 acres and extends from the northern end of Upper Alkali Lake south along the Warner Mountains to south of Dunn Reservoir. The study area overlaps approximately 39.5 acres (0.007 percent) of the ECA.

The alkali lakes and playas and their associated wet meadows are a significant component of the Modoc Plateau aquatic ecosystem and also provide valuable ecological service to terrestrial species (Padgett 2020). The Surprise Valley area provides important migration, foraging, and breeding habitat for many species of birds, including the fully protected greater sandhill crane. Cranes were observed in the study area during the nesting season and numerous other bird nests were encountered during the site visits to the study area.

The west side of Surprise Valley Road is mapped by CDFW as critical mule deer winter range (**Figure 16 in Appendix E**). The nearest mapped fawning grounds are located over 40 miles south of the study area, near Little Hat Mountain. Critical deer winter range can include corridors essential for movement, staging areas where deer temporarily congregate, habitats containing high quality winter forage, or other elements important to the survival of deer in winter. Winter ranges are generally at lower elevations and are far less abundant than summer ranges making them vulnerable to human impacts and often a limiting factor in populations. Deer from different summer ranges may share a common winter range where breeding typically occurs. This mixing of genes on winter ranges contributes to genetically diverse and healthy populations (CDFW 2024a). The existing wellhead at the southern end of

the study area west of Surprise Valley Road intersects mule deer critical winter range. No other well sites or roads intersect mule deer range. The study area is not within CDFW-mapped pronghorn (*Antilocapra americana*) migration stopover, high use corridors, or migration corridors for Modoc and Lassen counties (CDFW 2022). The study area is near but not within the CDFW-mapped home range contours for the North Warners herd of Rocky Mountain elk (CDFW 2024b).

4.5 Nesting Migratory Birds

Under the Migratory Bird Treaty Act (MBTA) of 1918, migratory bird species, their nests, and their eggs are protected from injury or death, and any project-related disturbances during the nesting period. In addition, California Fish and Game Code §3503 and §3503.5 provide regulatory protection for resident and migratory birds and all birds of prey within the State.

The USFWS identified three migratory Birds of Conservation Concern as potentially being affected by the proposed project: Cassin's finch (*Haemorhous cassinii*), evening grosbeak (*Coccothraustes vespertinus*), and willet (*Tringa semipalmata*). Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), which are protected under the Bald and Golden Eagle Protection Act, are also identified as warranting conservation action. Willets were observed in the project study area during the survey. Cassin's finch, evening grosbeak, bald eagles, and golden eagles have been observed in the vicinity according to eBird and iNaturalist records (GBIF 2026).

During the May field surveys, several ground nests with eggs were observed in the wet meadows (**Appendix D**), including a willet nest. Other species are also very likely to nest on or adjacent to the study sites.

4.6 Noxious Weeds

The introduction and spread of noxious weeds during construction activities has the potential to impact natural habitats. A noxious weed is a plant that has been defined as a pest by federal or state law. In California, the California Department of Food and Agriculture (CDFA) maintains a list of plants that are considered threats to the well-being of the state. Each noxious weed identified by the CDFA receives a rating that reflects the importance of the pest, the likelihood that eradication or control efforts would be successful, and the present distribution of the pest within the state. Below is a description of ratings categories that apply to the study area:

- Category A. A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. A-rated pests are prohibited from entering the state because they have been determined to be detrimental to agriculture.
- Category B. A pest of known economic or environmental detriment and, if present in California, it is of limited distribution. B-rated pests are eligible to enter the state if the receiving county has agreed to accept them.
- Category C. A pest of known economic or environmental detriment and, if present in California, it is usually widespread. C-rated organisms are eligible to enter the state as long as the

commodities with which they are associated conform to pest cleanliness standards when found in nursery stock shipments.

Three Category C noxious weeds (Russian thistle (*Salsola tragus*), bindweed (*Convolvulus arvensis*), and downy brome (*Bromus tectorum*)) were observed in the study area during the botanical survey. An additional nine observed plant species were listed with Cal-IPC invasiveness ratings between "moderate" and "high": poison hemlock (*Conium maculatum*), Canadian thistle (*Cirsium arvense*), heart-podded hoary cress (*Lepidium draba*), broadleaved peppergrass (*Lepidium latifolium*), slender wild oats (*Avena barbata*), tall fescue (*Festuca arundinacea*), common velvet grass (*Holcus lanatus*), wall barley (*Hordeum murinum*), sheep sorrel (*Rumex acetosella*), and Himalayan blackberry (*Rubus armeniacus*).

4.7 Wetlands and Other Waters of the State or United States

"Waters of the U.S." (WOTUS) include traditional navigable waters, territorial seas, and interstate waters; impoundments of and tributaries to such waters; and wetlands adjacent to and with a continuous surface connection to these waters or their tributaries. These waters must meet the "relatively permanent" standard. Qualifying waters are regulated by the US Environmental Protection Agency and US Army Corps of Engineers under the federal Clean Water Act. The federal definition of WOTUS is subject to change due to political action and legal interpretations. Most recently, in November 2025, the Trump administration published in the Federal Register proposed revisions to the current regulations to delete the interstate waters category and define terms such as "continuous surface connection" and "relatively permanent."

"Waters of the State" are broadly defined to include "any surface water or groundwater, including saline waters, within the boundaries of the state." In 2019, the State adopted a definition of wetlands based on the USACE's 1987 Wetlands Delineation Manual and the 2008/2010 Regional Supplements to the 1987 Manual.

Although the extent of regulated waters is routinely revised, the technical definition of wetlands has remained relatively constant. At both the state and federal level, a wetland must meet specific criteria with respect to hydrology, soils, and vegetation.

The Surprise Valley is in a closed basin with no connection to traditional navigable waters or interstate waters. When assessing the regulatory status of other waters in the basin, the USACE has determined that the waters are not subject to federal jurisdiction (e.g., in 2020, the Corps evaluated Soldier Creek, which flows into Upper Alkali Lake, and determined that the creek is not subject to federal regulation because Upper Alkali Lake is a closed basin with no connection to a regulated water). The revised definition of WOTUS as currently under review would more clearly establish that Upper Alkali Lake, its tributaries, and adjoining wetlands are not subject to federal jurisdiction. Nonetheless, all wetlands and other waters in the basin remain subject to State jurisdiction. NWI-mapped wetlands are shown in **Figure 3 in Appendix E**.

The presence of wetlands and other waters of the State or United States was investigated in the study area. All three wetland parameters were found to be problematic.

- Wetland hydrology was problematic because the natural flow patterns have been altered by irrigation practices.

- Soils were problematic because of the presence of volcanic ash and moderate to high alkalinity. As noted in the Arid West Supplement, wetland indicators may be very faint or absent in such soils.
- Vegetation was problematic because several of the study sites were mowed prior to the field evaluation and the dominant plant species could not be identified.

Despite the difficult field conditions, certain portions of the study area could be confidently identified as wetlands or uplands; however, boundaries could not be assigned in certain transition areas and additional field evaluation will be needed if work is proposed in these areas. Preliminary findings are presented in a series of Figures (**Figures 8-14 in Appendix E**) and described for each well site below in **Section 5**.

SECTION 5 Summary of Results by Well Site

Each well site was visited to assess the presence of habitat for sensitive species, presence of sensitive plant or animal species, and potential presence of waters and wetlands. Detailed results for each well site are provided below and visualized in the map series in **Appendix E**. A summary table is provided in Table 5 in Section 5.11. Mitigation measures based on recommendations are presented in Section 7.

5.1 Well Site 45-12

5.1.1 Site Description

This site consists primarily of dryland pasture with a sparse cover of shrubs and herbaceous species. A hay barn is present adjacent to the well si te. A graveled road extending from Surprise Valley Road to the hay barn provides access to the proposed well site. A geothermal test well was previously installed on this site; the well pad and test well are located just north of the currently proposed boring location. Results of the biological survey and wetland evaluation addressing Well Site 45-12 are shown on **Figure 8 in Appendix E**.

5.1.2 Special-Status Species

Intensive biological surveys of the well site were completed in May and July 2025.

- No special-status plants or milkweed were observed at this well pad during the field surveys, nor are any expected to be present.
- The site has a low potential to support special-status animal species
- Site has a low to moderate potential to support nesting migratory birds
- Sandhill crane vocalizations were heard during the field surveys and sandhill cranes could nest near the site, which could necessitate seasonal constraints on construction activities or the need for a biological monitor if work occurs during the nesting season.
- Suitable nesting habitat for Swainson's hawks is present along the access road corridor and west of Surprise Valley Road.

5.1.3 Wetlands and Other Waters

The National Wetlands Inventory (NWI) map shows an intermittent stream along the southern boundary of the well site (**Figure 3 in Appendix E**). A freshwater forested/shrub wetland is mapped immediately north of the site boundary, and freshwater emergent wetland extends north and east of the well site (**Figure 3 in Appendix E**). Natural Resources Conservation Service (NRCS) soil maps and documentation show the soil units mapped on the site are not considered to be hydric (USDA 2026), nor do they contain hydric inclusions (**Figure 4 in Appendix E**).

Site inspection confirmed the presence of an intermittent stream/constructed ditch in the approximate location mapped by NWI (**Figure 8 in Appendix E**). With the exception of this stream/ditch, no wetlands or other waters of the State or United States are present on the well site or along the access road to the site. A number of sandbar willows (*Salix exigua*) were observed in the adjacent area mapped by NWI as

a forested/shrub wetland. A portion of this feature was included in the initial study area boundary, so a wetland evaluation was completed. Many of the willows were dead or dying and the understory vegetation was dominated by upland species. No evidence of wetland hydrology was observed in a 15-inch-deep test pit. Very faint, infrequent mottles were observed in the dry soil.

Based on these observations, the test pit location is not a wetland. Likewise, visual inspection of freshwater emergent wetland shown on the NWI map found that this area also supports a predominance of upland plant species; no evidence suggesting the presence of a wetland was observed in the field.

5.1.4 Recommendations

If Site 45-12 is selected for geothermal test well development, the following actions are recommended:

- Conduct a survey for Swainson's hawk nests.
- Conduct a survey for nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Implement appropriate mitigation measures as specified below.

5.2 Well Site 82-13

5.2.1 Site Description

This site is located near the western margin of Upper Alkali Lake. Although farm gates and culverts facilitate equipment access to the site, construction or improvement of about 0.9 miles of road would be needed to serve the proposed project activities. The site supports an abundance of floral resources during the spring period, but is cropped for hay later in the season. Results of the biological survey and wetland evaluation addressing Well Site 82-13 are shown on **Figure 9 in Appendix E**.

5.2.2 Special-Status Species

An intensive biological survey of the well site was completed in May 2025. The well site and portions of the 0.9-mile access road corridor to the site had been mowed prior to the July visit.

- Two special-status plant species, desert popcornflower (CRPR 2B.2) and Great Basin downingia (CRPR 2B.2), were observed adjacent to the well site during the May field visit. These species were observed in short-grass habitat along the upper fringes of alkaline depressions. Because the site had been mowed prior to the July visit, it is possible that late-blooming special-status plant species (e.g., hairy marsh hedge-nettle) are present but were not identified.

With respect to special-status wildlife:

- The site is used as foraging habitat by sandhill cranes and has a very high potential to support nesting sandhill cranes.
- During the July field visit, a patch of showy milkweed was observed in an unmown strip about 40 feet north of the planned road corridor; milkweed is the host plant for the monarch butterfly, which is proposed for federal listing as Threatened. Given the presence of milkweed and

abundant floral resources, the monarch butterfly may be present. Because most of the site had been mowed prior to the July visit, it is possible that other milkweed populations are present but were not detectable due to mowing.

- Suitable nesting trees for Swainson's hawks are not present within 0.5 miles of the well site. Suitable nesting trees for Swainson's hawks are present near the access road entrance.
- The site has a high potential to support ground-nesting migratory birds.

5.2.3 Wetlands and Other Waters

NRCS mapping shows that no hydric soils units are present on the subject site (**Figure 5 in Appendix E**). However, NWI mapping shows that the entirety of the well site and the eastern two-thirds of the proposed access road are within a freshwater emergent wetland. Additionally, the western segment of the access road is shown as passing through a riverine feature (intermittent stream) and a linear freshwater emergent wetland (**Figure 3 in Appendix E**).

Field evaluation confirmed that the entirety of the well site supports hydrophytic vegetation. The well site was flooded or saturated during the May visit. Two soil test pits were installed to depths of up to 15 inches during the July visit. No indicators of hydric soils were observed. However, as discussed above, hydric soil indicators are masked or absent in soils with volcanic ash or moderate to high alkalinity. Soils at the well site (Hussa ashy clay loam, clay substratum, 0 to 2 percent slopes) are thus unlikely to exhibit hydric soil indicators.

Most of the access road corridor mapped as wetland also supports hydrophytic vegetation, although upland vegetation is present in a 450-foot portion of the road corridor. The previously mapped linear wetland feature in the western third of the road corridor was not observed; this feature appears to have been rerouted to the intermittent stream corridor. The stream channel was observed in the general vicinity shown on the NWI map. The channel is distinctly scoured where it emerges from the culvert under Surprise Valley Road and then transitions to a swale with upland vegetation; shortly downstream of an onsite culvert the feature begins to support more and more wetland vegetation and ultimately merges into the previously mapped freshwater emergent wetland (**Figure 9 in Appendix E**).

5.2.4 Recommendations

If Site 82-13 is selected for geothermal test well development, the following actions are recommended:

- Conduct a supplemental botanical survey to address the potential presence of special-status plant species and milkweeds that would not have been detectable during the 2025 surveys.
- Conduct a survey for Swainson's hawk nests focusing on the westernmost portions of the site access road(s).
- Conduct a survey for onsite and nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Conduct a supplemental wetland evaluation to better delineate the boundaries of wetlands in the site access corridor.
- Implement appropriate mitigation measures as specified below.

5.3 Well Sites 33-13 and 33A-13

5.3.1 Site Description

This site is approximately 5.25 acres in size. It would be served by the north-south portion of the access route for Well Site 82-13 and 43-13, an existing dirt road. Portions of the well site have been previously leveled and graded, and a well head is present in an existing pad. The approximate western half of the site, which includes the existing well pad, does not appear to be irrigated or mowed; the eastern half of the site was not irrigated at the time of our July field inspection, nor had it been mowed, but aerial photography shows that the eastern portion of the site is mowed at least in some years. The entirety of the site appears to be grazed at least periodically. This site was surveyed only in July. Results of the biological survey and wetland evaluation addressing Well Site Well Sites 33-13 and 33A-13 are shown on **Figure 10 in Appendix E**.

5.3.2 Special-Status Species

No special-status plant species were observed on the site during the July survey. Because the site was not surveyed in May, it is possible that early-blooming special-status plant species are present but were not observed (e.g., desert popcornflower and Great Basin downingia). However, the well site appears to have a low potential to support such species.

With respect to special-status wildlife:

- Sandhill cranes were observed foraging on the site in July and the site and vicinity have a high potential to support nesting sandhill cranes.
- Swainson's hawks would not nest on the site due to the absence of trees but could nest in trees within a ¼-mile of the site.
- The well site is within 500 feet of a freshwater pond that could support northwestern pond turtles. Although turtles were not observed in 2025, they could be present.
- No milkweeds were detected in the study area during the July survey, so the site is not expected to support breeding habitat for monarch butterflies.
- The site has a moderate to high potential to support ground-nesting migratory birds.

5.3.3 Wetlands and Other Waters

NRCS mapping shows that no hydric soils units are present on the subject site (**Figure 5 in Appendix E**). NWI mapping shows a freshwater emergent wetland covering over half of the well site, primarily to the east and north of the existing well pad (**Figure 3 in Appendix E**). A linear freshwater emergent wetland and a riverine feature are mapped in the western half of the site (**Figure 3 in Appendix E**).

The field evaluation resulted in similar findings but less wetland overall (**Figure 10 in Appendix E**). The previously mapped linear corridor of freshwater emergent wetland was not observed, the extent of wetlands along the northern site boundary was less than shown on NWI maps, and additional uplands were observed northeast of the existing well pad. A stream/ditch not shown on the NWI map was observed just outside and more-or-less parallelling the northern boundary of the well site (**Figure 10 in**

Appendix E). A constructed ditch supporting hydrophytic vegetation is present in the western half of the well site and enters a culvert on the site; the outlet of the culvert was not observed and may be buried.

5.3.4 Recommendations

If Sites 33-13 or33A-13 are selected for geothermal test well development, the following actions are recommended:

- Conduct a supplemental botanical survey to address the potential presence of special-status plant species that would not have been detectable during the 2025 surveys.
- Conduct a survey for Swainson's hawk nests focusing on the westernmost portions of the site access road(s).
- Conduct a survey for onsite and nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Conduct a supplemental wetland evaluation to better delineate the boundaries of wetlands in the wetland-upland transition zone.
- Document the absence of northwestern pond turtles in the nearby pond or implement turtle avoidance measures as appropriate.
- Implement appropriate mitigation measures as specified below.

5.4 Well Site 43-13

5.4.1 Site Description

This site would be served by the western portion of the access route described above for Well Site 82-13. The planned access route would be about ¼-mile long; about half of the route is an existing dirt road, the other half would need to be constructed. The well site primarily supports an irrigated hayfield/pasture; a half-acre pond is present about 125 feet east of the well site. Results of the biological survey and wetland evaluation addressing Well Site 43-13 are shown above on **Figure 10 in Appendix E**.

5.4.2 Special-Status Species

An intensive biological survey of the well site was completed in May 2025. No special-status plant species were observed. The site had been mowed prior to our July visit; it is possible that late-blooming special-status plant species (e.g., hairy marsh hedge-nettle) are present but were not detected due to mowing. However, the site appears to have a low potential to support such species.

With respect to special-status wildlife:

- The site is used as foraging habitat by sandhill cranes and has a very high potential to support nesting sandhill cranes. Four cranes were observed foraging on or adjacent to the site during the July visit.
- Swainson's hawks would not nest on the site due to the absence of trees but could nest in trees within a ¼-mile of the site.

- The well site is within 125 feet of a freshwater pond that could support northwestern pond turtles and/or northern leopard frogs. Although these species were not observed in 2025, they could be present.
- No milkweeds were observed on the site during the July survey; however, it is possible that milkweed populations are present but were not detectable due to mowing.
- The site has a moderate to high potential to support ground-nesting migratory birds.

5.4.3 Wetlands and Other Waters

NRCS soils maps show that hydric soils extend just inside the southwestern corner of the well site (**Figure 5 in Appendix E**). NWI mapping shows a freshwater emergent wetland in the approximate southern third of the well site and in its northeastern corner (**Figure 3 in Appendix E**). The access road is shown as passing through a riverine feature (intermittent stream) and a linear freshwater emergent wetland (**Figure 3 in Appendix E**).

Field evaluation identified the presence of a pond and wetlands to the east of the site and upland vegetation to the west of the site (**Figure 10 in Appendix E**). The well site itself is primarily in a transitional zone with a mix of wetland and upland plant species (**Figure 10 in Appendix E**). The study area boundary was revised following our May visit. Because the site was mowed prior to our July visit, we could not establish wetland/upland boundaries based on vegetation.

As with Well Site 82-13, the previously mapped linear wetland feature in the access road corridor was not observed; this feature appears to have been rerouted to the stream corridor. The stream channel was observed in the general vicinity shown on the NWI map. The channel is distinctly scoured where it emerges from the culvert under Surprise Valley Road and then transitions to a swale with upland vegetation; shortly downstream of an onsite culvert the feature begins to support more and more wetland vegetation and ultimately merges into the previously mapped freshwater emergent wetland.

5.4.4 Recommendations

If Site 43-13 is selected for geothermal test well development, the following actions are recommended:

- Conduct a supplemental botanical survey to address the potential presence of special-status plant species and milkweed that would not have been detectable during the 2025 surveys.
- Conduct a survey for Swainson's hawk nests focusing on the westernmost portions of the site access road(s).
- Conduct a survey for onsite and nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Conduct a supplemental wetland evaluation to better delineate the boundaries of wetlands in the wetland-upland transition zone.
- Document the absence of northwestern pond turtles and northern leopard frogs in the nearby pond or implement avoidance measures as appropriate.
- Implement appropriate mitigation measures as specified below.

5.5 Well Site 35-13

5.5.1 Site Description

The study area boundary for this well site was modified between the May and July field visits. As a result, only the access road corridor was surveyed in May. At the time of our July visit, nearly all of the extended study area had been mowed. A culvert extends under Surprise Valley Road just north of the access road for Well Site 35-13. Water flows south to the access road and then dissipates to the east. The access road was flooded in May but had only pockets of standing water in July. About 0.15 miles of road would need to be constructed to serve this site. Results of the biological survey and wetland evaluation addressing Well Site 35-13 are shown on **Figure 11 in Appendix E**.

5.5.2 Special-Status Species

Although the field survey coverage was quite limited, no special-status plant species were observed on the site during the field visits. The habitat present on the well site appears to have a low potential to support special-status plant species. No alkaline depressions were observed, and the site has a low potential to support Great Basin downingia and desert popcornflower. The site access road is wetter than the well site and has a higher potential to support special-status plants; most of the access road corridor had been mowed prior to our July field visit.

With respect to special-status wildlife:

- The site vicinity has a high potential to support nesting sandhill cranes. Two pairs of foraging cranes were observed on or adjacent to the study area during our July visit.
- Swainson's hawks would not nest on the site due to the absence of trees but could nest in trees within a ¼-mile of the site.
- Because most of the study area was mowed prior to the July survey, the potential presence of milkweeds/breeding habitat for monarch butterflies could not be determined.
- The site has a moderate potential to support ground-nesting migratory birds.

5.5.3 Wetlands and Other Waters

NRCS mapping shows that hydric soils units are present throughout most of the well site and access road corridor (**Figure 5 in Appendix E**). NWI mapping shows a linear freshwater forested/scrub wetland and a small amount of freshwater emergent wetland in the access road corridor (**Figure 3 in Appendix E**).

The July field inspection confirmed the presence of an intermittent stream/constructed ditch at the access road entrance (in the location shown on the NWI maps as forested/scrub wetland). Saturated soils were present in and to the south of the access road corridor, indicating that this area is likely a wetland. The well site and portions of the access road corridor had been mowed prior to our July visit. Inspection of the hay rows and hay bales revealed the presence of hydrophytic plants such as Baltic rush (FACW) and meadow foxtail (FACW); because the total cover of hydrophytic species could not be determined, these areas were mapped as a transition zone (**Figure 11 in Appendix E**). Most of the well

site is within the transition zone and small portions are in uplands. Most of the access road corridor appears to be in a wetland.

5.5.4 Recommendations

If Site 35-13 is selected for geothermal test well development, the following actions are recommended:

- Conduct a supplemental botanical survey to address the potential presence of special-status plant species that would not have been detectable during the 2025 surveys.
- Conduct a survey for Swainson's hawk nests focusing on the westernmost portions of the site access road(s).
- Conduct a survey for onsite and nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Conduct a supplemental wetland evaluation to better delineate the boundaries of wetlands in the wetland-upland transition zone.
- Implement appropriate mitigation measures as specified below.

5.6 Well Site 46-13

5.6.1 Site Description

As with Well Site 35-13, the study area boundary for this well site was modified between the May and July field visits. As a result, only a portion of the access road corridor was surveyed in May. At the time of our July visit, the proposed well site had been mowed. A culvert extends under Surprise Valley Road just north of the proposed access road. Water flows south to the access road and then dissipates to the east. The access road was flooded in May but had only pockets of standing water in July. About 0.28 miles of road would need to be constructed to serve this site. Results of the biological survey and wetland evaluation addressing Well Site 46-13 are shown above on **Figure 11 in Appendix E**.

5.6.2 Special-Status Species

Although the field survey coverage was quite limited, no special-status plant species were observed on the site during the July field visit. The well site and portions of the access road corridor appear to support long-duration ponding and could support special-status species such as Great Basin downingia, desert popcornflower, hairy marsh hedge-nettle, Aleppo avens and/or rosy orthocarpus.

With respect to special-status wildlife:

- The site vicinity has a high potential to support nesting sandhill cranes. Two pairs of foraging cranes were observed on or adjacent to the study area during our July visit.
- Swainson's hawks would not nest on the site due to the absence of trees but could nest in trees within a ¼-mile of the western terminus of the access road.
- Because most of the study area was mowed prior to the field visit, the potential presence of milkweeds/breeding habitat for monarch butterflies could not be determined.
- The site has a high potential to support ground-nesting migratory birds.

5.6.3 Wetlands and Other Waters

NRCS mapping shows that hydric soils units are present in the northwestern portion of the well site and throughout most of the access road corridor (**Figure 5 in Appendix E**). NWI mapping shows a linear freshwater forested/scrub wetland and a small amount of freshwater emergent wetland in the access road corridor (**Figure 3 in Appendix E**).

The July field inspection confirmed the presence of an intermittent stream/constructed ditch at the access road entrance (in the location shown on the NWI maps as forested/scrub wetland) (**Figure 11 in Appendix E**). Saturated soils were present in and to the south of the access road corridor, indicating that this area is likely a wetland. A wetland test pit was installed northeast of the well site. The soil profile was moist throughout and surface ponding was present nearby, indicating that the area is likely a wetland. The well site and portions of the access road corridor had been mowed prior to our July visit. Inspection of the hay rows and hay bales revealed an abundance of hydrophytic plants such as Baltic rush (FACW) and meadow foxtail (FACW); although the total cover of hydrophytic species could not be determined, the well site was mapped as a wetland (**Figure 11 in Appendix E**). Most of the access road corridor also appears to be in a wetland (**Figure 11 in Appendix E**).

5.6.4 Recommendations

If Site 46-13 is selected for geothermal test well development, the following actions are recommended:

- Conduct a supplemental botanical survey to address the potential presence of special-status plant species that would not have been detectable during the 2025 surveys.
- Conduct a survey for Swainson's hawk nests focusing on the westernmost portions of the site access road.
- Conduct a survey for onsite and nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Conduct a supplemental wetland evaluation to better delineate the boundaries of wetlands in the wetland-upland transition zone.
- Implement appropriate mitigation measures as specified below.

5.7 Well Sites 31-24 and 41-24

5.7.1 Site Description

This site is on the south side of County Road 13 and is approximately 11 acres in size. The site is irrigated, cropped for hay, and grazed; the western half of the site is distinctly drier than the eastern half. Because the site is bordered by County Road 13, no new road construction would be needed to access the site. Results of the biological survey and wetland evaluation addressing Well Sites 31-24 and 41-24 are shown on **Figure 12 in Appendix E**.

5.7.2 Special-Status Species

This site was not surveyed during our May field visit. The western half of the site had been mowed prior to our July visit and cattle were grazing the site; although we cannot conclusively state that no early-

blooming special-status plant species are present, the western portion of the site appears to have a very low potential to support such species. Intensive survey of the unmowed eastern half of the site during our July visit did not detect any special-status plants. The County Road 13 frontage (mapped by CNDDB as potentially supporting hairy marsh hedge-nettle) was surveyed in both May and July and no hairy marsh hedge-nettles were observed.

With respect to special-status wildlife:

- The site is unlikely to support nesting sandhill cranes due to the proximity of human activity and County Road 13 but could provide foraging habitat for the cranes. During the May survey, cranes were heard to the north of the eastern half of the site and were assumed to be nesting.
- Swainson's hawks would not nest on the site due to the absence of trees but could nest in trees within a ¼-mile of the site.
- The western half of the study area was mowed prior to the field visit; no milkweeds/breeding habitat for monarch butterflies were observed in the unmown eastern half of the site.
- The site has a moderate to high potential to support ground-nesting migratory birds.

5.7.3 Wetlands and Other Waters

NRCS mapping shows that no hydric soils units are identified on the subject site (**Figure 6 in Appendix E**). NWI mapping shows that the eastern half of the well site is a freshwater emergent wetland while the western half of the site contains no wetlands or other waters (**Figure 3 in Appendix E**). The NWI map also shows a linear freshwater forested/shrub wetland crossing under County Road 13 near Surprise Valley Road (**Figure 3 in Appendix E**).

The July field inspection confirmed the presence of hydrophytic vegetation in the eastern half of the site. Although the western half of the site had been mowed, remains of hydrophytic plant species were observed in the stubble up to about 150 feet into the drier western half of the site (**Figure 12 in Appendix E**). On the basis of this evidence, the wetland was mapped as extending into the western half of the site. Both of the proposed well heads are in the drier western half of the site. The field inspection confirmed the presence of a stream in the location shown on the NWI map as a freshwater forested/shrub wetland. Because an existing culvert conveys the flow under the road, this feature would not be affected by project implementation.

5.7.4 Recommendations

If Sites 31-24 or 41-24 are selected for geothermal test well development, the following actions are recommended:

- Conduct a supplemental botanical survey to address the potential presence of special-status plant species that would not have been detectable during the 2025 surveys.
- Conduct a survey for Swainson's hawk nests.
- Conduct a survey for onsite and nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Conduct a supplemental wetland evaluation to better delineate the boundaries of wetlands in the wetland-upland transition zone.

- Implement appropriate mitigation measures as specified below.

5.8 Well Site 81-24

5.8.1 Site Description

This site consists of an irrigated hayfield/pasture bounded on two sides by County Road 13. Because the site is bordered by County Road 13, no new road construction would be needed to access the site. Results of the biological survey and wetland evaluation addressing Well Site 81-24 are shown on **Figure 13 in Appendix E**.

5.8.2 Special-Status Species

Two special-status plant species, desert popcornflower and Great Basin downingia were observed adjacent to the well site during the May field visit. The site had been mowed prior to our July visit; although we cannot conclusively state that no late-blooming special-status plant species are present, the site appears to have a low potential to support such species. The County Road 13 frontage was surveyed in both May and July and no hairy marsh hedge-nettles were observed.

With respect to special-status wildlife:

- The site has a could support nesting sandhill cranes despite the proximity of human activity and County Road 13. The site could also provide foraging habitat for the cranes.
- Due to the absence of trees within a ¼-mile of the site, nesting Swainson's hawks would not be adversely affected by project implementation.
- The well site was mowed prior to the July field visit; milkweeds providing breeding habitat for monarch butterflies could potentially be present if the site was not mown.
- The site has a high potential to support ground-nesting migratory birds; three active nests were observed on the site in May.

5.8.3 Wetlands and Other Waters

NRCS mapping shows that no hydric soils units are present on the subject site (**Figure 6 in Appendix E**). NWI mapping shows that the entirety of the well site is within a freshwater emergent wetland (**Figure 3 in Appendix E**). The NWI map also shows a linear freshwater forested/shrub wetland crossing under County Road 13 near Surprise Valley Road.

Field evaluation confirmed the presence of hydrophytic vegetation and wetland hydrology throughout the well site (**Figure 13 in Appendix E**). Although a soil test pit was installed, the presence of hydric soils was not confirmed in the field. This is not unexpected due to masking as discussed above. The field inspection confirmed the presence of a stream in the location shown on the NWI map as a freshwater forested/shrub wetland. Because an existing culvert conveys the flow under the road, this feature would not be affected by project implementation.

5.8.4 Recommendations

If Site 81-24 is selected for geothermal test well development, the following actions are recommended:

- Conduct a supplemental botanical survey to address the potential presence of special-status plant species that would not have been detectable during the 2025 surveys.
- Conduct a survey for onsite and nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Implement appropriate mitigation measures as specified below.

5.9 Well Site 22-24

5.9.1 Site Description

This proposed well site is used for dryland farming and for cattle grazing. Outbuildings were present on or adjacent to the site prior to a landslide in the mid-1990's. A north-south rock wall situated immediately east of the site is the only remaining developed feature. An existing access road extends to the well site. The western half of the road is graveled and the remainder is dirt. The dirt portion may need to be improved to serve the proposed facilities. Results of the biological survey and wetland evaluation addressing Well Site 22-24 are shown on **Figure 14 in Appendix E**.

5.9.2 Special-Status Species

Field evaluation found that the western quarter of the site is a heavily grazed rocky upland with junipers and a weedy understory. The site has some potential to support nesting Swainson's hawks and other birds. Elevated noise levels during the well drilling period could disrupt nesting by sandhill cranes, Swainson's hawks, and other birds that may nest in the vicinity. However, the overall biological sensitivity of the site is relatively low.

5.9.3 Wetlands and Other Waters

NRCS mapping shows that no hydric soils units are present on the subject site (**Figure 6 in Appendix E**). NWI mapping shows no wetlands or other waters on the well site or in the access road corridor (**Figure 3 in Appendix E**).

The field evaluation confirmed that no wetlands or other waters are present on the site or in the access road corridor. A small stream is present about 50 feet north of the access road and a larger stream flows about 400 feet southwest of the well site (**Figure 14 in Appendix E**); neither of these streams would be affected by project implementation.

5.9.4 Recommendations

If Site 22-24 is selected for geothermal test well development, the following actions are recommended:

- Conduct a survey for Swainson's hawk nests.
- Conduct a survey for nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Implement appropriate mitigation measures as specified below.

5.10 Existing Wellhead Access Route

5.10.1 Site Description

An existing wellhead is present about 500 feet west of Surprise Valley Road. An access road to the wellhead was constructed in the 1990s but does not appear to have been maintained. As part of the current project, the eastern portion of the road would be rerouted to avoid an adjoining parcel on which the project proponent has no access rights. The remainder of the road would be restored or reconstructed. Results of the biological survey and wetland evaluation addressing the wellhead access route are shown above on **Figure 14 in Appendix E**.

5.10.2 Special-Status Species

No special-status species were observed during the field evaluation. Based on conditions observed during the July field survey, no additional botanical field survey is warranted. The site has some potential to support nesting Swainson's hawks and other birds. Elevated noise levels during road construction could potentially disrupt nesting by sandhill cranes, Swainson's hawks, and other birds that may nest in the vicinity. Because the road corridor is visually screened from potential sandhill crane nesting sites, the potential effect of construction on nesting cranes would be minimized. The overall biological sensitivity of the site is quite low.

5.10.3 Wetlands and Other Waters

NRCS mapping shows that no hydric soils units are present on the subject site (**Figure 6 in Appendix E**). NWI mapping shows no wetlands or other waters in the road corridor (**Figure 3 in Appendix E**). However, a small freshwater emergent wetland is mapped about 150 feet south of the road corridor and a linear freshwater emergent wetland is mapped less than 100 feet to the north.

The field evaluation confirmed the presence of an intermittent stream to the north of the road corridor. A depression potentially supporting a wetland was observed south of the road corridor corresponding with the NWI mapping. However, both features are outside the planned work area, and they would not be affected by the planned road improvements.

5.10.4 Recommendations

If the wellhead access road is to be improved as proposed, the following actions are recommended:

- Conduct a survey for Swainson's hawk nests.
- Conduct a survey for nearby sandhill crane nest sites.
- Conduct a pre-construction survey for nesting migratory birds.
- Implement appropriate mitigation measures as specified below.

5.11 Summary Table

Table 5. Summary of Biological, Botanical, and Aquatic Resources Field Surveys and Recommendations by Well Site.

Well Site # and Appendix E Figure #	Sensitive Natural Communities	Special-Status Plants	Special-Status Animals	Wetlands and Waters	Preliminary Recommendations
Well Site 45-12 Figure 8	Yes	None	• Greater sandhill crane nesting nearby • Swainson's hawk suitable nesting habitat nearby • Nesting birds	Intermittent stream present	• Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey
Well Site 82-13 Figure 9	Yes	Present	• Greater sandhill crane nesting and foraging • Monarch butterfly host plants present (milkweed) • Swainson's hawk suitable nesting habitat at access road entrance • Ground-nesting birds	Wetland present	• Supplemental botanical survey for special-status plant species and milkweeds • Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey (focus on ground-nesting birds) • Supplemental wetland evaluation
Well Site 33-13 and 33A-13 Figure 10	Yes	Low potential	• Greater sandhill crane nesting nearby • Swainson's hawk suitable nesting habitat nearby • Ground-nesting birds • Northwestern pond turtle and northern leopard frog habitat at pond approximately 500 ft from well site	Wetlands and stream present	• Supplemental botanical survey for special-status plant species • Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey (focus on ground-nesting birds) • Supplemental wetland evaluation • Survey pond for northwestern pond turtles and northern leopard frogs

Well Site # and Appendix E Figure #	Sensitive Natural Communities	Special-Status Plants	Special-Status Animals	Wetlands and Waters	Preliminary Recommendations
Well Site 43-13 Figure 10	Yes	Low potential	• Greater sandhill crane nesting nearby • Swainson's hawk suitable nesting habitat nearby • Ground-nesting birds • Northwestern pond turtle and northern leopard frog habitat at pond • Potential milkweed habitat for monarch butterflies	Wetland/upland transitional zone	• Supplemental botanical survey for special-status plant species and milkweeds • Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey (focus on ground-nesting birds) • Supplemental wetland evaluation • Survey pond for northwestern pond turtles and northern leopard frogs
Well Site 35-13 Figure 11	Yes	Low potential	• Greater sandhill crane nesting nearby • Swainson's hawk suitable nesting habitat nearby • Ground-nesting birds • Milkweed potential unknown.	Wetland/upland transitional zone	• Supplemental botanical survey for special-status plant species and milkweeds • Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey (focus on ground-nesting birds) • Supplemental wetland evaluation

Well Site # and Appendix E Figure #	Sensitive Natural Communities	Special-Status Plants	Special-Status Animals	Wetlands and Waters	Preliminary Recommendations
Well Site 46-13 Figure 11	Yes	Potential to support multiple special-status plant species	• Greater sandhill crane nesting nearby • Swainson's hawk suitable nesting habitat nearby • Ground-nesting birds • Milkweed potential unknown.	Wetland present	• Supplemental botanical survey for special-status plant species and milkweeds • Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey (focus on ground-nesting birds) • Supplemental wetland evaluation
Well Site 31-24 and 41-24 Figure 12	Yes	Low potential	• Greater sandhill crane foraging but not nesting • Swainson's hawk suitable nesting habitat nearby • Ground-nesting birds • Milkweed potential unknown.	Wetlands present in eastern portion of site	• Supplemental botanical survey for special-status plant species and milkweeds • Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey (focus on ground-nesting birds) • Supplemental wetland evaluation
Well Site 81-24 Figure 13	Yes	Present	• Greater sandhill crane foraging but not nesting • Ground-nesting birds • Milkweed potential unknown.	Wetland present	• Supplemental botanical survey for special-status plant species and milkweeds • Nesting sandhill crane survey • Pre-construction nesting bird survey (focus on ground-nesting birds)
Well Site 22-24 Figure 14	None	None	Low potential	None	• Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey

Well Site # and Appendix E Figure #	Sensitive Natural Communities	Special-Status Plants	Special-Status Animals	Wetlands and Waters	Preliminary Recommendations
Existing Wellhead Access Route Figure 14	None	None	• Low suitability for greater sandhill crane nesting, but route is within the potential nest buffer zone • Swainson's hawk suitable nesting habitat nearby • Nesting birds	None	• Nesting Swainson's hawk survey • Nesting sandhill crane survey • Pre-construction nesting bird survey

SECTION 6 Impact Assessment

6.1 Sensitive Natural Communities, Wetlands and Waters

As discussed above, juniper woodland, dryland grain crops, and dry pasture are not sensitive communities, but the wet meadow and riverine communities are sensitive and are likely regulated as waters of the State. The project study area includes approximately 19.98 acres of wetlands, 5.60 acres of transitional lands (additional field evaluation is needed to determine the wetland/upland classification of these lands), and approximately 103 linear feet of intermittent stream. The intermittent stream is on the southern boundary of Well Site 45-12. A minor change in the project footprint would fully exclude the stream from the work area.

Project implementation would result in the temporary fill of 20 to 25 acres of wetland and minor temporary fill of streams/constructed ditches. Rerouting of flow around the well pads could result in the temporary dewatering of additional wetlands; the extent of indirect impacts cannot be estimated but is likely to be relatively minor. Fill in the wetlands would be present for approximately two years. The project proposal calls for removal of fill and restoration of the wetlands upon completion of the geothermal testing project. A detailed restoration plan (**BIO-4**) will be prepared prior to project implementation. The plan will address the removal of fill, redistribution of salvaged topsoil (which will be stockpiled for the duration of the test well development and evaluation), site preparation including treatment of any compacted soils, species proposed for use in revegetation, methods for obtaining a sufficient quantity of plant propagules, planting methods, timing, maintenance activities such as weed control, revegetation success criteria, post-planting monitoring and reporting requirements, and adaptive management measures to ensure that the established success criteria are met.

As discussed above, the proposed project does not contain “Waters of the United States” as currently defined but does include “Waters of the State.” Accordingly, the project proponent must file an application with the Water Boards for any activity that could result in the discharge of dredged or fill material to waters of the state in accordance with California Code of Regulations, Title 23, Section 3855 and the State Policy for Water Quality Control: State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. The Water Boards may approve the proposed temporary fill of wetlands and other waters through issuance of Waste Discharge Requirements (WDRs). Compliance with the conditions of the WDRs would ensure that impacts on wetlands and other waters of the state are not significant.

Implementation of mitigation measures **BIO-1 through BIO-6** would reduce impacts to sensitive natural communities and potentially jurisdictional wetlands and waters (Section 7).

6.2 Special-Status Plants

As discussed above in Section 4.2, special-status plant populations are present immediately east and south of Well Site 82-13 and immediately east of Well Site 81-24. Development of the well pads would include installation of ditches to divert water around the pads. The changes in hydrology are likely to adversely affect the special-status plant populations even if direct impacts are avoided. The plant

populations could also potentially be affected by changes in water quality, increased sedimentation, increased particulate matter, and inadvertent entry into the plant populations by workers. In a maximum-impact scenario, the desert popcornflower and Great Basin downingia populations adjacent to the two well pads would be eliminated. This would be a significant adverse environmental impact.

Re-establishment of the special-status plant populations at offsite locations could mitigate the loss associated with project implementation. However, re-establishment may be difficult; as relatively little is known about these special-status species and their specific habitat requirements, which makes habitat creation a difficult mitigation option. Alternatively, mitigation could be achieved by protecting other known populations of these species through either direct purchase of land or establishment of a conservation easement. Under this approach, CDFW would likely require preservation of at least three times the area/size of the affected plant populations. An appropriate buffer zone would also need to be established around the protected populations and activities allowed in the mitigation site would need to be detailed in a management plan approved by CDFW.

If subsequent botanical surveys identify the presence of special-status plant populations at sites not fully surveyed in 2025, modification of project activities to avoid impacts on the populations is recommended. If full avoidance is not possible, then mitigation would be required, as outlined above.

Implementation of mitigation measures **BIO-1 through BIO-6** would reduce impacts to special-status plants and their habitat (Section 7).

6.3 Special-Status Wildlife

6.3.1 General Construction Impacts

Project duration is anticipated to be 28 months, with well drilling and testing occurring 24 hours per day for a period of 20 months (**Table 4**). Primary impacts to wildlife from these activities are typically due to noise and vibration, night lighting, habitat loss or fragmentation, and disturbance from the presence of human activity and heavy machinery. General impacts to wildlife from construction are discussed herein. A number of APMs and BMPs have been developed to reduce impacts to wildlife from general construction practices (Section 2.5). Specific impacts to special-status wildlife species are discussed below in Sections 6.3.2-6.3.5).

6.3.1.1 Habitat Alteration

Proposed construction activities would include the loss, degradation, and fragmentation of habitat for wildlife and special-status wildlife species during ground-clearing activities (**Table 1**). Ground-clearing activities include construction of access roads and clearing of well pad areas. Large or highly mobile wildlife, such as deer, elk, and birds would be disturbed by construction activities and would be expected to avoid the area and disperse to adjacent habitat outside of the immediate construction disturbance. Smaller or less mobile wildlife (e.g., amphibians, reptiles, small mammals, invertebrates) in the construction area would be more affected by ground disturbance, creation of edge habitat, loss of vegetation, erosion, noise and vibration, and construction vehicle traffic. At the end of the permitted or useful life of the test well facilities and if testing yields negative results, no future geothermal energy developments would occur. The general objective of the final reclamation phase is to return the site as

close as possible to the conditions prior to geothermal development. Reclamation activities would be planned and conducted in accordance with County requirements.

Effects to wildlife movement are discussed in greater detail in Section 6.4 below and effects to specific special-status species are discussed individually in the subsections below.

6.3.1.2 Noise and Vibration

Construction activities would include noise- and vibration-producing activities. Noise and vibration levels would primarily be generated by the use of heavy machinery as described in **Table 2.**

Anthropogenic (human-caused) noise and vibration can have a variety of effects on wildlife, including special-status wildlife. Terrestrial wildlife responses such as altered behavior to noise begin at levels of approximately 40 A-weighted decibels (dBA), similar to the levels at which humans report annoyance (Shannon et al. 2016). For the purposes of this analysis, 40 dBA is considered the threshold for disturbance impacts to wildlife, with birds likely to be the most sensitive receptors. Noise is also more disturbing the closer a receptor is to the source; noise levels generally decrease by 6 dB as the distance from its source doubles (FHWA 2011).

Anthropogenic noise has a variety of effects on species reliant on acoustic communication, such as birds. Mule deer, elk, and small mammals also rely on their sensitive hearing to receive predation cues (Kleist et al. 2020). Noise can disrupt breeding, sheltering, and foraging activities and change patterns of habitat use for some species. Birds nearest the source of noise may alter their behavior to include increased alertness, turning toward the disturbance, fleeing the disturbance, changes in activity patterns, and nest abandonment. Habitat use and breeding success of grassland birds is more impacted by shorter duration noise such as drilling compared to operating noises such as those generated by continuous generators or pumping (Rosa and Koper 2020). Rosa and Kroper (2020) suggest that acute drilling noises have greater negative impacts on breeding migratory birds when compared to chronic oil well noises because of the unpredictability of drilling noises and recommend mitigation strategies such as mufflers, sound dampening walls or curtains, or shifting the timing of drilling activities away from the breeding period to reduce impacts to some species of birds.

Frogs and toads rely heavily on acoustic communication for mating because males must call to females and females must be able to hear males and approach them (Erbe et al. 2022). Some species of frogs, including leopard frogs, have been reported to adjust their dominant frequencies in site with high traffic noise compared to those without (Cunnington and Fahrig 2010; Libramento de los Santos et al. 2025). Cunnington and Fahrig (2012) investigated whether traffic noise resulted in reduced mate attraction success but found that negative effects of traffic were mainly related to road mortality as opposed to noise.

Little is known about the hearing capabilities of turtles. Research on airborne and underwater sound sensitivity of red-eared sliders (*Trachemys scripta elegans*) has demonstrated that the ear is adapted for underwater hearing and that the turtles' sensitivity to airborne sound is poor (Christensen-Dalsgaard et al. 2012). At present, little is known regarding hearing sensitivity for northwestern pond turtle; however, underwater noise and vibration from activities such as pile driving are likely to cause stress or acoustic trauma (Salas et al. 2023; Caltrans 2024).

Anthropogenic noise masks biological sounds and may cause prey animals to respond with heightened vigilance at the expense of foraging or prevent effective communication (Shannon et al. 2014; Erbe et al. 2022). Noise and vibration may increase stress on individuals and disrupt breeding, sheltering, and foraging activities. Stress is a physiological response and can affect numerous life functions, including immune response, communication, reproductive success, and predation risk (Erbe et al. 2022).

During site preparation, noise emissions will be periodic and temporary, depending on the use of heavy equipment. During the drilling phase (17 months) and testing phase (3 months), some components (e.g., drills, pumps, and generators) would run continuously (24-hrs per day) (Table 2). These activities may generate noise levels exceeding 40 dBA over a distance of a half mile or more from the active well pads. Existing ambient noise in the vicinity of the Project sites is consistent with a rural agricultural landscape with the dominant noise sources consisting of vehicular traffic on local roads, occasional aircraft overflights, and the operation of agricultural equipment. The major source of vehicular noise in the Project area is traffic along Surprise Valley Road; however, the traffic volume on Surprise Valley Road is very low. Typical rural and agricultural ambient noise levels are between 30 and 50 dBA day-night average sound level (L_{dn}) (USEPA 1974).

6.3.2 Greater Sandhill Cranes

Project implementation would result in the temporary loss of greater sandhill crane foraging habitat during the 28 months of proposed project activity and would result in habitat fragmentation due to site preparation at well sites that are within suitable sandhill crane foraging or nesting habitat. Much of the study area and surrounding areas provides suitable habitat for greater sandhill cranes. While the potential for direct effects on nesting sandhill cranes is low, there is a moderate to high potential that noise and human activity could affect nesting behavior of sandhill cranes or cause abandonment of active nests. As discussed above, Beedy (n.d.) has found that sandhill cranes may be sensitive to human disturbance within a mile of a nest site. Cranes also have a high fidelity to their nest sites; if the nest sites are not viable due to increased noise or human activity, then the cranes may not successfully breed. Additionally, flushing of sandhill cranes due to noise or human activity could increase the potential for collision with vehicles or power lines, resulting in injury or death. As described above, noise minimization using timing restrictions and sound dampening measures may greatly reduce noise impacts to birds. An Applicant Proposed Measure is included in the Project to install mufflers/silencers on drilling equipment, further reducing noise impacts (Section 2.5.7). Night lighting associated with the proposed project could also adversely affect greater sandhill cranes (**BIO-13)**.

Given the high sensitivity of nesting sandhill cranes and the regulatory restrictions associated with the cranes' "fully protected" status, the most effective approach to ensure that there is no take of sandhill cranes is to limit the work season to the period when sandhill cranes are not present (**BIO-9**). Greater sandhill cranes migrate into the Surprise Valley as early as mid-March and depart by mid-September after young fledge with the breeding season falling between approximately April 1 and August 30. If work were to occur only when cranes are absent, no additional avoidance or mitigation measures would be needed. If work would proceed during the breeding season, avoidance and mitigation measures would be needed, including preconstruction surveys and implementation of protective buffers (**BIO-9**). Additional consultation with CDFW may be required to establish further protective measures.

Implementation of APMs, BMPs, and mitigation measures **BIO-1, BIO-9, BIO-12, and BIO-13** would reduce potential impacts to greater sandhill cranes (Section 7).

6.3.3 Swainson's Hawks

Project implementation would result in the temporary loss and fragmentation of Swainson's hawk foraging habitat. Additionally, although the potential for direct effects on nesting Swainson's hawks is quite low, there is a moderate potential that noise and human activity could preclude nesting by hawks or cause abandonment of active nests. As described above, noise minimization using timing restrictions and sound dampening measures may greatly reduce noise impacts to birds. An Applicant Proposed Measure is included in the Project to install mufflers/silencers on drilling equipment, further reducing noise impacts (Section 2.5.7). If work were to occur between late September 1 and March 31 (i.e., outside the Swainson's hawk breeding period), no additional avoidance or mitigation measures would be needed. If work would occur during the Swainson's hawk breeding period (generally late March to late August), it may be possible to conduct Swainson's hawk nest surveys each year in which project activities would occur and then schedule well site development activities to preclude work within an approved buffer zone (¼ to ½ mile depending on site-specific conditions) from the active nest (**BIO-10)**. If work must occur during the breeding period and within the prescribed nest buffer zone, the project proponent may need to obtain an ITP from CDFW.

Night lighting associated with the proposed project could also adversely affect Swainson's hawks. Night lighting can affect bird communication, foraging, thermoregulation behavior, and migration (**BIO-13**). Use of downward-directed, fully shielded night lighting can minimize the potential effects on Swainson's hawk.

Implementation of APMs, BMPs, and mitigation measures **BIO-1, BIO-10, BIO-12, and BIO-13** would reduce potential impacts to Swainson's hawks (Section 7).

6.3.4 Northwestern Pond Turtles and Northern Leopard Frogs

Potentially suitable habitat for northwestern pond turtles and/or northern leopard frogs could be present in the pond east of Well Site 43-13. Subsequent surveys could be undertaken to document the presence/absence of northern leopard frogs in the pond (**BIO-11**). If northwestern pond turtles[5] or northern leopard frogs are present or if it is not practicable to conduct such surveys and the applicant assumes presence of the species, implementation of avoidance and minimization measures would be appropriate (**BIO-11**). Likely avoidance and mitigation measures would consist of establishing and maintaining exclusionary fencing between the pond and nearby work areas (Well Sites 33-13, 33A-13, and 43-13), monitoring for turtle nesting activity, protecting confirmed nests, monitoring for frog presence, and having a qualified biologist relocate any northwestern pond turtles or northern leopard frogs that may enter the work area.

[5] Proposed threatened species are not protected by the take prohibitions of section 9, consistent with any protective regulations finalized under section 4(d) of the ESA, until the rule to list is finalized. Under section 7(a)(4) of the ESA, Federal agencies must confer with the Service if their action will jeopardize the continued existence of a proposed species.

Compliance with the conditions of the Waste Discharge Requirements and General Construction Stormwater Permit to be obtained for the project would be protective of northwestern pond turtles and northern leopard frogs by preventing water quality impairment in waters and wetlands that may serve as habitat. Implementation of APMs, BMPs, and mitigation measures **BIO-1, BIO-3, and BIO-11** would also reduce potential impacts on northwestern pond turtles and northern leopard frogs (Section 7).

6.3.5 Monarch Butterflies

One population of milkweed was identified about 40 feet outside the proposed access road corridor. These milkweeds would not be directly affected by project implementation. If monarch butterfly larvae are present on the plants during the summer breeding season, there is a slight possibility that they could be adversely affected by increased dust, which could clog the pores in the butterfly's body that are used to obtain oxygen. However, implementation of standard dust control practices would ensure that the butterfly and its larvae are not adversely affected.

Monarch butterflies may also be indirectly affected by night lighting associated with the proposed project, in which test well drilling would occur 24 hours per day. Monarchs migrate during daytime hours. Their sense of direction is based on an internal circadian clock and use of the sun as a compass. A recent study by researchers at the University of Cincinnati showed that night lighting disrupts the monarchs' circadian clock function, which in turn can disrupt migratory behavior (Parlin et al., 2022). Use of downward-directed, fully shielded night lighting can minimize the potential effects on the butterfly (**BIO-13**).

If subsequent botanical surveys (**BIO-5, BIO-7**) identify the presence of milkweed populations in the study area, removal of the plants may be necessary. If removal of the plants occurs before the monarchs migrate into the area (which could occur as early as May 15), then there would be no direct adverse effects on the butterfly. If the butterflies are present at the time plant removal would occur, then a survey would be needed to determine if monarch eggs or larvae are present on the plants to be removed; work could proceed only if monarch eggs and larvae are absent. If milkweeds are removed at any time of the year, it would reduce the extent of breeding habitat for the monarchs. This impact could be offset by planting milkweeds in the project vicinity (**BIO-8**).

Implementation of APMs, BMPs, and mitigation measures **BIO-1, BIO-3, BIO-5-BIO-8, and BIO-13, and BIO- 14** would reduce potential impacts on monarch butterflies (Section 7).

6.4 Wildlife Movement Corridors and Nursery Sites

The study area is not within designated critical habitat for listed species; however, it is within an area mapped as "essential connectivity area" for wildlife by the California Essential Habitat Connectivity Project (CDFW 2025c). Greater sandhill cranes and other birds use the study area and adjacent areas to nest and raise young (Pacific Flyway Council 1997). Project activities could impact up to 0.007 percent (39.5 acres) of the 595,069.75-acre Warner Mountains-Mount Bidwell/Larkspur Hills ECA (**Figure 15 in Appendix E**). The existing wellhead at the southern end of the study area west of Surprise Valley Road intersects mule deer critical winter range (**Figure 16 in Appendix E**). No other well sites or roads intersect mule deer range.

While the study area is mapped within ECA, it is also subject to annual alteration via agricultural practices, with meadows mowed and baled for hay production seasonally, including during the breeding season for greater sandhill cranes and other nesting birds. Therefore, wildlife in the study area are acclimated to seasonal disruptions to meadow habitat.

Habitat fragmentation would occur where geothermal testing well sites and access roads are developed. These areas of alteration would be small in relation to the available habitat and would not be expected to result in exclusion of wildlife when appropriate APMs, BMPs, and mitigation measures are implemented. The general objective of the final reclamation phase (Section 2.4) is to return the site as close as possible to the conditions prior to geothermal development.

Impacts to wildlife movement corridors and nursery sites would be reduced by implementation of APMs, BMPs, **BIO-1, BIO-3-BIO-4, BIO-8 -BIO-10, and BIO-12 through BIO-14**. These mitigation measures provide avoidance, minimization, and mitigation for effects to sensitive habitats that provide nursery sites for wildlife as well as for effects to specific species of wildlife known to use the area for movement or reproduction.

6.5 Nesting Migratory Birds

As discussed above, several active bird nests were observed in the project work area during the field surveys, and most of the proposed well sites have a moderate to high potential to support nesting migratory birds. If ground-disturbing construction activities are initiated during the nesting season, nesting migratory birds could be directly impacted through loss of nests, eggs, and/or young. With respect to indirect effects, a Caltrans study (2016) has shown that:

> *"…construction or traffic noise that adds significantly to natural ambient noise has the possibility of producing a suite of significant short- and long-term behavioral and physiological changes in birds. These may include changes in foraging location and behavior; interference with acoustic communicate [sic] between conspecifics; failure to recognize other important biological signals, such as sounds of predators and/or prey; decreasing hearing sensitivity temporarily or permanently; and/or increasing stress and altering steroid hormone levels. Any of these effects could have long-term consequences and enduring impacts that include interference with breeding by individuals and populations, thereby threatening the survival of individuals or species."*

Given the observation of active bird nests in the study area, nesting birds could be directly or indirectly affected by construction activities. Direct effects could include mortality resulting from construction equipment operating in an area containing an active nest with eggs or chicks. Indirect effects could include nest abandonment by adults in response to loud noise levels or human encroachment, or a reduction in the amount of food available to young birds due to changes in feeding behavior by adults. High noise levels generated by the proposed project activities, such as drilling 24 hours per day, may also discourage birds from nesting in the project vicinity.

Most birds in the study area nest between February 1 and August 31. The potential for adversely affecting nesting birds can be greatly minimized by conducting site preparation and construction activities either before February 1 or after August 31. If this is not possible, a nesting bird survey should be conducted prior to commencement of construction. If active nests are found, construction activities

would need to be postponed until after the young birds have fledged. Recommended mitigation measures are provided in Section 7.

The proposed project would increase noise levels above natural ambient noise levels as described in Section 6.3.1.2 above and could thus adversely affect nesting migratory birds by reducing the potential that birds will nest in the proximity of ongoing noise sources and by increasing the potential for nest abandonment due to increased noise levels.

Implementation of APMs, BMPs, and mitigation measures **BIO-1, BIO-3, BIO-12, and BIO-13** would reduce potential impacts on nesting birds (Section 7).

6.6 Noxious Weeds

Construction activities have a high potential to export weeds outside of the project area and/or to import additional weed species into the area. The potential for introduction and spread of noxious weeds can be avoided/minimized by using only certified weed-free erosion control materials, mulch, and seed; limiting any import or export of fill material to material that is known to be weed free; and requiring the construction contractor to thoroughly wash all equipment at a commercial wash facility prior to entering and upon leaving the work site.

Implementation of APMs, BMPs, and mitigation measures **BIO-1, BIO-5, and BIO-14** would reduce potential impacts from noxious weeds (Section 7).

SECTION 7 Recommended Avoidance, Minimization, and Mitigation Measures

The project as currently proposed would unavoidably affect wetlands subject to the jurisdiction of the State Water Boards and could potentially affect streams subject to the jurisdiction of the California Department of Fish and Wildlife. Permits issued by these agencies are expected to contain standard measures to avoid, minimize, and offset adverse environmental effects of the proposed project. Compliance with other existing regulations such as the Construction Stormwater General Permit will also avoid or minimize impacts due to increased erosion and sedimentation. Compliance with existing regulations, permit conditions, and the following measures will ensure that project implementation will not adversely affect significant biological resources.

7.1 Suggested Mitigation Measures

BIO-1. Worker Environmental Awareness Program (WEAP)

Prior to commencement of any earth disturbance (e.g., clearing, grading, trenching, etc.), all contractors, work crews, and any onsite personnel shall receive training from a qualified biologist regarding protective measures for special-status animal species and sensitive habitats that could exist in the project area. If new personnel are added to the project, the project applicant shall ensure that they receive the mandatory training before starting work. At a minimum, the training shall include the following:

a) A review of the special-status species that could occur in the project study area, the life history and habitat requirements for each species, the locations where the species could occur, the laws and regulations that protect these species, procedures to be implemented in the event that these species are encountered during construction, and the consequences of noncompliance with those laws and regulations.

b) A review of sensitive natural communities such as wetlands and other waters of the State that occur in the study area.

c) A review of applicable mitigation measures, standard construction measures, best management practices, and resource-agency permit conditions that apply to the protection of special-status species and sensitive habitats.

BIO-2. Supplemental Aquatic Resources Delineation

Prior to project implementation, the project applicant shall conduct a supplemental field evaluation to evaluate the presence/absence of wetlands and other waters of the state. The evaluation shall address any lands in the final project footprint that were not sufficiently addressed in the 2025 study (as described in this report). Upon completion of the evaluation, an aquatic resources delineation map and report meeting State Water Board standards shall be prepared and submitted for agency review and approval.

BIO-3: Avoid Indirect Impacts to Wetlands

High-visibility fencing, flagging, or other markers shall be installed along the outer edges of the construction zone adjacent to wetlands and other waters designated for avoidance. The fencing location shall be determined by a qualified biologist in consultation with the project manager. No construction activities (e.g., clearing, grading, trenching, etc.), including vehicle parking and materials stockpiling, shall occur within the avoidance area. The exclusionary fencing shall be periodically inspected during construction activities to ensure the fencing is properly maintained. The fencing shall be removed upon completion of work.

BIO-4. Wetland Restoration Plan

Prior to implementation of any work in wetlands or other waters of the State, the project applicant shall prepare a wetland restoration plan. At a minimum, the plan shall address the removal and storage of topsoil (which will be stockpiled for the duration of the test well development and evaluation); post-project removal of the constructed well pads, access roads, equipment, fencing, and other imported materials and equipment; restoration of pre-existing topography and site drainage; soil decompaction and other pre-planting site preparation activities; redistribution of the stockpiled topsoil; use of locally sourced native species for revegetation; sourcing of propagules, density of planting, and planting techniques and timing; post-planting monitoring activities and revegetation success criteria; maintenance activities such as weed control; annual reporting requirements; and adaptive management measures to ensure that the established success criteria are met. Plan implementation, monitoring, and reporting shall then be conducted by the applicant as prescribed in the approved plan.

BIO-5. Supplemental Botanical Survey and Evaluation

Prior to project implementation, the project applicant shall conduct a supplemental field evaluation to evaluate the presence/absence of special-status plant species as well as noxious weed populations. The evaluation shall address any lands in the final project footprint that were not sufficiently addressed in the 2025 study (as described in this report). Upon completion of the evaluation, a botanical survey report meeting California Department of Fish and Wildlife standards shall be prepared and submitted for agency review and approval.

BIO-6. Mitigation Plan Addressing the Loss of Special-Status Plant Species

Prior to project implementation, a qualified biologist shall review the final project design to determine if work could directly or indirectly affect the special-status plant populations identified in the 2025 study or in subsequent botanical field surveys. If the project could directly or indirectly affect special-status plant species, a mitigation plan acceptable to the California Department of Fish and Wildlife shall be prepared and submitted to the agency for review and approval. Mitigation could potentially be achieved through reestablishment or enhancement of the existing populations on or adjacent to the work site, creation of new self-sustaining populations, preservation of offsite populations and surrounding buffer zones, or a combination of these approaches. Plan implementation, monitoring, and reporting shall then be conducted by the applicant as prescribed in the approved plan.

BIO-7. Supplemental Milkweed Survey

Prior to project implementation, the project applicant shall conduct a supplemental field evaluation to evaluate the presence/absence of milkweeds (*Asclepias* spp.). The evaluation shall address any lands in the final project footprint that were not sufficiently addressed in the 2025 study (as described in this report). Upon completion of the evaluation, botanical survey report meeting California Department of Fish and Wildlife standards shall be prepared and submitted for agency review and approval.

BIO-8. Monarch Butterfly Breeding Habitat Loss Offset if Warranted

The monarch butterfly is currently proposed for federal listing as threatened under the Endangered Species Act. Because no federal permits or funding would be needed for the proposed project, no mitigation is currently required at the federal level. If, at the time project construction is initiated, the western migratory population of the monarch butterfly is State listed, a Candidate for state listing, or otherwise qualifies for State protection as determined by CDFW , mitigation may be required. If mitigation is required, it shall consist of the following:

- If milkweeds are present in or adjacent to the work area, and can be avoided during construction, temporary marking such as fencing or flagging shall be established to protect the plants; the marking shall be maintained in good condition throughout the duration of construction.
- If the milkweeds cannot be avoided, then they shall be removed outside of the monarch summer breeding season, if possible. If milkweeds must be removed during the monarch breeding season, a biologist shall inspect each milkweed for the presence of monarch butterfly eggs, larvae, and pupae prior to its removal. If monarch butterfly eggs, larvae, or pupae are present, the milkweed shall not be removed until the biologist determines that the milkweed is no longer hosting the monarch butterfly. This may require rescheduling of construction in those areas supporting milkweeds.
- If removal of milkweeds is required at any time during the pre-construction or construction periods, one of the following options shall be implemented:
    - If, prior to project initiation, the US Fish and Wildlife Service (USFWS) or California Department of Fish and Wildlife approves a mitigation banking or in-lieu fee program to offset impacts to the monarch butterfly, the project applicant shall purchase credits or pay fees at an amount/ratio acceptable to the agency.
    - If no mitigation banking or in-lieu fee program is available prior to project initiation, the project applicant shall re-establish milkweeds in the immediate area in the fall or spring following completion of construction. This shall be accomplished by planting seeds or rooted milkweed seedlings/cuttings. The planted milkweeds shall be locally sources and of the same species as those removed. Planting shall be conducted at a sufficiently high ratio to ensure success, which is defined as establishing at least one milkweed plant per milkweed plant removed as determined through field monitoring one year after the milkweed planting is undertaken. If the minimum success ratio is not met, milkweed seeding/planting shall continue in successive years until the success criterion is met.

Documentation regarding milkweed re-establishment and success shall be provided to the lead agency on an annual basis until the success criterion is met. The planting program may be undertaken by the applicant, its contractors, or a third-party conservation-oriented entity such as a Resource Conservation District.

BIO-9. Protection of Greater Sandhill Crane Nest Sites and Flightless Young

To the greatest extent possible, ground-disturbing work (e.g., site preparation, well development, reclamation) would be performed between September 1 and March 30 to avoid the greater sandhill crane breeding season.

When work within the greater sandhill crane breeding season (April 1-August 30) cannot be avoided, preconstruction nesting greater sandhill crane surveys would be completed within 0.5 miles of the proposed work area no more than 30 days prior to construction initiation. If no occupied nests are found, construction would proceed. If active nests or flightless young are identified within the survey area, a no-disturbance buffer would be established at a distance of no less than 500 feet to minimize disturbance. The buffer may be increased at the discretion of a qualified biologist based on the nest location, topography, and cover. No ground-disturbing activities would occur within the 500-foot buffer around active nest sites.

If active nests or flightless young are found within the survey area but outside of the 500-foot no-disturbance buffer, a qualified biologist shall be on site to monitor the nest/flightless young for signs of disturbance (e.g., agitated behavior or modified foraging or feeding behavior). If it is determined by the biologist that construction activities are resulting in disturbance, work shall cease immediately and CDFW shall be contacted to determine adequate protective measures.

To the greatest extent possible, initiation of well drilling would be scheduled to begin during the non-breeding season to minimize noise disturbance as drilling is the project activity that would generate the most noise. Once drilling begins, noise generation would be sustained for up to 17 months and therefore constitute baseline conditions at the beginning of the subsequent nesting season. Additionally, Applicant Proposed Measure is included in the Project to install mufflers/silencers on drilling equipment, further reducing noise impacts during drilling.

BIO-10. Protection of Swainson’s Hawk Nests

To the greatest extent possible, ground-disturbing work (e.g., site preparation, well development, reclamation) would be performed between September 1 and March 30 to avoid the Swainson's hawk nesting season. No potentially suitable nesting trees for Swainson's hawk would be removed as part of the project.

When work within the Swainson's hawk nesting season (April 1-August 30) cannot be avoided, preconstruction nesting Swainson's hawk surveys would be completed within 0.25 miles (1,320 ft) to 0.5 miles (2,640 feet) of the proposed work area no more than 15 days prior to any ground-disturbing project work. The survey area would be determined at the discretion of a qualified biologist based on influencing factors such as topography or landcover. If active construction lapses for more than 15 days during the nesting season, another preconstruction survey for nesting Swainson's hawks would be

required. If active nests are identified within the survey area, a no-disturbance buffer would be established at a distance of no less than 1,320 feet to minimize disturbance from noise and construction activity until the young have been confirmed to have fledged by a qualified biologist. A larger no-disturbance buffer may be implemented at the discretion of the qualified biologist.

To the greatest extent possible, initiation of well drilling would be scheduled to begin either during the non-breeding season or after nestlings within 1,320 feet of the well have been confirmed to have fledged by a qualified biologist to avoid potential sudden noise disturbance to nesting adults. Once drilling begins, noise generation would be sustained for up to 17 months and therefore constitute baseline conditions at the beginning of the subsequent nesting season.

BIO-11. Northwestern Pond Turtle and Northern Leopard Frog Surveys and Avoidance

Prior to commencement of construction activities within 500 feet of the pond east of Well Site 43-13, a qualified biologist shall conduct a pre-construction survey for northwestern pond turtles and northern leopard frogs at an appropriate time(s) of year. Alternatively, presence of these species could be presumed rather than conducting surveys. If the biologist can document that northwestern pond turtles and northern leopard frogs are not present in the pond, no additional work is needed.

If northwestern pond turtles are confirmed present or presumed present:

- Construction during the breeding season for northwestern pond turtles (April through August) shall be avoided if feasible.
- Within one week prior to initiation of construction at work sites within 500 feet of the pond, preconstruction surveys shall be performed by a qualified biologist within the work site, including a 50-foot buffer, to determine whether northwestern pond turtles or active nests are present.
- If active nests are present, they shall be flagged and avoided until the eggs have hatched or the nests are no longer active, as determined by the qualified biologist. To avoid impacts to northwestern pond turtles, construction shall not occur within 50 feet of an active nest site.
- Prior to Project activities within 500 feet of the pond, exclusionary fencing shall be erected to ensure northwestern pond turtles are kept out of the construction area. This fencing will be maintained until the permanent chain link fencing around the well pad is in place. The integrity of the exclusion fencing will be checked daily.
- The work site will be checked every morning before construction begins to ensure that no turtles are within the exclusion area.
- If a northwestern pond turtle individual or nest is observed in the impact area, construction activities will stop until a qualified biologist establishes an appropriate buffer, or the turtle is no longer in the impact area.
- A qualified biologist may relocate northwestern pond turtles to an appropriate nearby location if necessary. Relocation areas shall be approved by CDFW prior to relocation of any turtles.

If northern leopard frogs are confirmed present or presumed present:

- Exclusionary fencing shall be erected between the pond and work areas within 50 feet of the pond to prevent access to the site by migrating frogs.
- The exclusionary fencing shall be inspected and maintained throughout the duration of construction.
- If northern leopard frogs are encountered on site access roads or within the exclusionary fencing at any time during construction, construction personnel shall contact a qualified biologist and halt construction activities within 50 feet of the animal until it has left the area or is relocated by the qualified biologist.

BIO-12. Nesting Bird Surveys and Avoidance

In order to avoid impacts to nesting birds, including raptors, protected under the federal Migratory Bird Treaty Act and California Fish and Game Code §3503 and §3503.5, including their nests and eggs, one of the following shall be implemented:

- Vegetation removal and other ground-disturbance activities associated with construction shall occur between September 1 and March 1 when birds are not nesting; or
- If vegetation removal or ground disturbance activities occur during the nesting season, a pre-construction nesting survey shall be conducted by a qualified biologist to identify active nests in and adjacent to the work area.

Surveys shall begin prior to sunrise and continue until vegetation and nests have been sufficiently observed. The survey shall take into account acoustic impacts and line-of-sight disturbances occurring as a result of the project in order to determine a sufficient survey radius to avoid nesting birds.

At a minimum, the survey report shall include a description of the area surveyed, date and time of the survey, ambient conditions, bird species observed in the area, a description of any active nests observed, any evidence of breeding behaviors (e.g., courtship, carrying nest materials or food, etc.), and a description of any outstanding conditions that may have impacted the survey results (e.g., weather conditions, excess noise, the presence of predators, etc.).

The results of the survey shall be submitted to the California Department of Fish and Wildlife upon completion. The survey shall be conducted no more than one week prior to the initiation of construction. If construction activities are delayed or suspended for more than one week after the pre-construction survey, the site shall be resurveyed.

If active nests are found, the project biologist shall contact the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service regarding appropriate action to comply with the Migratory Bird Treaty Act and California Fish and Game Code §3503. Compliance measures may include, but are not limited to, exclusion buffers, sound-attenuation measures, seasonal work closures based on the known biology and life history of the species identified in the survey, as well as ongoing monitoring by biologists.

BIO-13. Minimize Impacts due to Night Lighting

Project activities shall be designed to minimize the use of artificial light during the hours of dusk and dawn, as these times are when many wildlife species are most active. When night lighting must be used,

it shall be motion-activated to decrease wildlife exposure to artificial light. The lighting shall also be shielded and directed downward and “warm” lighting shall be used to minimize wildlife disruption, i.e., LED lighting with a correlated color temperature at or under 2,700 Kelvin.

BIO-14. Avoid/Minimize the Potential for Introduction and Spread of Noxious Weeds

The potential for introduction and spread of noxious weeds shall be avoided/minimized by:

- Using only certified weed-free erosion control materials, mulch, and seed,
- Limiting any import or export of fill material to material that is known to be weed free, and
- Requiring the construction contractor to thoroughly wash all equipment at the nearest commercial wash facility prior to entering and upon leaving the job site.

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SECTION 9 Staff Qualifications

9.1 Lead Biologist – Donald Burk

Mr. Burk received his Master of Science degree in Botany, and Bachelor of Arts degree in Chemistry and Biological Sciences from California State University, Chico. Having worked in the environmental consulting field since 1981, he has an in-depth background in a broad spectrum of environmental studies. His experience includes managing the preparation of CEQA/NEPA environmental compliance documents, environmental site assessments, wildlife and botanical studies, wetland delineations, reclamation plans, and stream restoration projects. Mr. Burk was responsible for the biological surveys, wetland evaluation, and final report review.

9.2 Staff Botanist – Kathleen Pate

Ms. Pate recently completed her undergraduate degree in Botany at California State Polytechnic University, Humboldt. She has completed numerous courses related to botany, ecology, and environmental science. Ms. Pate has served as an intern with Catalyst for three seasons and is now a full-time employee; during that time, she has assisted with biological and botanical surveys, construction monitoring, and environmental document preparation. Ms. Pate conducted the biological records review and drafted this report.

9.3 GIS Analyst – Hannah Raab

Ms. Raab received her Bachelor of Science in Environmental Science and Management (Natural Resource Management) from the University of California, Davis and her Geographic Information Systems (GIS) certificate from Shasta College in Redding, California. Ms. Raab designed and prepared project maps for this report.

9.4 Technical Review – Emily Merickel

Ms. Merickel received her Master of Science degree in Biology from Minnesota State University – Mankato in 2009 and her Bachelor of Science degree in Fisheries and Wildlife from Michigan State University in 2006. Ms. Merickel has been working in environmental consulting since 2010 and has a breadth of experience conducting biological and aquatic surveys and preparing complex CEQA and NEPA documents, biological resources baseline reports, aquatic resources reports, biological assessments for Section 7 Endangered Species Act compliance, and other environmental documentation. Ms. Merickel provided technical expertise and technical editing for the draft report.

APPENDIX A – SPECIES OCCURRENCE TABLES

TABLE 1
Rarefind (CNDDB) Report Summary
Surprise Valley Geothermal; Five-Mile Radius of Project Area
January 2026

Listed Element	Quadrangle[1]							Status [2]
	LC	DC	FB	CV	SH	PP	BHS	
	ANIMALS							
American badger	●							SSSC
American goshawk	●	●	●					SSSC
Gray-headed pika				●				None
Greater sandhill crane	●			●				ST, SFP
North American porcupine	●			●	●			None
Northern leopard frog	●							SSSC
Prairie falcon	●	●		●		●		WL
Swainson's hawk				●				ST
	PLANTS							
Aleppo avens		●						2B.2
Beautiful sagebrush bluebells		●			●			2B.2
Blue alpine phacelia						●		2B.2
Broad-nerved hump moss		●						2B.2
Desert popcornflower	●							2B.2
Doublet	●			●				2B.3
Dwarf resin birch		●						2B.2
Gray's lomatium	●							2B.3
Great Basin nemophila				●				2B.3
Green shield-moss		●						2B.2
Hairy marsh hedge-nettle	●							2B.3
Hillside arnica				●				2B.2
Kitten-tails		●				●		2B.3
Macdougal's lomatium				●				2B.2
Many-flowered thelypodium							●	2B.2
Modoc bedstraw				●				1B.2
North American moonwort		●						2B.3
Northwestern moonwort		●						2B.2
Oregon campion		●						2B.2
Paiute lomatium				●				2B.3
Prostrate buckwheat				●				1B.2
Rosy orthocarpus		●						2B.1
Scalloped moonwort		●						2B.2
Squarestem phlox				●				2B.3
Tundra thread moss						●		2B.3
Warner mountains buckwheat		●						1B.3
Western goblin		●						2B.1
Yakima bird's-beak		●						2B.2

Highlighting denotes the quadrangle in which the project site is located

[1]QUADRANGLE CODE

LC Lake City
DC Davis Creek
FB Fort Bidwell
CV Cedarville
SH Sugar Hill
PC Payne Peak
BHS Boyd Hot Springs

[2]STATUS CODES

Federal

FE	Federally Listed – Endangered
FT	Federally Listed – Threatened
FC	Federal Candidate
FP	Federal Proposed
FD	Federally Delisted
FSC	Federal Species of Concern
FBCC	Federal Bird of Conservation Concern

State

SFP	State Fully Protected
SR	State Rare
SE	State Listed – Endangered
ST	State Listed – Threatened
SC	State Candidate
SD	State Delisted
SSSC	State Species of Special Concern
WL	Watch List

Rare Plant Rank

1A	Plants Presumed Extinct in California
1B	Plants Rare, Threatened or Endangered in California and Elsewhere
2	Plants Rare, Threatened, or Endangered in California, but More Common Elsewhere
3	Plants About Which We Need More Information *(A Review List)* (generally not considered special-status, unless unusual circumstances warrant)
4	Plants of Limited Distribution *(A Watch List)* (generally not considered special-status, unless unusual circumstances warrant)

Rare Plant Threat Ranks

0.1 Seriously Threatened in California

0.2 Fairly Threatened in California

0.3 Not Very Threatened in California

TABLE 2
California Native Plant Society
Inventory of Rare and Endangered Plants
U.S. Geological Survey's Lake City 7.5-minute Quadrangle

Common Name	Scientific Name	CA Rare Plant Rank	Blooming Period	State Listing Status	Federal Listing Status
Beautiful sagebrush bluebells	*Mertensia oblongifolia* var. *amoena*	2B.2	Apr-Jul	None	None
Desert popcornflower	*Plagiobothrys salsus*	2B.2	May-Aug	None	None
Doublet	*Dimeresia howellii*	2B.3	May-Sep	None	None
Gray's lomatium	*Lomatium grayi*	2B.3	Apr-Jun	None	None
Hairy marsh hedge-nettle	*Stachys pilosa*	2B.3	Jun-Aug	None	None
Mountain lady's-slipper	*Cypripedium montanum*	4.2	Mar-Aug	None	None

Rare Plant Rank	
1A	Plants Presumed Extinct in California
1B	Plants Rare, Threatened or Endangered in California and Elsewhere
2	Plants Rare, Threatened, or Endangered in California, but More Common Elsewhere
3	Plants About Which We Need More Information – A Review List (generally not considered special-status, unless unusual circumstances warrant)
4	Plants of Limited Distribution – A Watch List (generally not considered special-status, unless unusual circumstances warrant)
Rare Plant Threat Rank	
0.1	Seriously Threatened in California
0.2	Fairly Threatened in California
0.3	Not Very Threatened in California

Source: *California Native Plant Society, Rare Plant Program. 2026. Inventory of Rare and Endangered Plants of California (online edition, v-9.5.1a). http://www.rareplants.cnps.org. Accessed January 2026.*

Status Codes			
Federal		***State***	
FE	Federally Listed – Endangered	SFP	State Full Protected
FT	Federally Listed – Threatened	SR	State Rare
FC	Federal Candidate	SE	State Listed – Endangered
FP	Federal Proposed	ST	State Listed – Threatened
FD	Federal Delisted	SC	State Candidate
FSC	Federal Species of Concern	SD	State Delisted
FBCC	Federal Bird of Conservation Concern	SSSC	State Species of Special Concern
		WL	Watch List

TABLE 3
Potential for Special-Status Species to Occur on the Project Site
Surprise Valley Geothermal Project

January 2026

COMMON NAME	SCIENTIFIC NAME	STATUS[1]	GENERAL HABITAT DESCRIPTION	HABITAT PRESENT (Y/N)	CRITICAL HABITAT PRESENT (Y/N)	SPECIES PRESENT (Y/N/POT.)	RATIONALE/COMMENTS
PLANTS							
Aleppo avens	*Geum aleppicum*	2B.2	Aleppo avens, an herbaceous perennial, grows in meadows within Great Basin scrub and lower montane coniferous forest. The species is reported between 1,400 and 5,000 feet in elevation. The flowering period is June through August.	Yes	No	Pot.	Potentially suitable habitat for Aleppo avens is present in the study area. Although the species was not observed during the botanical field survey, some of its potential habitat had been mowed prior to the plant's blooming period. Therefore, the species may have been present but was not detectable.
Beautiful sagebrush bluebells	*Mertensia oblongifolia* var. *amoena*	2B.2	Beautiful sagebrush bluebells occur in several types of habitats in the western United States, including open slopes, drier meadows, and sagebrush scrub. The species is reported at elevations from 5,350 to 8,000 feet. The flowering period is April through July.	No	No	No	The project site is below the reported elevation range for sagebrush bluebells and no suitable habitat for the species is present in the study area. The species was not observed during the botanical survey and is not expected to be present.
Blue alpine phacelia	*Phacelia sericea* var. *ciliosa*	2B.2	In California, blue alpine phacelia is found in the Klamath Ranges and Warner Mountains between 6,900 and 8,850 feet. The species grows in forest openings on rocky and sandy substrates. The flowering period is June through August.	No	No	No	The project site is well below the reported elevation range for sagebrush bluebells and no suitable habitat for the species is present in the study area. The species was not observed during the botanical survey and is not expected to be present.
Broad-nerved hump moss	*Meesia uliginosa*	2B.2	Broad-nerved hump moss occurs in rich fens, on moist to wet soil or humus, and occasionally on decomposing logs, at elevations from 3600 to 9200 feet. The species often forms dense green to yellowish tufts up 1.2 inches tall.	No	No	No	This species often occurs in wetlands with high calcium carbonate concentrations but is not reported in other alkaline habitats. Broad-nerved hump moss was not observed during the botanical survey and is not expected to be present.

TABLE 3
Potential for Special-Status Species to Occur on the Project Site
Surprise Valley Geothermal Project

January 2026

COMMON NAME	SCIENTIFIC NAME	STATUS[1]	GENERAL HABITAT DESCRIPTION	HABITAT PRESENT (Y/N)	CRITICAL HABITAT PRESENT (Y/N)	SPECIES PRESENT (Y/N/POT.)	RATIONALE/COMMENTS
Desert popcornflower	*Plagiobothrys salsus*	2B.2	Desert popcornflower occurs in the Great Basin and Desert provinces of California. It grows in moist saline or alkaline habitats including mud flats and marshes. The species is reported between 2,000 and 4,625 feet in elevation. The flowering period is from March through July.	Yes	No	Yes	Desert popcornflower was observed at four locations in and adjacent to the study area.
Doublet	*Dimeresia howelli*	2B.3	Doublet occurs on slopes with dry gravelly volcanic soils in pinyon-juniper woodlands and lower montane conifer forests. The species is reported between 4,350 and 8,200 feet in elevation. The flowering period extends from May through September.	Yes	No	No	Although potentially suitable habitat for doublet is present in the small portions of the study area, the species was not observed during the botanical field survey and is not expected to be present.
Dwarf resin birch	*Betula glandulosa*	2B.2	Dwarf resin birch occurs in bogs, fens, meadows, seeps, marshes, and swamps. The species is reported between 4,200 and 7,600 feet in elevation. The flowering period is in May and June.	Yes	No	No	Although potentially suitable habitat for dwarf resin birch is present in the study area, the species was not observed during the botanical field survey and is not expected to be present.
Gray's lomatium	*Lomatium grayi*	2B.3	Gray's lomatium occurs in the Modoc Plateau and Warner Mountains where it grows on rocky banks and slopes in Great Basin scrub and pinon-juniper woodland habitats. The species is reported between 4,200 and 6,500 feet in elevation. The flowering period is from April to June.	Yes	No	No	The species was observed along Surprise Valley Road in the project vicinity in 1995, growing on a roadcut with rocky volcanic soil. Small amounts of marginally suitable habitat for Gray's lomatium are present on the western edge of the study area. However, the species was not observed during the botanical field survey and is not expected to be present.

TABLE 3
Potential for Special-Status Species to Occur on the Project Site
Surprise Valley Geothermal Project

January 2026

COMMON NAME	SCIENTIFIC NAME	STATUS[1]	GENERAL HABITAT DESCRIPTION	HABITAT PRESENT (Y/N)	CRITICAL HABITAT PRESENT (Y/N)	SPECIES PRESENT (Y/N/POT.)	RATIONALE/COMMENTS
Great Basin nemophila	*Nemophila breviflora*	2B.3	Great Basin nemophila is an annual herb that occurs along streams, springs, and ponds, and on mesic cliffs and rocky slopes in the Modoc Plateau. The species is reported between 2,900 and 8,000 feet in elevation. The flowering period is May through July.	Yes	No	No	Small amounts of marginally suitable habitat for Great Basin nemophila are present in the study area. However, the species was not observed during the botanical field survey and is not expected to be present.
Green shield-moss	*Buxbaumia viridis*	2B.2	Green shield-moss grows in lower mountain coniferous forest, subalpine coniferous forest, and upper montane coniferous forest. Typically, it grows on fallen, decorticated logs or humus. The species grows between 3,200 and 7,200 feet in elevation.	No	No	No	No suitable forest habitat with downed trees is present in the study area. Green shield-moss would not be present.
Greene's tuctoria	*Tuctoria greenei*	FE, 1B.1	Greene's tuctoria occurs in vernal pools in valley and foothill grasslands below 4,500 feet in elevation. The flowering period is May through July.	No	No	No	No suitable habitat for Greene's tuctoria is present in the study area. The species would not be present.
Hairy marsh hedge-nettle	*Stachys pilosa*	2B.3	Hairy marsh hedge-nettle is a perennial herb that occurs in mesic sites within Great Basin scrub, and meadow/seep habitats, particularly along streams, ditches, and ponds. The species is found between 2,500 and 5,000 feet in elevation. The flowering period is June through August.	Yes	No	Pot.	Hairy marsh-nettle has previously been observed in or near the project area. Although it was not observed during the 2025 surveys, the species has a high potential to be present.

TABLE 3
Potential for Special-Status Species to Occur on the Project Site
Surprise Valley Geothermal Project

January 2026

COMMON NAME	SCIENTIFIC NAME	STATUS[1]	GENERAL HABITAT DESCRIPTION	HABITAT PRESENT (Y/N)	CRITICAL HABITAT PRESENT (Y/N)	SPECIES PRESENT (Y/N/POT.)	RATIONALE/COMMENTS
Hillside arnica	*Arnica fulgens*	2B.2	Hillside arnica occurs on open, damp depressions and meadows within sagebrush scrub and juniper woodlands between 4,300 and 8,900 feet in elevation. The flowering period is May through July.	No	No	No	This species prefers meadow habitat drier than that in the study area and is typically closely associated with woodland or forest habitat. No suitable habitat for hillside arnica is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.
Kitten-tails	*Synthyris missurica* ssp. *missurica*	2B.3	In California, kitten-tails grow in moist forest habitats at elevations of 6,300 to 9520 feet, in the Warner Mountains. The flowering period is from March through July.	No	No	No	The project site is well below the reported elevation range for kitten-tails and no suitable habitat for the species is present in the study area. The species was not observed during the botanical survey and is not expected to be present.
Macdougal's lomatium	*Lomatium foeniculaceum* ssp. *macdougalii*	2B.2	MacDougal's lomatium occurs on volcanic soil in chenopod scrub, Great Basin scrub, lower montane coniferous forest, and pinyon-juniper woodland habitats. The species is reported between 4,000 and 7,250 feet. The flowering period is April to July.	Yes	No	No	Marginally suitable habitat for the species is present on the western edge of the study area. However, the species was not observed during the botanical field survey and is not expected to be present.
Many-flowered thelypodium	*Thelypodium milleflorum*	2B.2	Many-flowered thelypodium grows in sandy soils within Great Basin scrub and chenopod scrub habitats. It occurs at elevations between 3,900 and 8,200 feet. The flowering period is from April through August.	No	No	No	No suitable habitat for many-flowered thelypodium is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.

TABLE 3
Potential for Special-Status Species to Occur on the Project Site
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COMMON NAME	SCIENTIFIC NAME	STATUS[1]	GENERAL HABITAT DESCRIPTION	HABITAT PRESENT (Y/N)	CRITICAL HABITAT PRESENT (Y/N)	SPECIES PRESENT (Y/N/POT.)	RATIONALE/COMMENTS
Modoc bedstraw	*Galium glabrescens* ssp. *modocense*	1B.2	Modoc bedstraw grows in volcanic talus and on gravelly slopes in the Warner Mountains. It occurs at elevations between 5,000 and 9,150 feet. The flowering period is from June through August.	No	No	No	The project site is well below the reported elevation range for Modoc bedstraw and no suitable habitat for the species is present in the study area. The species was not observed during the botanical survey and is not expected to be present.
North American moonwort	*Botrychium neolunaria*	2B.3	North American moonwort grows in meadows and seeps. This fern occurs at elevations between 6,400 and 11,200 feet. The spore-bearing period is June through September.	No	No	No	The project site is below the reported elevation range for North American moonwort; no suitable habitat for the species is present in the study area. The species was not observed during the botanical survey and is not expected to be present.
Northwestern moonwort	*Botrychium pinnatum*	2B.2	Northwestern moonwort is a streamside plant in lower and upper montane coniferous forests; this moonwort also occurs in meadows. The species is reported between 5,400 and 6,700 feet in elevation. The flowering period is July through October.	No	No	No	The project site is below the reported elevation range for northwestern moonwort; no suitable habitat for the species is present in the study area. The species was not observed during the botanical survey and is not expected to be present.
Oregon campion	*Silene oregana*	2B.2	Oregon campion grows in sagebrush scrub and subalpine conifer forest habitats. The species is found at elevations between 4,920 and 9,600 feet. The flowering period is July through September.	No	No	No	The project site is below the reported elevation range for Oregon campion; no suitable habitat for the species is present in the study area. The species was not observed during the botanical survey and is not expected to be present.

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January 2026

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Paiute lomatium	*Lomatium ravenii* var. *paiutense*	2B.3	Paiute lomatium grows on flats, slopes, ridges in Great Basin scrub habitat, where it grows on rocky, gravelly volcanic soils with underlying clay. It is found from 2,880 to 5,580 feet. The flowering period is April through June.	No	No	No	No suitable habitat for the species is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.
Prostrate buckwheat	*Eriogonum prociduum*	1B.2	Prostrate buckwheat occurs on open dry volcanic soils in Great Basin scrub, pinyon-juniper woodland, and upper montane coniferous forest. The species is reported between 4,300 and 8,900. The flowering period is May through August.	No	No	No	No suitable habitat for the species is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.
Rosy orthocarpus	*Orthocarpus bracteosus*	2B.1	Rosy orthocarpus is an annual herb that occurs in moist meadows and seeps. The species is found between 1,640 and 6,562 feet in elevation. The flowering period is June through August.	Yes	No	Pot.	Potentially suitable habitat for rosy orthocarpus is present in the study area. Although the species was not observed during the botanical field survey, some of its potential habitat had been mowed prior to the plant's blooming period. Therefore, the species may have been present but was not detectable.
Scalloped moonwort	*Botrychium crenulatum*	2B.2	Scalloped moonwort occurs in moist meadows and marshes, and near streams with high calcium and magnesium content. The species is reported between 4,100 and 10,800 feet in elevation. The flowering period is June through September.	No	No	No	No suitable habitat for the species is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.
Squarestem phlox	*Phlox muscoides*	2B.3	Squarestem phlox occurs on open rocky slopes in subalpine and alpine coniferous forests. The species is reported between 4,200 and 8,900 feet in elevation. The flowering period is June through August.	No	No	No	No suitable habitat for the species is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.

TABLE 3
Potential for Special-Status Species to Occur on the Project Site
Surprise Valley Geothermal Project

January 2026

COMMON NAME	SCIENTIFIC NAME	STATUS[1]	GENERAL HABITAT DESCRIPTION	HABITAT PRESENT (Y/N)	CRITICAL HABITAT PRESENT (Y/N)	SPECIES PRESENT (Y/N/POT.)	RATIONALE/COMMENTS
Tundra thread moss	*Pohlia tundrae*	2B.3	Tundra thread moss grows in alpine boulder and rock field habitats, typically occurring in gravelly, damp soil. The species is reported between 8,860 and 9,845 feet in elevation.	No	No	No	No suitable habitat for the species is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.
Warner Mountains buckwheat	*Eriogonum umbellatum* var. *glaberrimum*	1B.3	Warner Mountains buckwheat grows on sandy and gravelly substrate in the Warner Mountains. The species is reported between 5,000 and 7,550 feet. The flowering period is from July through September.	No	No	No	No suitable habitat for the species is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.
Western goblin	*Botrychium montanum*	2B.1	Western goblin, a perennial herb, occurs along streams in old-growth forests. The species is reported between 4,700 and 7,000 feet in elevation.	No	No	No	No suitable habitat for the species is present in the study area. The species was not observed during the botanical field survey and is not expected to be present.
Yakima bird's-beak	*Cordylanthus capitatus*	2B.2	Yakima bird's-beak grows on open dry slopes in Great Basin scrub, coniferous forests, and pinon-juniper woodlands in the Warner Mountains. It is found from 5,900-7,800 feet. The flowering period is from July through October.	No	No	No	The project site is below the reported elevation range for Yakima bird's-beak; no suitable habitat for the species is present in the study area. The species was not observed during the botanical survey and is not expected to be present.

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January 2026

COMMON NAME	SCIENTIFIC NAME	STATUS[1]	GENERAL HABITAT DESCRIPTION	HABITAT PRESENT (Y/N)	CRITICAL HABITAT PRESENT (Y/N)	SPECIES PRESENT (Y/N/POT.)	RATIONALE/COMMENTS
BIRDS							
American goshawk	*Astur atricapillus*	SSSC	American goshawks generally nest on north-facing slopes near water in old-growth coniferous and deciduous forests. Goshawks re-use old nests and maintain alternate nest sites.	No	No	No	The project site is outside the breeding range of the American goshawk, but inside its winter range. No goshawk sightings within Surprise Valley are reported in the CNDDDB or on iNaturalist. No suitable nesting habitat is present in the project area and the goshawk would not be adversely affected by project implementation.
California condor	*Gymnogyps californianus*	EXPN	The California condor is a permanent resident of the semi-arid, rugged mountain ranges surrounding the southern San Joaquin Valley, including the South Coast Ranges, the Traverse Ranges, Tehachapi Mountains, and southern Sierra Nevada. Condors roost on cliffs, large trees, and snags. Nesting habitat includes caves, crevices, behind rock slabs, or large ledges on high sandstone cliffs. An experimental population (Pacific Northwest NEP) has recently been established in Humboldt County and is currently designated the status Experimental Population, Non-Essential.	No	No	No	No suitable nesting habitat for California condors is present in the project area. Therefore, the California condor is not expected to nest onsite.
Greater sandhill crane	*Antigone canadensis tabida*	ST, SFP	Greater sandhill cranes nest in wetland habitats near grain fields in northeastern California. Nests generally consist of large mounds of vegetation in shallow water. Shallow islands bordered by tules and cattails are ideal nesting sites; natural hummocks or muskrat houses may also be used as nest sites.	Yes	No	Yes	Several breeding pairs of sandhill cranes were observed in the study area during the biological survey.

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Prairie falcon	*Falco mexicanus*	WL	Prairie falcons nest in scrapes on sheltered ledges of cliffs overlooking large, open areas. Sometimes nests on old raven or eagle stick nest on cliff, bluff, or rock outcrop. Species forages in open terrain with cliffs, canyons, escarpments, and rock outcrops.	No	No	No	No suitable nesting habitat for prairie falcon is present in the project area. Therefore, the prairie falcon is not expected to nest onsite.
Swainson's hawk	*Buteo swainsoni*	ST	Swainson's hawks forage in open habitats often in croplands and pastures. They nest in scattered stands of trees near the foraging areas, particularly in riparian areas, oak savannahs, and juniper-sage flats.	Yes	No	Yes	Swainson's hawks were observed foraging in and near the project site in 2025. Although no nests were observed, Swainson's hawks could nest in the scattered trees in the study area or in nearby stands of trees.
Yellow-billed cuckoo	*Coccyzus americanus*	FT	Yellow-billed cuckoos inhabit and nest in extensive deciduous riparian thickets or forests with dense, low-level or understory foliage, and which abut slow-moving watercourses, backwaters, or seeps. Willows are almost always a dominant component of the vegetation. In the Sacramento Valley, the yellow-billed cuckoo also utilizes adjacent orchards, especially of walnut, for nesting.	No	No	No	No suitable nesting habitat for yellow-billed cuckoos is present in the project area. No cuckoo sightings are reported within Modoc County in the CNDDDB or on iNaturalist.The species is not expected to nest onsite.

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REPTILES							
Northwestern pond turtle	*Actinemys marmorata*	FP, SSSC	The northwestern pond turtle associates with permanent or nearly permanent water in a variety of habitats. This turtle is typically found in quiet water environments. Pond turtles require basking sites such as partially submerged logs, rocks, or open mud banks, and suitable upland habitat (sandy banks or grassy open fields) for egg-laying. Nesting and courtship occur during spring. Nests are generally constructed within 500 feet of a waterbody. Pond turtles leave aquatic sites in the fall and overwinter in nearby uplands. Pond turtles return to aquatic sites in spring.	No	No	Pot.	Review of CNDDB and iNaturalists records show that the northwestern pond turtle has not previously been reported in the Surprise Valley but has been observed within 10 miles of the project site. The study area includes one permanent or nearly permanent pond that could potentially support the species. Although pond turtles were not observed, they could potentially be present.
AMPHIBIANS							
Northern leopard frog	*Lithobates pipiens*	SSSC	The northern leopard frog is found throughout North America, but is uncommon and localized in California. This highly aquatic species occurs in permanent ponds, swamps, marshes, and slow-moving streams in many habitat types. Important habitat requirements include shoreline cover, and submerged/emergent aquatic vegetation.	Yes	No	Pot.	The species has been observed once in the Surprise Valley, in 1926. The study area includes one permanent or nearly permanent pond that could potentially support northern leopard frogs. Although leopard frogs were not observed, they could potentially be present in the pond.

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INSECTS							
Monarch butterfly	*Danaus plexippus* pop. 1	FPT	Monarch butterflies are reliant on milkweed species for development and survival. Adults migrate from their overwintering sites on the California Coast in February and March and reach the northern limit of their North America range in California, Oregon, Washington, Idaho, and Nevada, in early to mid-June. Eggs are laid singly on milkweed plants within their breeding range. Once hatched, larva reach the adult stage in 20 to 35 days; adults live 2 to 5 weeks. Several generations are produced within one season, with the last generation beginning migration to their overwintering range in August and September where they live between 6 and 9 months before migrating north.	Yes	No	Pot.	A small population of showy milkweed (*Asclepias speciosa*) was observed immediately adjacent to the study area. Milkweeds provide essential summer breeding habitat for the monarch butterfly. The monarch butterfly thus may breed on the site.
Suckley's cuckoo bumble bee	*Bombus suckleyi*	FPE, SCE	In California, Suckley's cuckoo bumble bees are limited to the Klamath Mountains. The bee is a social parasite that reproduces only in colonies of western bumble bees. Females emerge in late May, forage primarily on species of composites, and search for a suitable host bumble bee nest. Upon finding a nest, the invading female kills the queen, "enslaves" the workers, and lays her eggs in the nest. All offspring are reproductive. Males patrol circuits in search of females. Once mated, females seek a place to overwinter. Very little is known about overwintering sites utilized by the species, although generally, bumble bee females overwinter in soft, disturbed soil or under leaf litter or other debris.	No	No	No	According to CDFW range maps, the nearest potential habitat for Suckley's cuckoo bumble bee is about 40 miles west of the project site. The bees have no potential to occur onsite.

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MAMMALS							
American badger	*Taxidea taxus*	SSSC	American badgers are permanent residents of dry, open shrub, forest and herbaceous habitats with friable soils. Burrows are used for cover and for birthing, and may be reused in subsequent years. Badgers are carnivorous and feed on small mammals as well as on reptiles, insects, birds, and carrion.	Yes	No	No	The species was collected in the immediate project vicinity in 1916. Although potentially suitable habitat is present in the study area, it is greatly compromised by agricultural activities. No badgers or their burrows were observed during the biological survey, and the species is not expected to be present.

[1] Status Codes

Federal:

FE	Federally Listed – Endangered
FT	Federally Listed – Threatened
FC	Federal Candidate Species
FP	Federal Proposed Species
FD	Federal Delisted
FBCC	Federal Bird of Conservation Concern
EPNE	Experimental Population; Non-Essential

State:

SFP	State Fully Protected
SR	State Rare
SE	State Listed - Endangered
ST	State Listed - Threatened
SC	State Candidate Species
SCE	State Candidate Endangered
SSSC	State Species of Special Concern
WL	Watch List

Rare Plant Rank

1A	Plants Presumed Extinct in California
1B	Plants Rare, Threatened or Endangered in California and Elsewhere
2A	Presumed Extirpated in California, but More Common Elsewhere
2B	Rare or Endangered in California, but More Common Elsewhere

Rare Plant Threat Rank

0.1	Seriously Threatened in California
0.2	Fairly Threatened in California
0.3	Not Very Threatened in California

APPENDIX B – USFWS LIST OF THREATENED AND ENDANGERED SPECIES

IPaC U.S. Fish & Wildlife Service

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Modoc County, California



Local office

Klamath Falls Fish And Wildlife Office

(541) 885-8481
(541) 885-7837

1936 California Avenue
Klamath Falls, OR 97601

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
California Condor Gymnogyps californianus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8193	EXPN
Yellow-billed Cuckoo Coccyzus americanus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Reptiles

NAME	STATUS
Northwestern Pond Turtle Actinemys marmorata Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1111	Proposed Threatened

NOT FOR CONSULTATION

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Suckley's Cuckoo Bumble Bee Bombus suckleyi No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10885	Proposed Endangered

Flowering Plants

NAME	STATUS
Greene's Tuctoria Tuctoria greenei Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1573	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete

NOT FOR CONSULTATION

If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

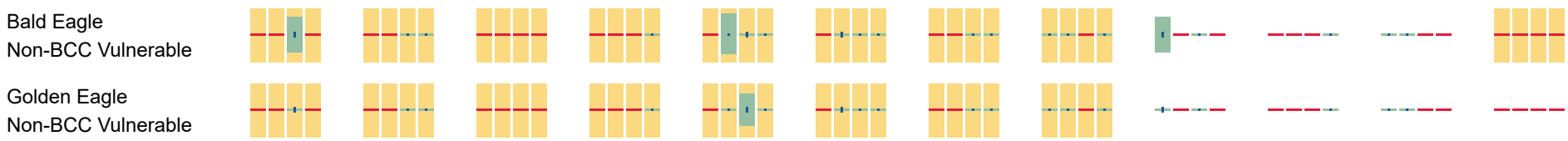
Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

■ probability of presence ■ breeding season | survey effort – no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

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Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle (Bald and Golden Eagle Protection Act requirements may apply).

Proper interpretation and use of your eagle report
On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management

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- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases birds of concern, including Birds of Conservation Concern (BCC), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the Nationwide avoidance and minimization measures for birds document, and any other project-specific avoidance and minimization measures suggested at the link Measures for avoiding and minimizing impacts to birds for the birds of concern on your list below.

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles document, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Cassin's Finch Haemorhous cassinii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15
Evening Grosbeak Coccothraustes vespertinus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Aug 10
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted

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Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

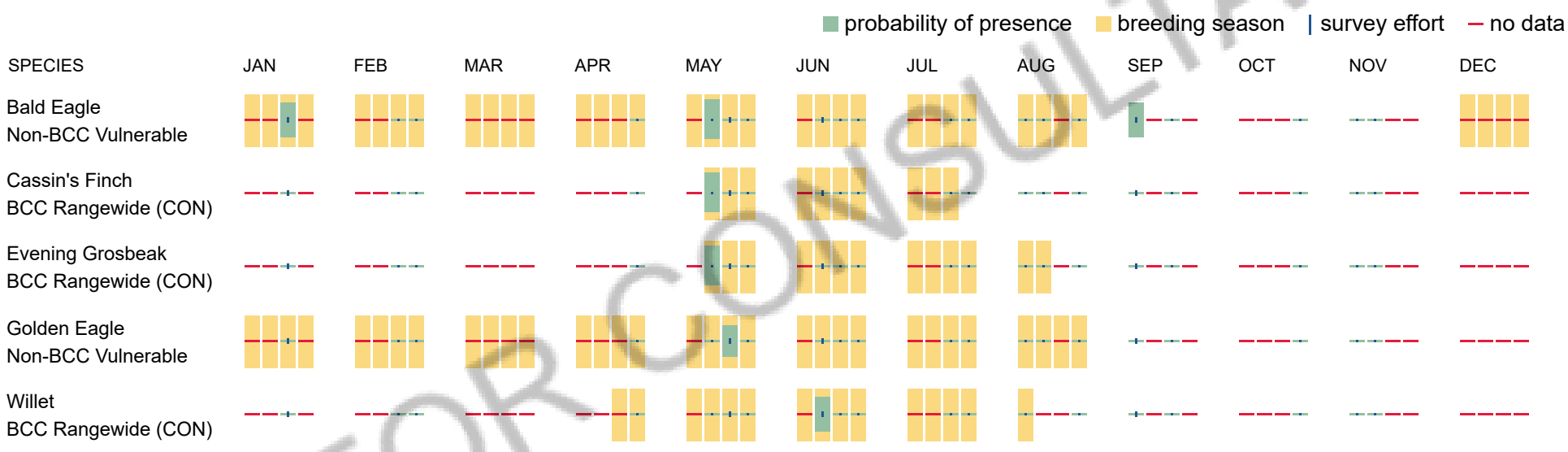
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Avoidance & Minimization Measures for Birds describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the Bald and Golden Eagle Protection Act and those species marked as “Vulnerable”. See the FAQ “What are the levels of concern for migratory birds?” for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle (Bald and Golden Eagle Protection Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the Rapid Avian Information Locator (RAIL) Tool.

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

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What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Bald and Golden Eagle Protection Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ “Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds”.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Proper interpretation and use of your migratory bird report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs
Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

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A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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APPENDIX C – LIST OF VASCULAR PLANTS OBSERVED

VASCULAR PLANT SPECIES OBSERVED

Surprise Valley Geothermal Exploration Project

May 29 - 30, and July 8 - 10, 2025

Agavaceae	**Century-plant Family**
Camassia quamash subsp. *breviflora*	Small camas
Alismataceae	**Water Plantain Family**
Alisma triviale	Water plantain
Amaranthaceae	**Amaranth Family**
Amaranthus blitoides	Mat amaranth
Suaeda calceoliformis	Horned sea blite
Apiaceae	**Carrot Family**
Anthriscus caucalis	Bur-chervil
Conium maculatum	Poison hemlock
Asteraceae	**Sunflower Family**
Achillea millefolium	Common yarrow
Agoseris glauca var. *glauca*	Pale agoseris
Anthemis cotula	Mayweed
Artemisia ludoviciana	White sagebrush
Bidens cernua var. *cernua*	Nodding beggartick
Cirsium sp. *(inamoenum* var. *inamoenum?)*	Thistle
Cirsium arvense	Canadian thistle
Ericameria nauseosa	Rubber rabbitbrush
Gnaphalium palustre	Western marsh cudweed
Helianthus annuus	Hairy leaved sunflower
Helianthus nuttallii subsp. *nuttallii*	Nuttall's sunflower
Iva axillaris	Poverty weed
Lactuca serriola	Prickly lettuce
Lagophylla ramosissima	Common hareleaf
Matricaria discoidea	Pineapple weed
Onoprodum acanthium subsp. *acanthium*	Scotch thistle
Pyrrocoma lanceolata	Lanceleaf goldenweed
Senecio hydrophilus	Alkali marsh ragwort
Sonchus asper subsp. *asper*	Prickly sow thistle
Taraxacum officinale	Common dandelion
Xanthium spinosum	Spiny cocklebur
Xanthium strumarium	Cocklebur
Boraginaceae	**Borage Family**
Amsinckia menziesii	Small-flowered fiddleneck
Amsinckia retrorsa	Rigid fiddleneck
Asperugo procumbens	German madwort
Myosotis sp.	Forget-me-not
Plagiobothrys bracteatus	Bracted allocarya
Plagiobothrys stipitatus var. *micranthus*	Small popcorn-flower
Plagiobothrys salsus	Desert popcorn-flower
Brassicaceae	**Mustard Family**
Alyssum simplex	Alyssum
Capsella bursa-pastoris	Shepherd's purse
Descurainia sophia	Flixweed
Lepidium draba	Heart-podded hoary cress
Lepidium latifolium	Broadleaved peppergrass
Lepidium perfoliatum	Round-leaved peppergrass
Nasturtium officinale	Water cress
Sisymbrium altissimum	Tumble-mustard
Thlaspi arvense	Fanweed

Species highlighted blue are categorized as noxious weeds by CDFA

Species highlighted pink are listed by Cal-IPC as moderate or high invasiveness

VASCULAR PLANT SPECIES OBSERVED

Surprise Valley Geothermal Exploration Project

Campanulaceae	**Bluebell Family**
Downingia laeta	Great Basin calicoflower
Chenopodiaceae	**Goosefoot Family**
Bassia scoparia	Kochia
Chenopodium album	Lambs quarters
Monolepis nuttalliana	Nuttall's poverty weed
Salsola tragus	Russian thistle
Convolvulaceae	**Morning Glory Family**
Convolvulus arvensis	Bindweed
Cupressaceae	**Cypress Family**
Juniperus occidentalis	Western juniper
Cyperaceae	**Sedge Family**
Bolboschoenus maritimus subsp. *paludosus*	Saltmarsh bulrush
Carex nebrascensis	Nebraska sedge
Carex praegracilis	Clustered field sedge
Eleocharis macrostachya	Creeping spikerush
Schoenoplectus americanus	Olney's bulrush
Equisetaceae	**Horsetail Family**
Equisetum laevigatum	Smooth scouring rush
Euphorbiaceae	**Spurge Family**
Croton setigerus	Dove weed
Euphorbia maculata	Spotted spurge
Fabaceae	**Legume Family**
Acmispon americanus	Spanish lotus
Lotus corniculatus	Birdsfoot trefoil
Medicago lupulina	Black medick
Medicago sativa	Alfalfa
Melilotus albus	White sweetclover
Melilotus officinalis	Yellow sweetclover
Robinia pseudoacacia	Black locust
Trifolium dubium	Little hop clover
Trifolium fragiferum	Strawberry clover
Trifolium hybridum	Alsike clover
Trifolium pratense	Red clover
Trifolium repens	White clover
Trifolium wormskioldii	Springbank clover
Vicia americana subsp. *americana*	American vetch
Gentianaceae	**Gentian Family**
Zeltnera exaltata	Canchalagua
Geraniaceae	**Geranium Family**
Erodium cicutarium	Red-stemmed filaree
Hydrophyllaceae	**Waterleaf Family**
Phacelia heterophylla subsp. *virgata*	Vari-leaf phacelia
Iridaceae	**Iris Family**
Iris missouriensis	Rocky Mountain iris
Sisyrinchium bellum	Blue-eyed grass

VASCULAR PLANT SPECIES OBSERVED

Surprise Valley Geothermal Exploration Project

Juncaceae	**Rush Family**
Juncus balticus subsp. *ater*	Baltic rush
Juncus bufonius var. *bufonius*	Toad rush
Juncus orthophyllus	Straight-leaved rush
Juncaginaceae	**Arrow-grass Family**
Triglochin maritima	Arrowgrass
Triglochin scilloides	Flowering quillwort
Lamiaceae	**Mint Family**
Marrubium vulgare	Horehound
Mentha canadensis	Wild mint
Lythraceae	**Loosestrife Family**
Lythrum tribracteatum	Three bracted loosestrife
Malvaceae	**Mallow Family**
Malva neglecta	Common mallow
Sidalcea sp.	Perennial sidalcea
Melanthiaceae	**False-Hellebore Family**
Toxicoscordion venenosum var. *venenosum*	meadow deathcamas
Lysimachia maritima	Sea milkwort
Onagraceae	**Evening-Primrose Family**
Epilobium ciliatum subsp. *ciliatum*	Fringed willowherb
Epilobium pallidum	Large-flower spike-primrose
Orobanchaceae	**Broom-rape Family**
Castilleja lacera	Cut-leaved owl clover
Castilleja minor subsp. *minor*	Lesser Indian paintbrush
Chloropyron maritimum subsp. *canescens*	Salt-marsh bird's-beak
Phrymaceae	**Lopseed Family**
Erythranthe guttata	Common monkey-flower
Plantaginaceae	**Plantain Family**
Plantago lanceolata	English plantain
Plantago major	Broadleaf plantain
Veronica catenata	Chain speedwell
Veronica anagallis-aquatica	Water speedwell
Poaceae	**Grass Family**
Agropyron cristatum subsp. *pectinatum*	Desert crested wheatgrass
Agrostis gigantea	Giant bentgrass
Agrostis stolonifera	Creeping bentgrass
Alopecurus pratensis	Meadow foxtail
Apera interrupta	Apera
Avena barbata	Slender wild oats
Beckmannia syzigachne	American sloughgrass
Bromus hordeaceus	Soft chess
Bromus inermis	Smooth brome
Bromus racemosus	Smooth brome
Bromus tectorum	Downy brome
Deschampsia cespitosa subsp. *cespitosa*	Tufted hairgrass
Distichlis spicata	Saltgrass
Echinochloa crus-galli	Barnyard grass
Elymus cinereus	Basin wild-rye
Elymus elymoides	Squirreltail

Elymus hispidus subsp. *hispidus*	Intermediate wheatgrass
Elymus ponticus subsp. *ponticus*	Tall wheatgrass
Elymus smithii	Western wheat grass
Festuca arundinacea	Tall fescue
Holcus lanatus	Common velvet grass
Hordeum brachyantherum	Meadow barley
Hordeum jubatum	Foxtail barley
Hordeum marinum subsp. *gussoneanum*	Mediterranean barley
Hordeum murinum	Foxtail barley
Hordeum murinum subsp. *murinum*	Wall barley
Melica sp.	Melic
Muhlenbergia asperifolia	Scratchgrass
Phleum pratense	Cultivated timothy
Poa bulbosa	Bulbous bluegrass
Poa pratensis	Kentucky bluegrass
Poa secunda subsp. *secunda*	One-sided bluegrass
Polypogon monspeliensis	Annual beardgrass
Puccinellia nuttalliana	Nuttall's alkali grass
Secale cereale	Rye
Setaria viridis	Bristly foxtail
Triticum aestivum	Wheat
Polemoniaceae	**Phlox Family**
Collomia grandiflora	Large-flowered collomia
Polygonaceae	**Buckwheat Family**
Eriogonum nudum var. *pubiflorum*	Hairy-flowered buckwheat
Persicaria maculosa	Lady's thumb
Polygonum aviculare	Common knotweed
Rumex acetosella	Sheep sorrel
Rumex crispus	Curly dock
Rumex salicifolius	Willow dock
Rumex transitorius	Willow dock
Ranunculaceae	**Buttercup Family**
Ranunculus aquatilis	Water buttercup
Ranunculus occidentalis	Western buttercup
Ranunculus sceleratus var. *multifidus*	Cursed buttercup
Rosaceae	**Rose Family**
Potentilla gracilis	Slender cinquefoil
Potentilla anserina subsp. *anserina*	Silverweed cinquefoil
Prunus armeniaca	Apricot
Prunus emarginata	Bitter cherry
Prunus virginiana var. *demissa*	Western choke-cherry
Purshia tridentata	Antelope bush
Rosa woodsii subsp. *ultramontana*	Interior rose
Rubus armeniacus	Himalayan blackberry
Rubiaceae	**Madder Family**
Galium aparine	Cleavers
Ruscaceae	**Butcher's Broom Family**
Maianthemum stellatum	Star-flowered false Solomon's-seal
Salicaceae	**Willow Family**
Salix sp.	Willow
Salix exigua var. *exigua*	Narrowleaf willow
Salix exigua	Sandbar willow
Salix lasiandra var. *caudata*	Shining willow

VASCULAR PLANT SPECIES OBSERVED

Surprise Valley Geothermal Exploration Project

Sapindaceae	**Soapberry Family**
Acer negundo	Box elder
Scrophulariaceae	**Snapdragon Family**
Verbascum thapsus	Woolly mullein
Typhaceae	**Cattail Family**
Typha sp.	Cattail
Urticaceae	**Nettle Family**
Urtica dioica subsp. *holosericea*	Hoary creek nettle
Zygophyllaceae	**Caltrop Family**
Tribulus terrestris	Puncture vine

APPENDIX D – REPRESENTATIVE PHOTOGRAPHS



Intermittent stream/constructed ditch along the southern boundary of Well Site 45-12. May 30, 2025.



Existing graveled access road to Well Site 45-12. May 30, 2025.



Wildflower field representative of Well Site 82-13. May 29, 2025.



Well Site 82-13 after mowing. July 9, 2025.



Well Sites 33-13 and 33A-13. The existing wellhead is to the left of the access road. July 9, 2025.



Pond east of Well Site 43-13. July 9, 2025.



Grain crop representative of the northwestern corner of Well Site 35-13. May 29, 2025.



Mowed wetland in planned road corridor to Well Sites 35-13 and 46-13. July 9, 2025.



Sandhill cranes along the planned road between Well Sites 35-13 and 46-13. July 9, 2025.



Standing water immediately east of Well Site 81-24. May 29, 2025.



Desert popcornflower immediately east of Well Site 81-24. May 30,2025.



Great Basin downingia immediately east of Well Site 81-24. May 30,2025.



One of several bird nests observed at Well Site 81-24. May 29, 2025.



Well Sites 31-24 and 41-24 viewed from the western site boundary. July 10, 2025.



Well Sites 31-24 and 41-24 with potential wetlands to the left of center and uplands to the right of the center. July 10, 2025.



Rocky upland with junipers and a weedy understory representative of Well Site 22-24. May 29, 2025.



Well head to be served by rerouted and improved access road. July 9, 2025.



Weed infestation in the access corridor to the existing wellhead west of Surprise Valley Road. July 9, 2025

APPENDIX E – MAP SERIES

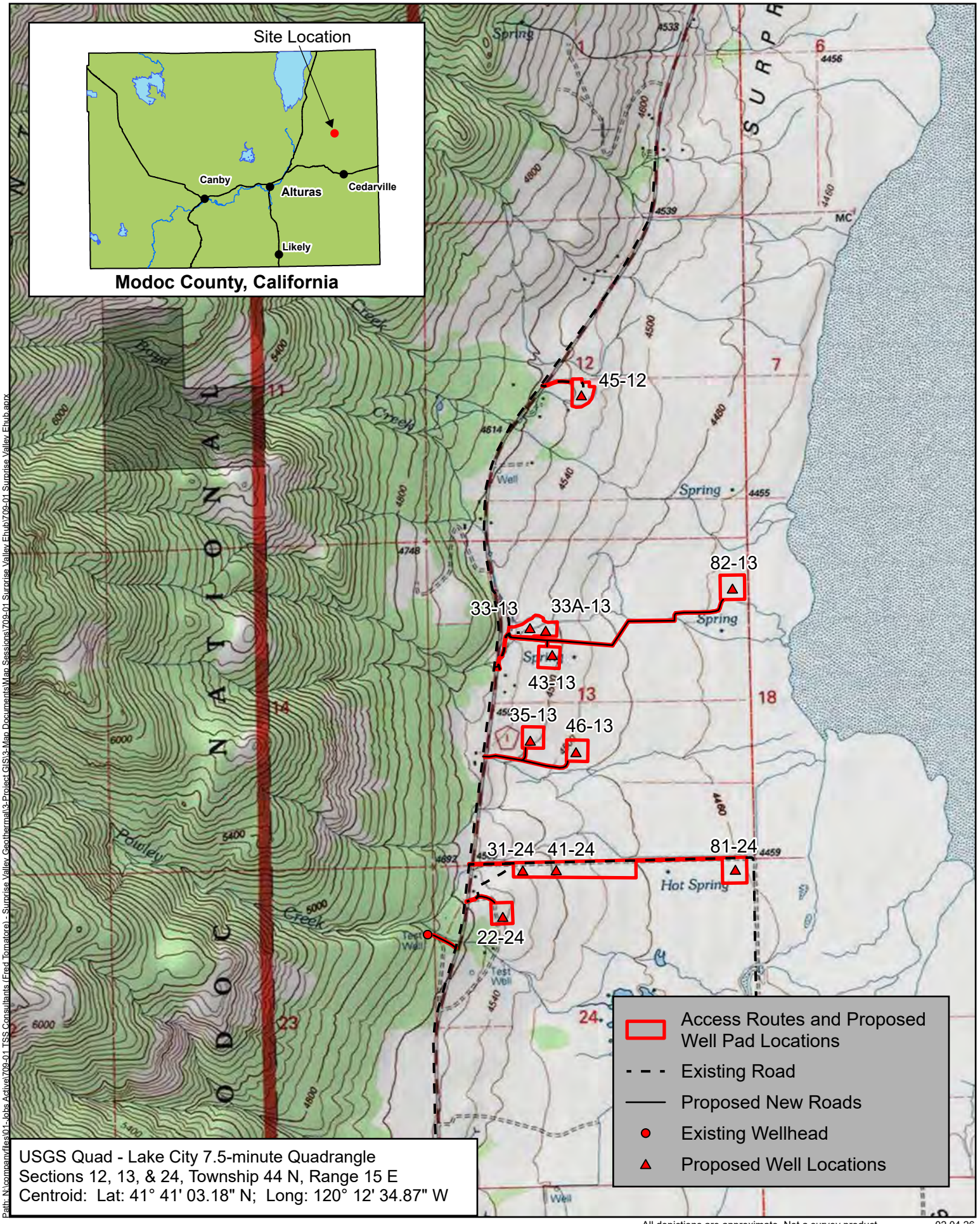
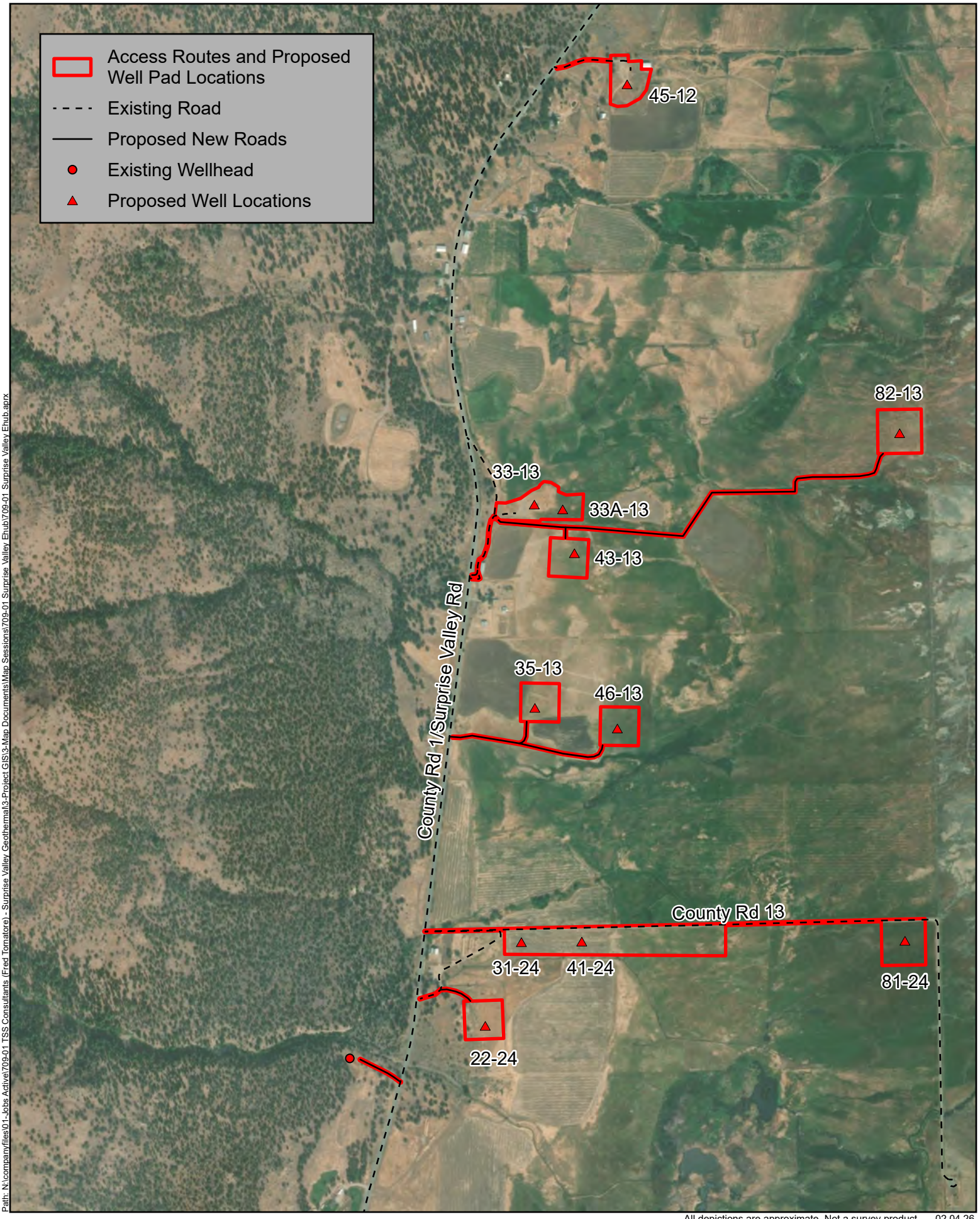


Figure 1

Project Location and Vicinity



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All depictions are approximate. Not a survey product. 02.04.26

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Figure 2

Study Area Boundaries

Catalyst ENVIRONMENTAL SOLUTIONS

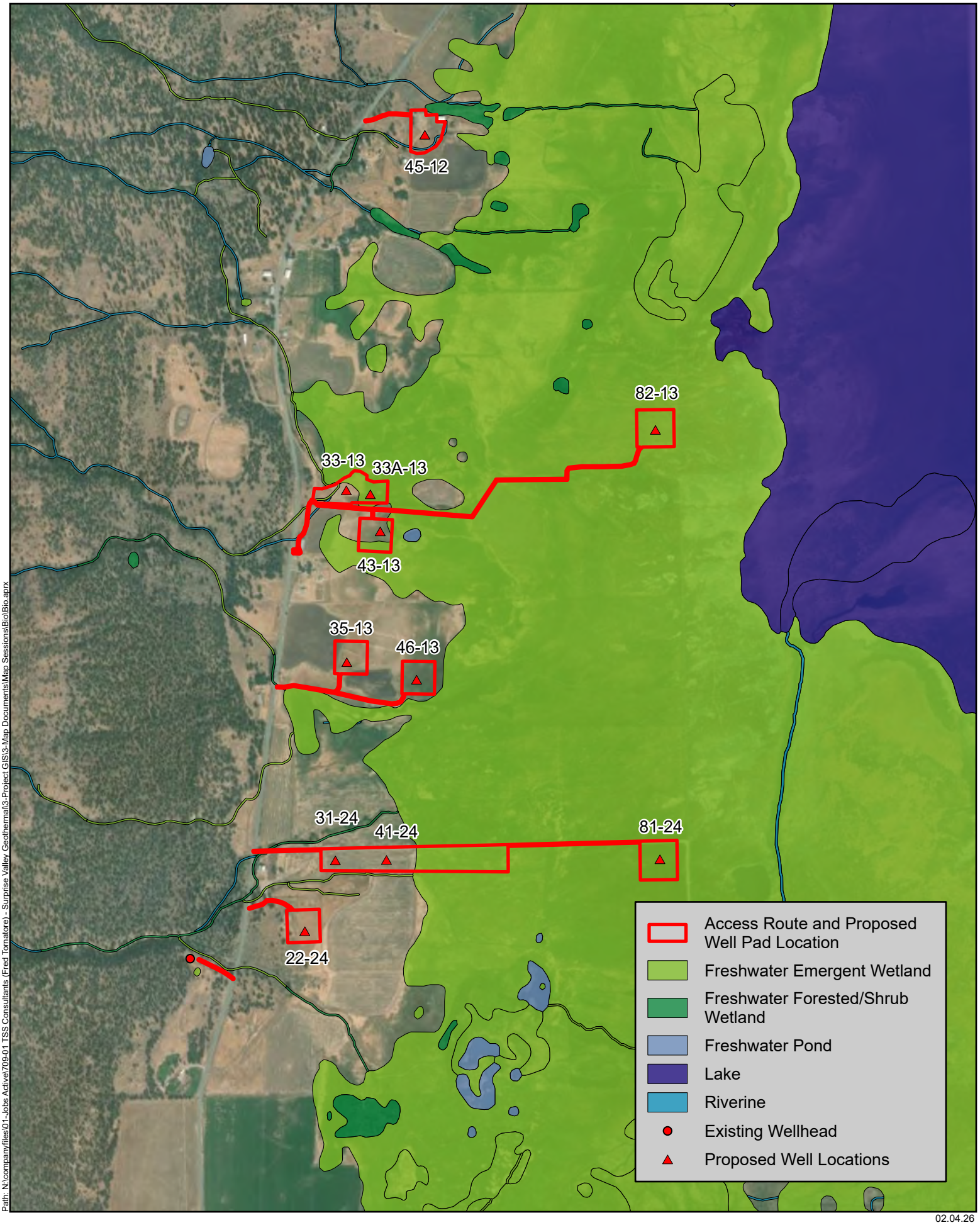
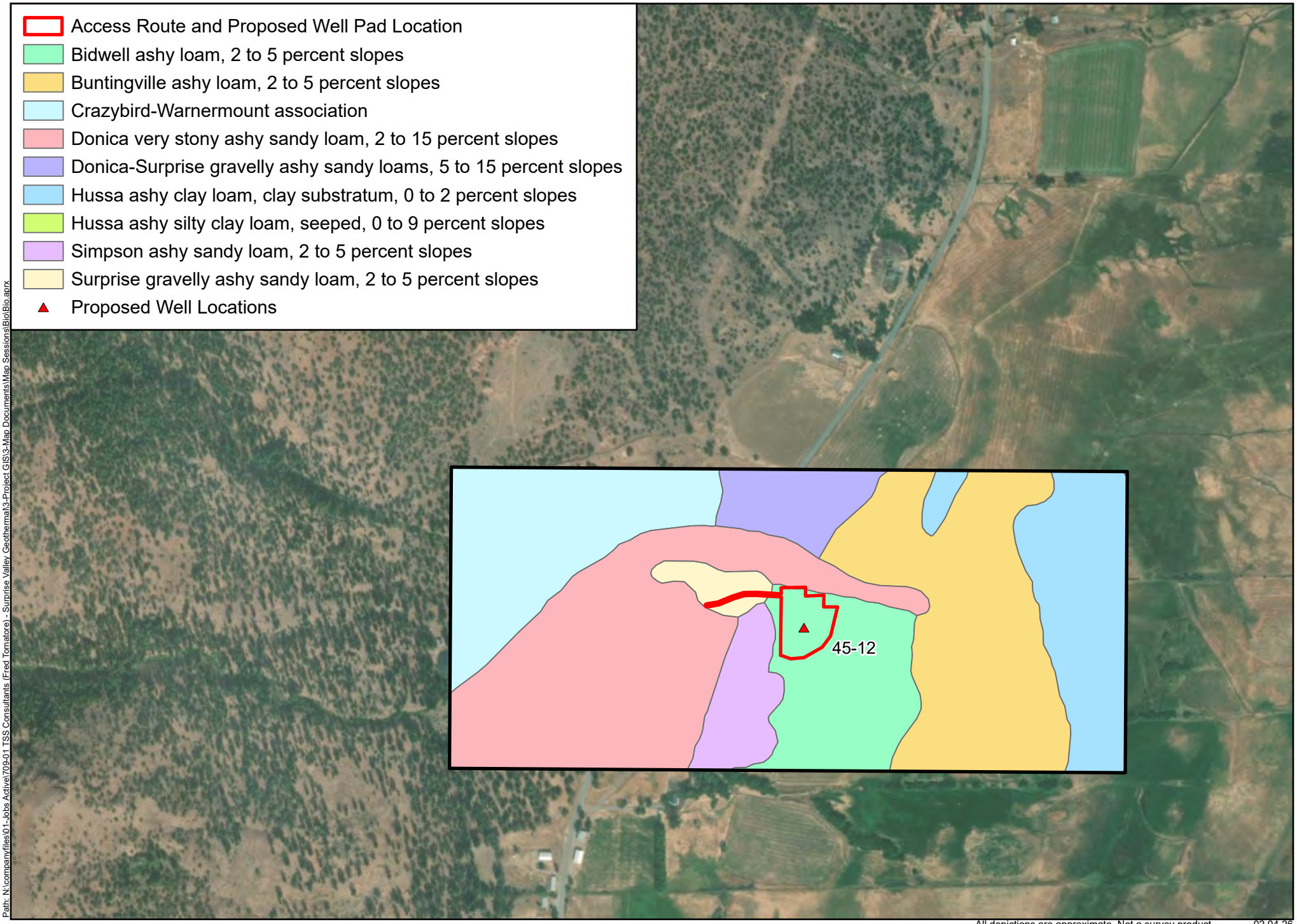


Figure 3

USFWS NWI Records Search Results



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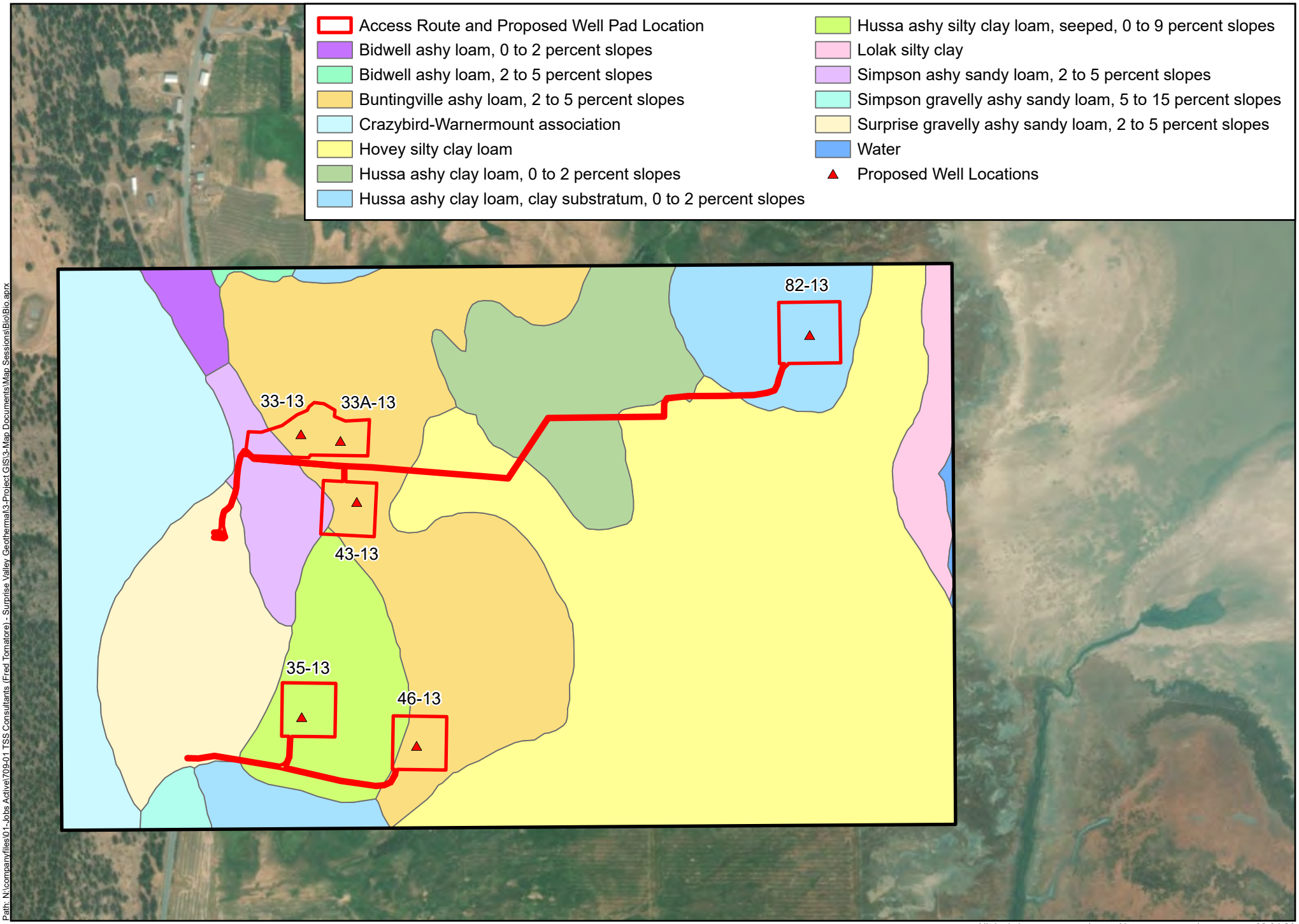
All depictions are approximate. Not a survey product. 02.04.26

0 800 Feet

Figure 4

USDA NRCS Soil Survey Project Site

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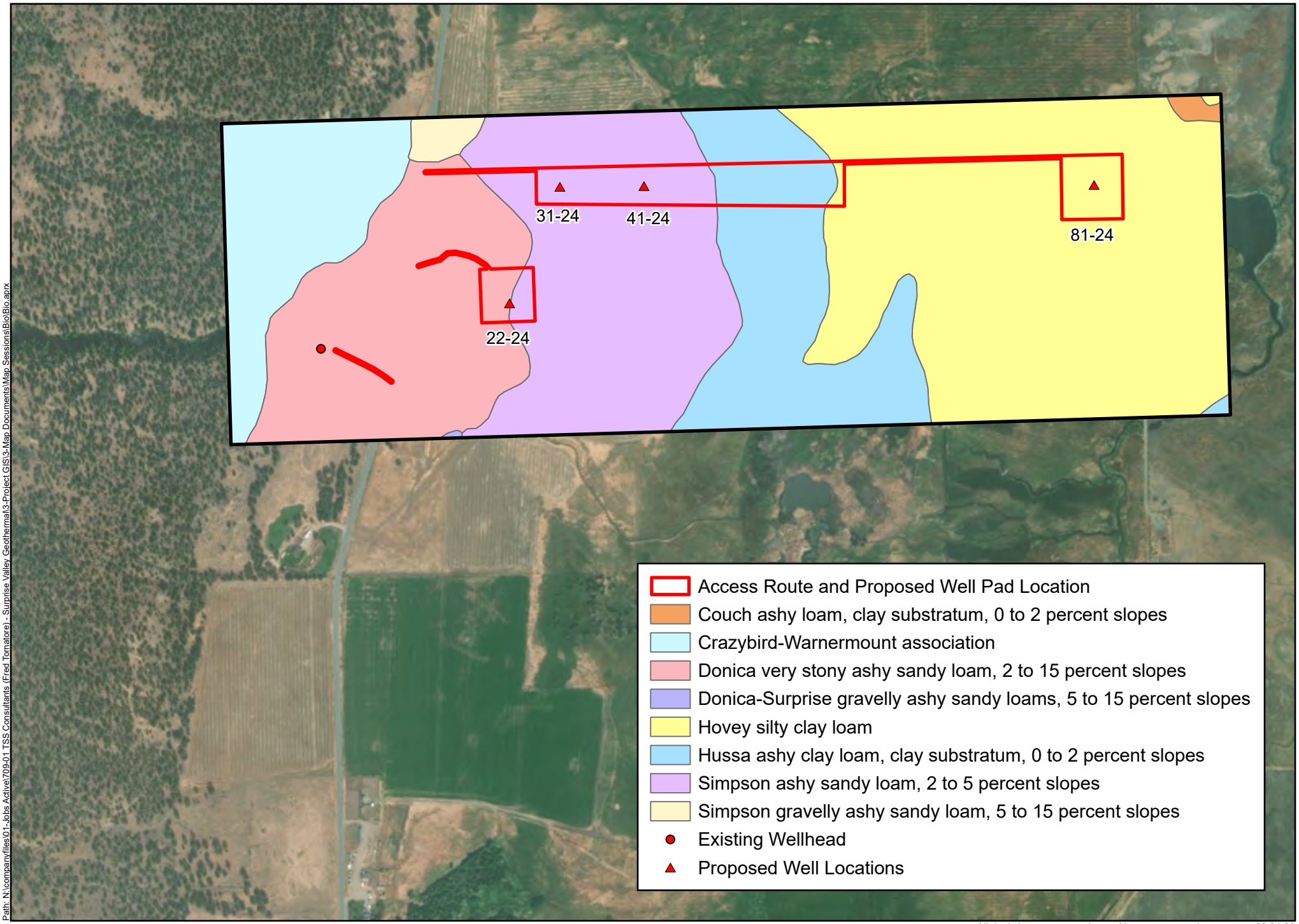
All depictions are approximate. Not a survey product. 02.04.26

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Figure 5

USDA NRCS Soil Survey Project Site

Catalyst ENVIRONMENTAL SOLUTIONS



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All depictions are approximate. Not a survey product. 02.04.26

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Figure 6

USDA NRCS Soil Survey Project Site

Catalyst ENVIRONMENTAL SOLUTIONS

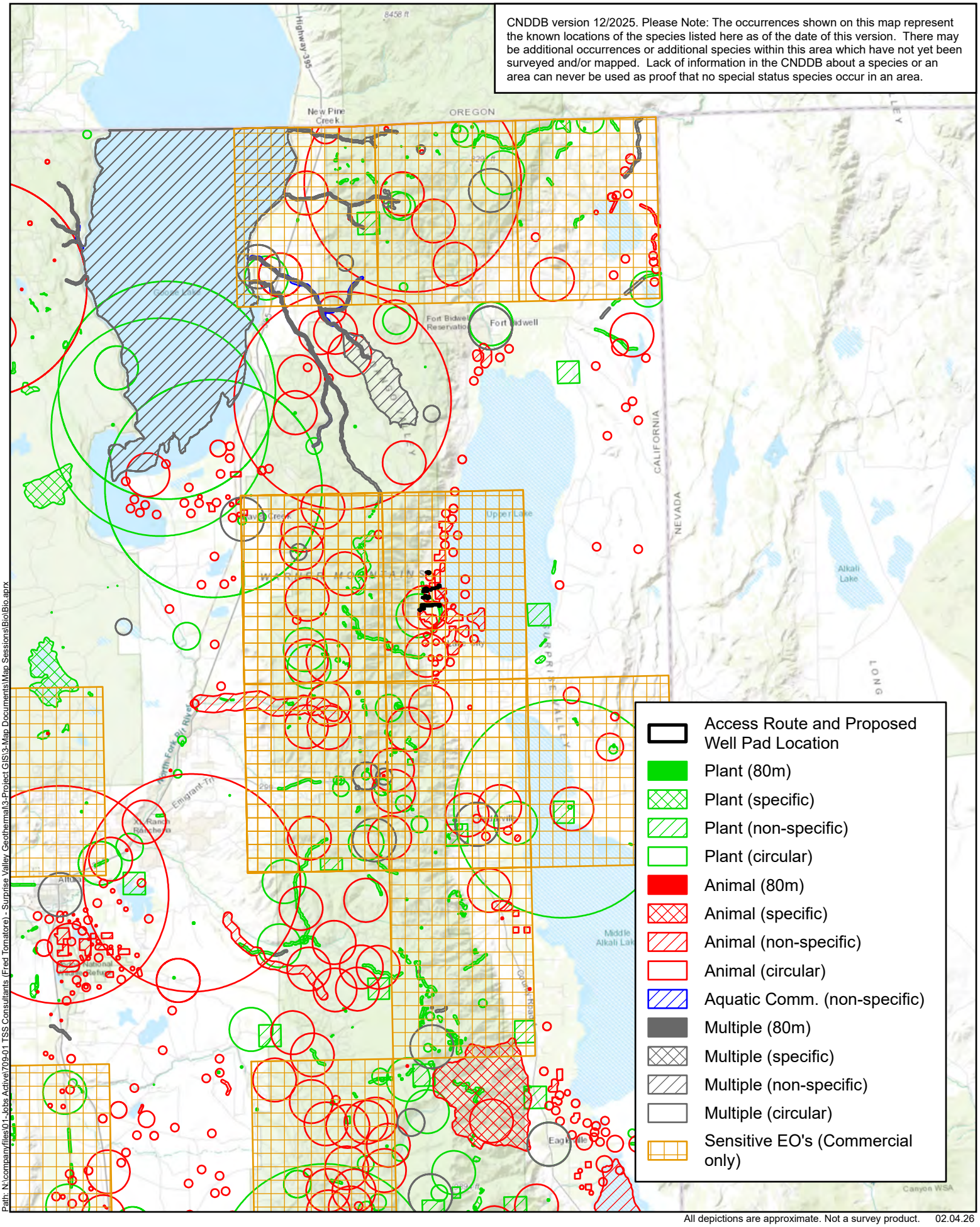


Figure 7

CDFW CNDDB Records



Delineation data provided on this map is preliminary and not yet verified by the Army Corps of Engineers.

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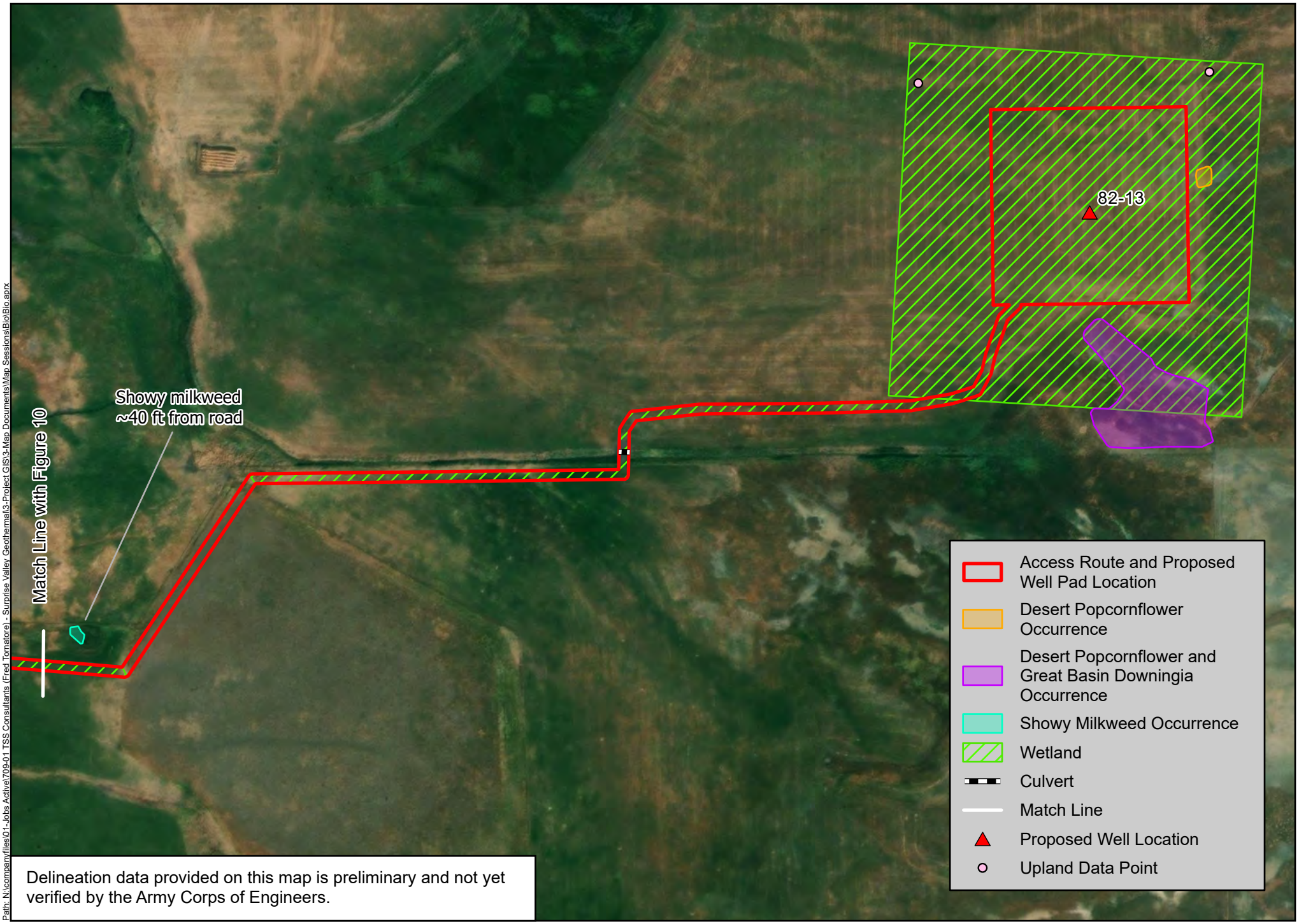
All depictions are approximate. Not a survey product. 02.04.26

0 250 Feet

Figure 8

Survey Results: Well Site 45-12

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All depictions are approximate. Not a survey product. 02.04.26

0 250 Feet

Figure 9

Survey Results: Well Site 82-13

Catalyst Environmental Solutions

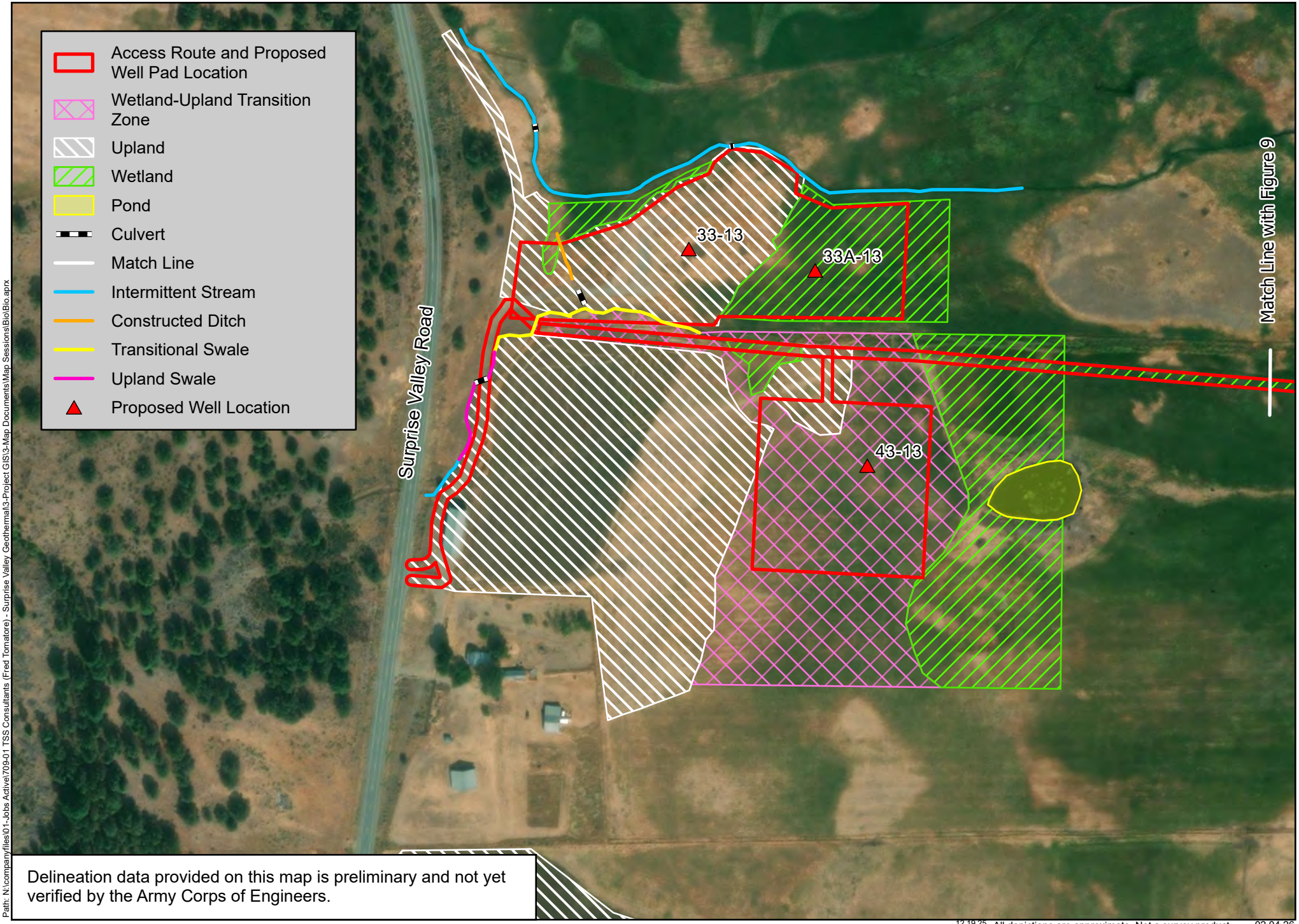


Figure 10

Survey Results: Well Sites 33-13, 33A-13, and 43-13

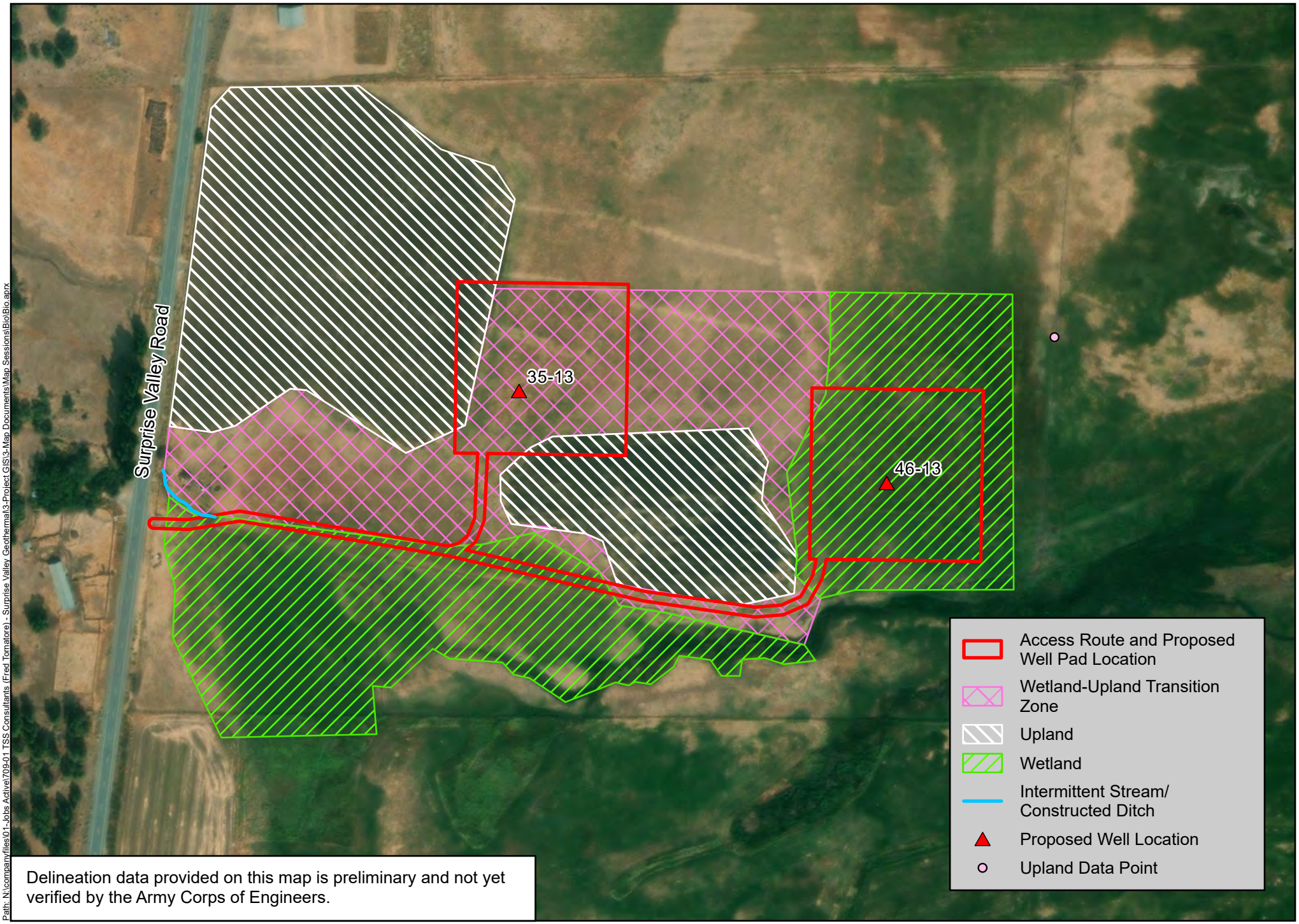


Figure 11

Survey Results: Well Sites 35-13 and 46-13

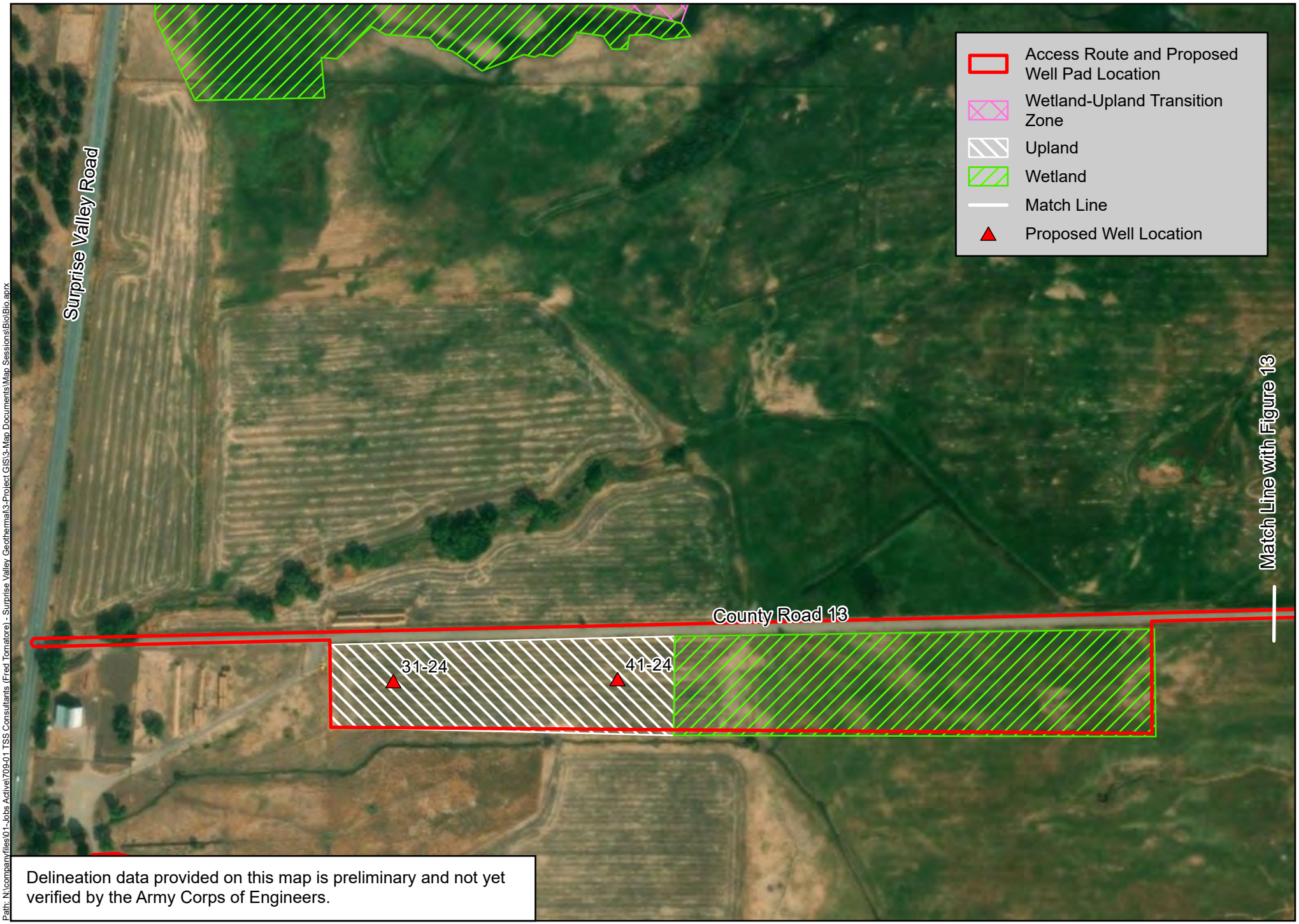
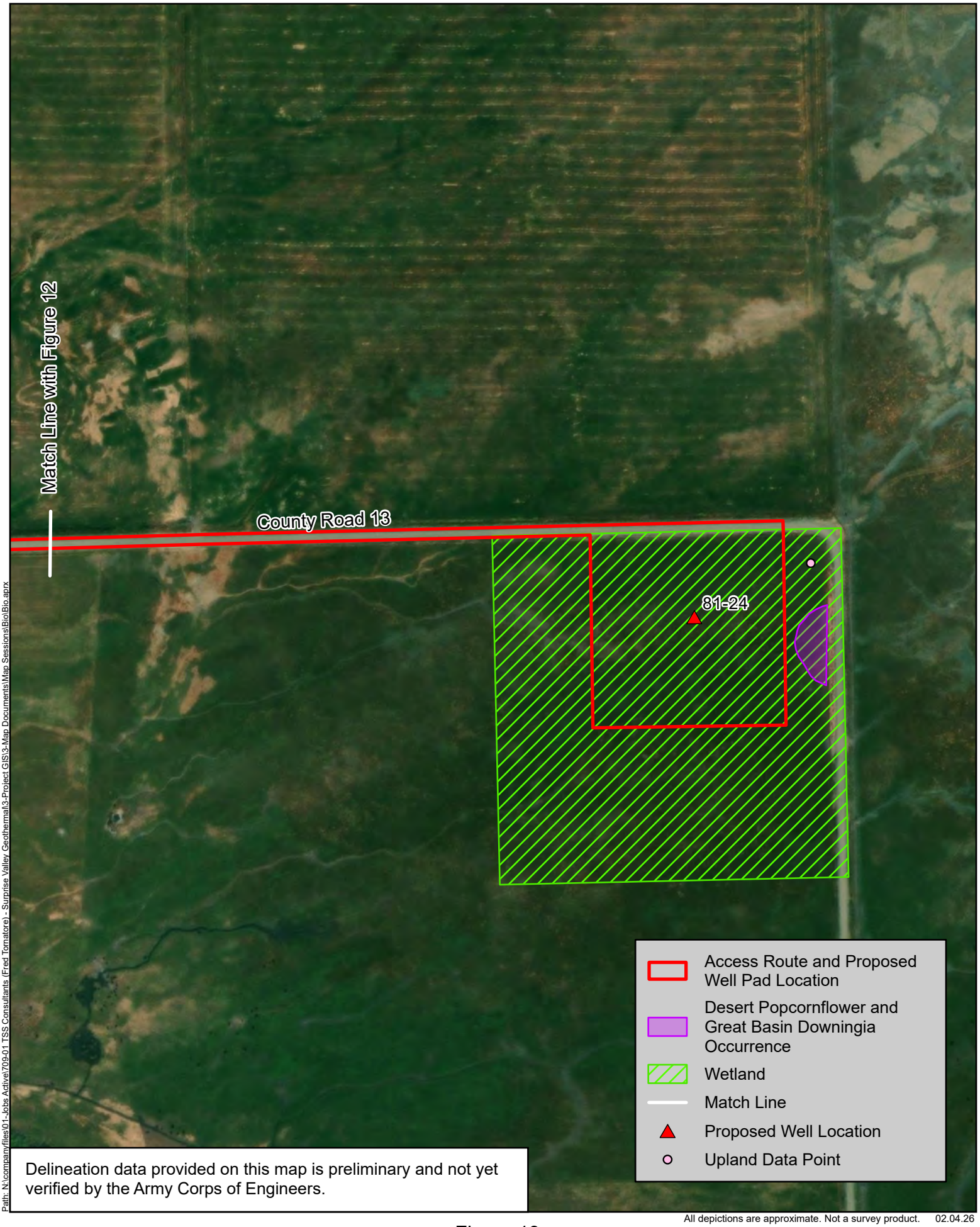


Figure 12

Survey Results: Well Sites 31-24 and 41-24

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Delineation data provided on this map is preliminary and not yet verified by the Army Corps of Engineers.

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All depictions are approximate. Not a survey product. 02.04.26

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Figure 13

Survey Results: Well Site 81-24

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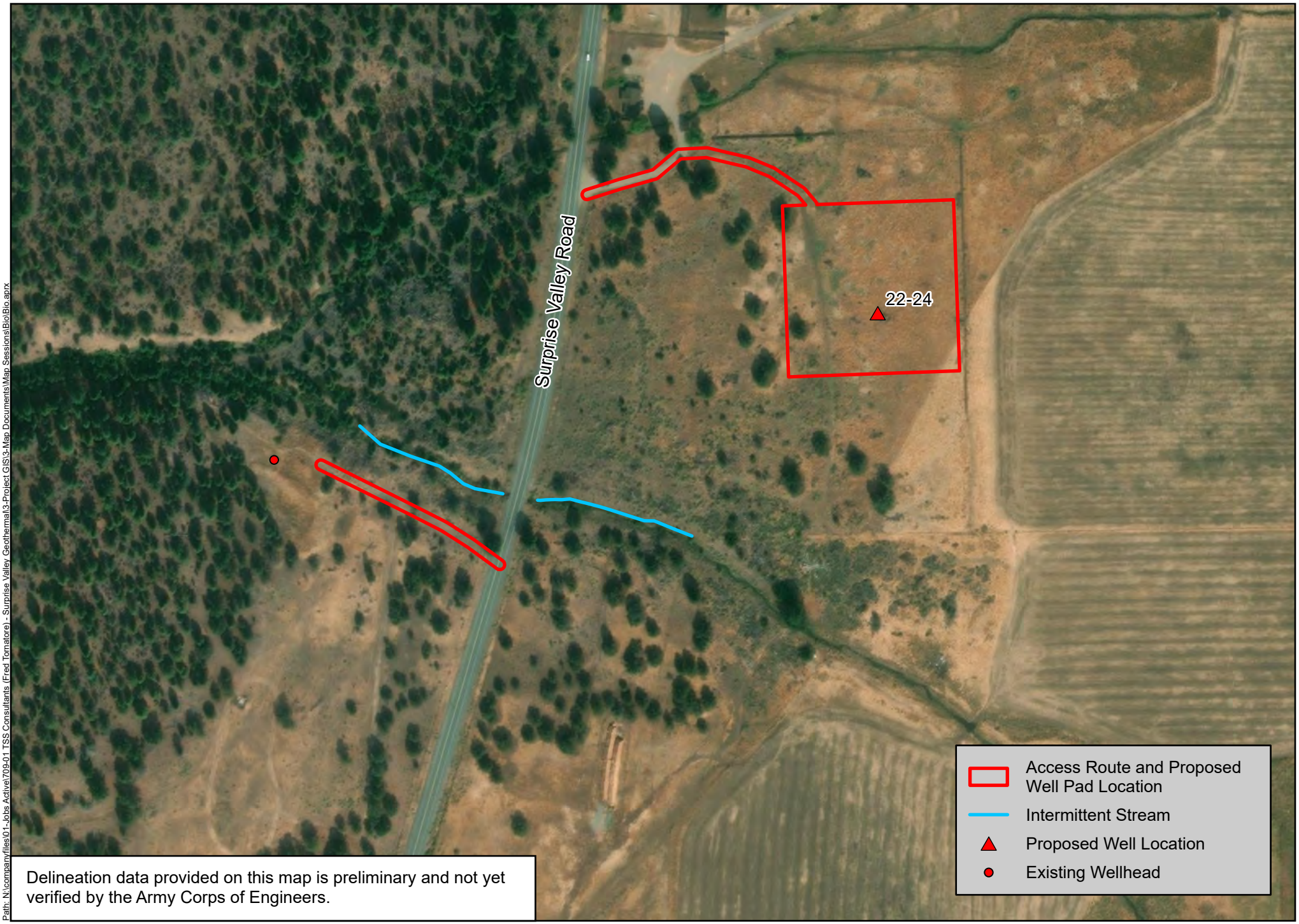
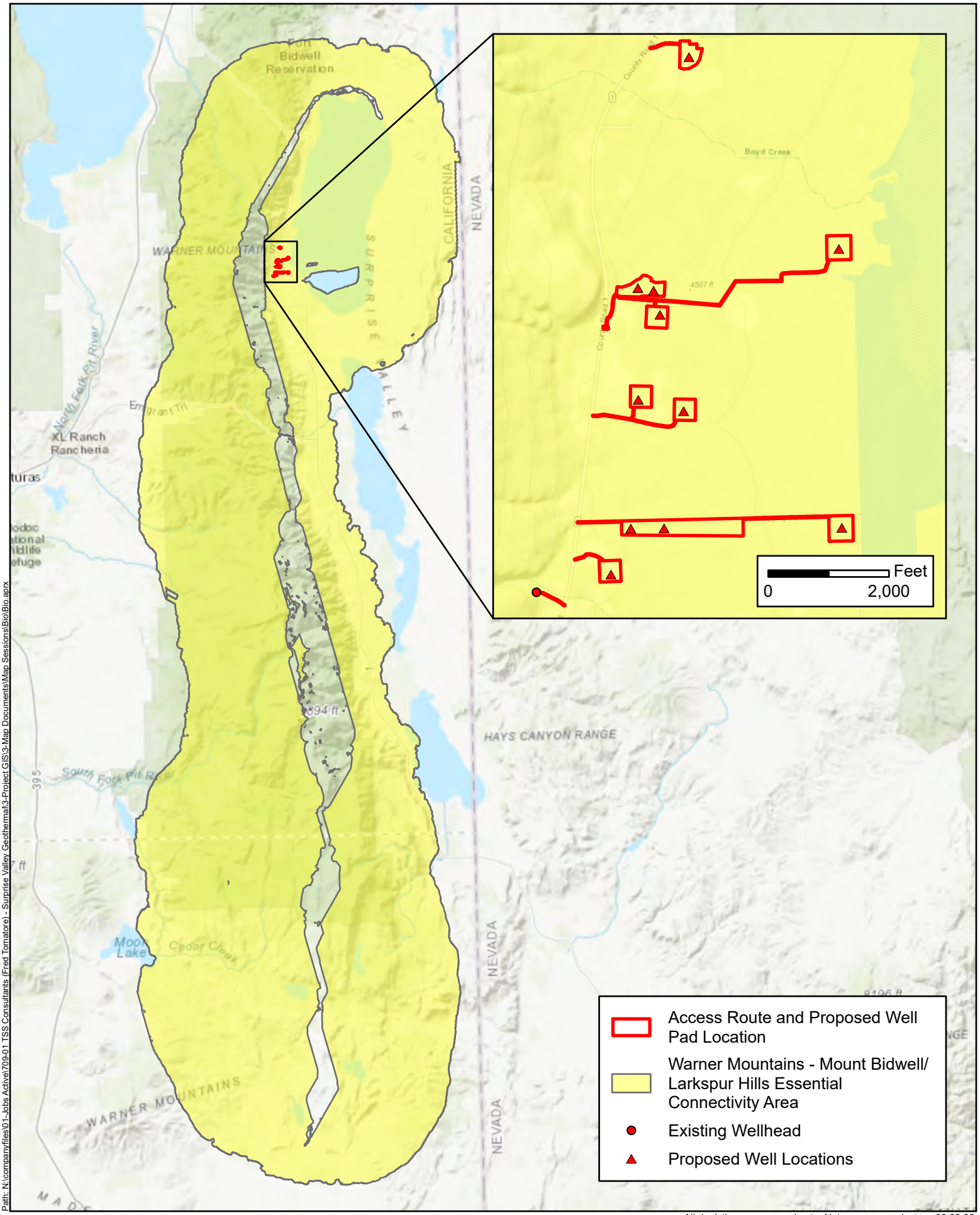


Figure 14

Survey Results: Well Site 22-24



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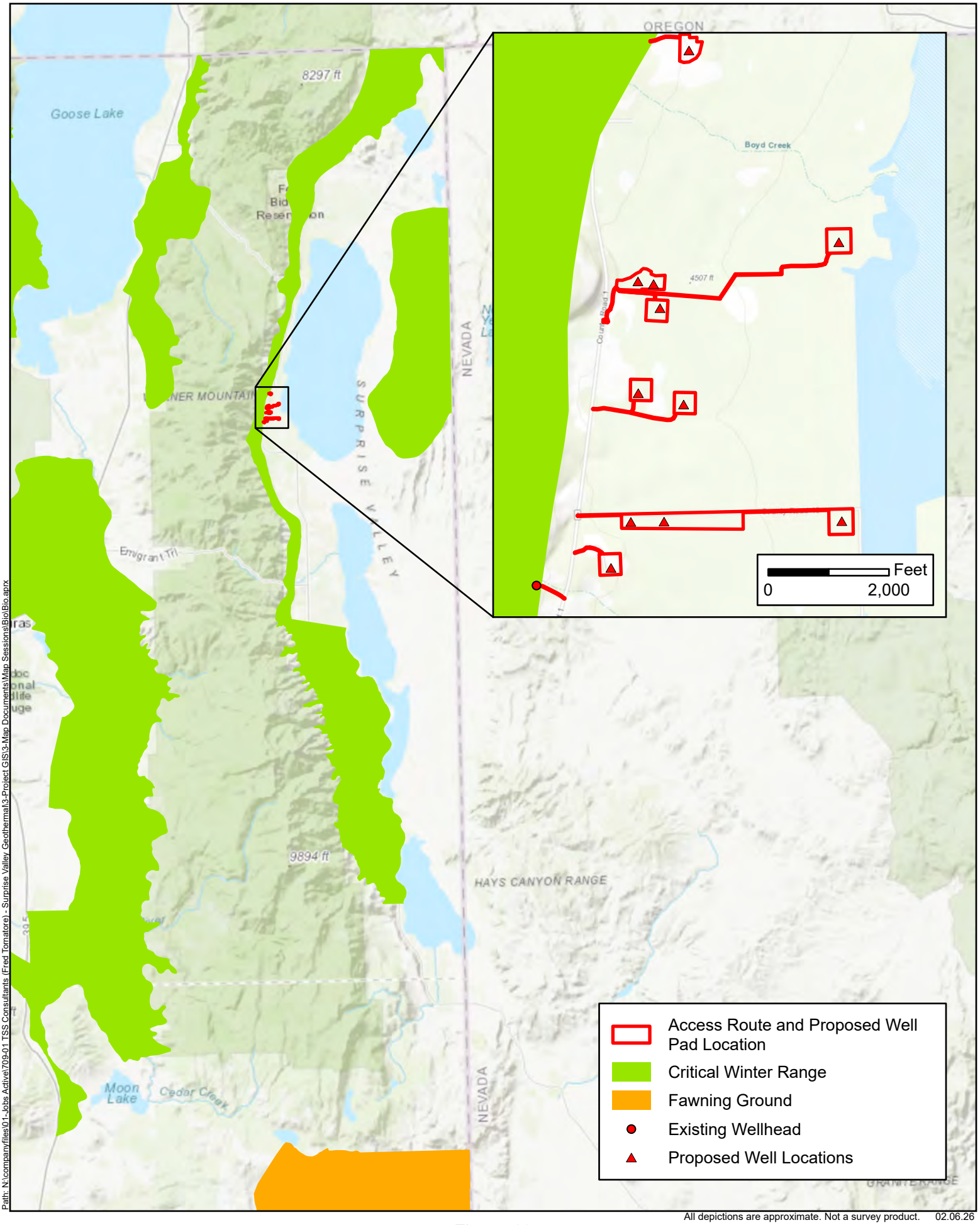
All depictions are approximate. Not a survey product. 02.06.26

Feet
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Figure 15

CDFW Essential Connectivity Areas Records

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All depictions are approximate. Not a survey product. 02.06.26

Feet
0 38,334

Figure 16

CDFW Mule Deer Range - Region 1 Records

Catalyst ENVIRONMENTAL SOLUTIONS

Appendix C

Cultural Resources Technical Report

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Appendix C

Cultural Resources Technical Report

NOTE TO REVIEWER

The *Cultural Resources Inventory Report – Surprise Valley Geothermal Exploration Project, Modoc County, California* is not available for public distribution. This report identifies the locations of cultural resource sites. Disclosure of this information to the public may be in violation of both federal and State laws. Applicable United States laws include, but may not be limited to, Section 304 of the National Historic Preservation Act (16 U.S.C. 470w-3). In California, such laws include, but may not be limited to, Government Code Section 6254.10. Site location information should be kept confidential and is not for public disclosure.

Additionally, records maintained or in the possession of the Native American Heritage Commission or State and local agencies that are exempt from public disclosure include those that contain information on Native American graves, cemeteries, and sacred places, and include records obtained during consultation with Native Americans (California Government Code Section 6254(r) and Section 6254.10).

Information contained in the above referenced reports related on the specific location of prehistoric and historic sites is confidential and exempt from the Freedom of Information Act (FOIA) and the California Public Records Act (CPRA); therefore, site specific cultural resource investigations are not appended to this Initial Study. Professionally qualified individuals, as determined by the California Office of Historic Preservation, may contact the Modoc County Planning Department directly in order to inquire about its availability.

Appendix D

Water Quality Management Plan

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Water Quality Management Plan

Surprise Valley Geothermal Energy Exploration Project

Prepared for: Modoc County

Submitted by: ORMAT

February 5th, 2023

Innovative solutions for a complex world

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Document Information

Prepared for Ormat Surprise Valley LLC (A subsidiary of Ormat Technologies, Inc.)

Project Name **Surprise Valley Geothermal Energy Exploration Project**
APN 026-080-018; APN 026-100-014; APN 026-100-006; APN 026-100-007; APN 026-100-008 and APN 032-030-001

Address ORMAT
6140 Plumas Street
Reno, NV 89519-6075

Project Manager Ben Pogue
bpogue@ce.solutions

Project Engineer Paden Voget, P.E.
pvoget@ce.solutions
State of California Professional Engineer #69238

Date February 5th, 2026

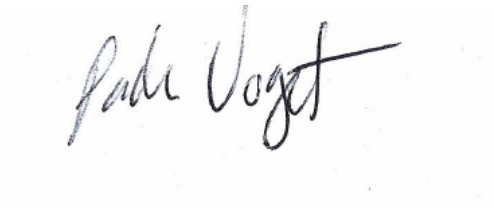
Professional Certification

Water Quality Management Plan

Surprise Valley Geothermal Exploration Facilities

This report has been prepared by Catalyst Environmental Solutions Corporation under the professional supervision of the Principal(s) and/or staff whose signature(s) appear hereon.

The scope of work and specifications are presented in accordance with generally accepted professional engineering practice and those of the California State Water Resources Control Board Order No. 2013-001-DWQ. There is no other warranty either expressed or implied.





Paden Voget, PE
State of California Professional Engineer #69238

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for Ormat Surprise Valley LLC (Applicant), by Catalyst Environmental solutions. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions expressed in this document. Once the undersigned transfers its interest in the property, its successors in interest and the city/county/town shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):	New CUP for Surprise Valley Geothermal Exploration Facilities	Grading Permit Number(s)	N/A
Tract/Parcel Map Number(s):	APN 026-080-018; APN 026-100-014; APN 026-100-006; APN 026-100-008, and APN: 026-100-004-000	Building Permit Number(s)	N/A
CUP:			
Owner's Signature			
Owner Name:	Alissa Sanchez		
Title:	Senior Manager, Environmental Permitting		
Company:	ORMAT		
Address:	6140 Plumas Road, Reno, NV		
Email:	asanchez@ormat.com		
Telephone:	775-356-9029 ext. 32234		
Signature:	Date:		February 5, 2025

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SECTION 1 Project Description

Project Overview

Catalyst Environmental Solutions Corporation (Catalyst) has prepared this report to evaluate the potential for impacts related to air quality and greenhouse gas (GHG) resulting from implementation of the proposed Surprise Valley Geothermal Exploration Project (Project) in Modoc County, California. This report includes an evaluation of potential construction and operational air emissions and whether Project-induced emissions are in excess of standards established by the applicable local jurisdiction (i.e., Modoc County Air Pollution Control District). Site-specific construction and operations activity information used for air emissions models are based on information provided by ORMAT.

1.1.1 Project Location and Description

The Project entails the development of eleven geothermal exploration/test wells southwest of Upper Alkali Lake, and 1.85 miles north of Lake City within the Lake City-Surprise Valley 1 Known Geothermal Resources Area (KGRA) of Modoc County.

Proposed developments would be located within the Lake City USGS quadrangle in sections 12, 13, and 24 Township 44 north Range 15 east; on APN 026-080-018, APN 026-100-004, APN 026-100-014, APN 026-100-006, APN 026-100-007, and APN 026-100-008. The proposed development areas are leased to ORMAT by various private landowners.

Primary access to the general project area is provided by Surprise Valley Road which travels north and south through or adjacent to Project parcels. Existing agricultural roads stemming from Surprise Valley Road provide access to individual well pad development sites and will be improved as necessary to accommodate the proposed development. An additional access road will be constructed on APN 026-100-014 and APN 026-100-004 to provide access to the proposed well pads 43-13 and 82-13 and an additional access road to be constructed on APN 0226-100-006 from Surprise Vally Road to the proposed well pads 35-13 and 46-13. A new access road segment will also be constructed in APN 026-100-008 to provide access to proposed well pad 22-24.

The total project area of disturbance from the proposed development is approximately 39.49 acres as summarized in **Table 1**.

Table 1. Project Area of Disturbance Estimates

Facility	Disturbance (Acres)
Geothermal Exploration Wells (i.e., Well Pads)	37.18 acres
Improved Access Roads	0.2 acres
New Access Roads	2.11
TOTAL	**39.49 acres**

1.1.2 Geothermal Exploration/Test Wells

Eleven test/exploratory wells would explore areas of potentially viable geothermal resources, for future production well development. One test well will be developed on each of the following parcel's APN 026-080-018 and APN 026-100-004; three test wells on APN 026-100-014; two test wells on APN 026-100-006; and four test wells on APN 026-100-008.

During well installation, each well pad would accommodate a drilling rig, support equipment, portable bathroom, baker tanks, and project vehicles. Each well pad would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Each well would be drilled with a rotary drill rig similar to those used to drill oil and gas wells. The test wells would each be drilled and cased to a design depth of approximately 3,000 to 5,000 feet. Following the cementing of the surface casing, blowout prevention equipment (BOPE) would be installed. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic barite (barium sulfate) would be stored at each well pad (as appropriate for the type of material) for use in preventing uncontrolled well flow, as necessary.

Once the well is completed, a well head will be installed, and pressure and flow testing will be conducted. Well testing consists of flowing the well into baker tanks stationed on the well pad and monitoring geothermal fluid for temperatures, pressures, flow rates, chemistry and other parameters. Discharge from test wells would be captured in steal baker tanks and transported off site for disposal at an appropriate facility. No geothermal fluid would be discharged to the surrounding landscape. Successful test wells may be developed into commercial geothermal production wells in the future.

1.1.3 Access Roads

Existing farm roads currently serve as access roads to the majority of proposed well pad development sites. These existing access roads will be the primary ingress and egress to the well pad sites. New access roads will be developed to access the well pads on APN 026-100-004, APN 026-100-014, APN 026-100-006, and APN 026-100-008. Existing access roads may require improvements to accommodate transportation of well and drilling equipment. New and improved access roads would be constructed using a dozer and/or road grader for the Project. Existing access roads may require resurfacing to accommodate the import of drilling equipment. Access roads will be compacted with a roller-compactor and surfaced with gravel as needed. Improvements to existing access roads will be kept within the current road boundaries as feasible. Widening of access roads would only be done in areas where road width is less than 15 feet and is unable to accommodate drilling equipment.

Road construction techniques would vary depending on the specific site and existing road conditions. New roads are typically dozed or bladed following topography where possible. During rough grading the amount of cut and fill will be kept to a minimum while providing for drivability and maintenance. If the base material has adequate aggregate and composition to maintain a stable road surface only grading will be performed. Should additional aggregate/base be needed for stability, it would be laid in even lifts and compacted by grading and water equipment. All aggregate material needed for road construction or improvements will be sourced from local permitted aggregate mines.

1.1.4 Site Reclamation

Testing would determine if future geothermal energy development is feasible. If exploratory testing is successful, the exploration/test wells may be developed in full-size production wells for commercial geothermal energy generation. Any future action would be subject to CEQA review and permitting, as the scale of future development cannot be reasonably assumed prior to successful test well development.

Interim Reclamation would be conducted at the close of construction work of each well pad location, and be maintained throughout the testing period prior to final reclamation. Interim Reclamation will

maintain the sites integrity for final reclamation and prevent degradation form the proposed project to the surrounding landscape.

Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas. Prior to final reclamation soil will be seeded and stabilized with an approved erosion control mix to prevent erosion. Disturbed well pad areas not required for use during testing will be stabilized similarly stabilized with an erosion control seed mixture. Temporary BMPs may be used at the Site to prevent soil erosion include the use of sandbags, crushed rock, and silt fence. These BMPs are used as and where needed, especially in areas that are undeveloped or in the process of being developed.

At the end of the permitted or useful life of the test well facilities and if testing yields negative results, no future geothermal energy developments would occur. The Applicant would prepare a Site Reclamation and Restoration Plan that establishes the plan and protocol for dismantling, removing, abandoning, transporting, and disposing of wells and associated equipment, as well as the plan for performing site restoration activities after the facilities are removed. Further, within three years of the cessation of testing, all equipment will be dismantled, all wells capped or abandoned as required by the County and CalGEM and the land involved be made compatible with the surrounding uses or as requested by the County Planning Director. A Bond, Letter of Credit, or other forms of security acceptable to Modoc County in addition to that of the amount set by CalGEM, would be filed with the County that guarantees restoration of the land to its condition prior to the permitted well pad development.

The general objective of the final reclamation phase is to return the site as close as possible to the conditions prior to geothermal development. Reclamation activities would be planned and conducted in accordance with County requirements.

1.1.5 Water Use and Source

Water required for facility construction activities and testing, including grading and dust control, will be imported by truck as needed from a permitted offsite source(s).

Construction Activities

The Suprise Vally geothermal exploration facilities would be developed on agricultural land currently dedicated to alfalfa production and would require earthwork for development. For the well pads, a 300-foot by 300-foot (~90,000 square feet) area would be cleared and a chain-link security fence would be installed around each well pad construction site. Site preparation activities for the well pads would include clearing, earthwork, drainage and grading necessary for safe operations and for fire prevention. To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557). On-site soil that has been piled during excavation will be used as backfill material, as necessary.

Construction and testing of the proposed facilities is anticipated to occur over an approximate 28-month period, beginning in late 2026 or when permitting is completed. Project construction would include site

preparation activities, but no demolition of existing structures/buildings will occur. **Table 2** below provides a breakdown of the proposed construction schedule by phase and duration.

Table 2. Project Construction Process/Phasing

Construction Phase	Construction Activity	Activity Duration	Phase Duration
Site Preparation	Construction Kick-off/Staging	1 week	5 months
	Site Clearing	1 week	
	Site Preparation/Rough Grading	2 weeks	
	Fine/Pad Grading	1 month	
	Well Pad Construction	3 months	
Well Drilling	Well Drilling and Completion	12 months	17 months
Flow Testing	Testing Phase	3 months	3 months
Reclamation	Well Head Removal/Well Abandonment/Site Restoration	2 months	3 month

ORMAT has estimated construction equipment and usage for the Project based on experience with similar projects as provided in **Table 3**. Similarly, based on construction activities associated with similar projects, ORMAT anticipates that up to 15 workers would be required for construction of Project components. Vehicle and truck trip generation rates for the Project provided in **Table 4** are estimated assuming roughly 2 trips/worker (to/from site) for a total of 30 trips, and 2 trips/vehicle (in/out) for vendor and haul trips. Trip lengths consist of default CalEEMod values.

Table 3. Project Construction Equipment List by Project Activity

Construction Phase	Equipment	Quantity	Engine Horsepower	No. Days Used	No. Hours Operated Per Day
Site Preparation (5 Months)	Heavy Duty Trucks	3	402	60	5
	Excavator	1	97	60	8
	Roller	2	200	60	8
	Light-Duty Truck	8	350	60	4
	Backhoe	1	97	60	8
	Rubber Tired Loader	1	203	60	8
	Grader	1	187	60	8
Well Drilling and (17 Months)	Light tower	2	27	105	12
	Drill Rig	1	500	210	24
	Rig Mud Pump	1	500	210	24
	Rig Generator	1	415	210	24
	Heavy Duty Trucks (Mob/Demob)	8	450	28	8
	Crane	2	231	28	5
	Backhoe	1	97	28	6
	Forklift	1	89	28	6
	Vacuum Truck	1	385	28	10

Construction Phase	Equipment	Quantity	Engine Horsepower	No. Days Used	No. Hours Operated Per Day
	Concrete Truck	1	428	4	4
	Concrete Pumper	1	100	4	4
	Light Duty Truck	4	350	28	4
Testing (3 Months)	Generator	1	671	90	24
	Light Tower (27 hp)	2	27	90	12
	Light Tower (9 hp)	2	9	90	12
	Pump (115 hp)	1	115	90	24
	Pump (415 hp)	1	415	90	24
	Light Duty Truck	1	350	90	4
Reclamation (3 Months)	Backhoe	1	97	35	8
	Grader	1	187	35	8

Table 4. Construction Vehicle Trips

Construction Phase	Trip Type	Number of One-Way Trips per Day[1]	One-Way Trip Length (miles)[2]
Site Preparation	Workers	30	11.9
	Vendor	104	9.0
	Haul	6	20
Well Drilling	Workers	30	11.9
	Vendor	10	9.0
	Haul	26	20
Testing	Workers	30	11.9
	Vendor	4	9.0
	Haul	4	20
Reclamation	Workers	6	11.9
	Vendor	4	9.0
	Haul	4	20

Notes:

[1] All truck trips delivering construction materials are assigned to vendor deliveries. Truck trips associated with water deliveries are assigned to haul trips.

[2] Trip lengths consist of default CalEEMod values with exception of vendors for delivery of Project equipment during construction.

1.1 Land Use and Topography

The Project area is located in the Surprise Valley region of Modoc County. This area is surrounded by views of the Warner Mountain range and Modoc National Forest directly to the west, Upper Alkali Lake to the east, Middle Alkali Lake to the south and rural agricultural landscapes throughout the valley. Views from the work areas will be dominated by the warner Mountains to the west, Upper Alkali Lake to the east and the surrounding agricultural

The proposed development areas are leased to ORMAT by various private landowners. Surprise Valley is identified as a geothermal resource area in the County of Modoc 1998 General Plan (Update 2018). Proposed test facilities will be located on agricultural land currently dedicated to the production of Alfalfa or associated agricultural facilities. The Project parcels are zoned as Unclassified and general land use designation is Exclusive agriculture or Exclusive agriculture/ General Agriculture. Land use surrounding the project area is primarily agricultural including irrigated fields for the production of alfalfa, grazing lands in the foothills to the west and open space around Upper Alkali Lake to the east. The Project area is in the flat valley bottom, surrounding topography is flat except to the west which transitions into the foothills of the Warner Mountains

1.2 Site Geology, Hydrogeology, and Soils

The site is located in Modoc County which is underlain by two primary Geomorphic Provinces, The Modoc Plateau Provinces on the western two-thirds of the County and the Basin and Range Province along the eastern side. The Modoc Plateau is a volcanic table consisting of lava flows and tuff beds along with many small volcanic cones. The Basin and Range is the westernmost part of the Great Basin. The province is characterized by interior drainage with lakes and playas, and the typical horst and graben structure (subparallel, fault-bounded ranges separated by down dropped basins) (California Geological Survey, 2002).

The Project site is located in in the Surprise Valley region of Modoc County, directly within the Surprise Valley fault area. The Surprise Valley, is a north-trending structural graben bordered on the west and north by the Warner Mountains and on the east by the Hays Canyon Range in Nevada. The Surprise Valley fault is the boundary between the Modoc Plateau geomorphic province to the west and the Basin and Range province to the east (Bryant, 1990). Mapped Geologic Units within the Project area consist of Quaternary Alluvium and Marine Deposits (Figure9).

Soils within the Project site vary between each well pad development area. The USDA Natural Resources Conservation Service (NRCS) has mapped the soils at the Project site (Figure 10) as follows:

- Bidwell ashy loam, 2 to 5 percent slopes
- Buntingville ashy loam, 2 to 5 percent slopes
- Donica very stony ashy sandy loam, 2 to 15 percent slopes
- Hovey silty clay loam
- Hussa ashy clay loam, clay substratum, 0 to 2 percent slopes
- Hussa ashy silty clay loam, seeped, 0 to 9 percent slopes
- Simpson ashy sandy loam, 2 to 5 percent slopes
- Surprise gravelly ashy sandy loam, 2 to 5 percent slopes

The Project area is located adjacent to the Upper Alkali Lake, the shores around the lake are predominantly freshwater emergent wetlands which have been converted to agriculture. Three of the proposed drill pad locations are located within areas mapped by the USFWS National Wetlands Inventory as Freshwater Emergent Wetland. Multiple intermittent streams flow from the foothills to the west into the project area, including Powley Creek Boyd Creek and Bucher Creek. These streams largely lose definition as they enter the agriculture areas. Defined surface water resources in the vicinity of the

work areas include a stock pond, undisturbed wetlands along Upper Alkali Lake directly, and a stream. Powlely Creek flows south of well-pad and eventually flows int o the Lake City Hot Springs, hot springs and wetlands complex).

1.3 Hydromodificaiton Applicability

The Project would not result in the creating of impervious area from pre-Project conditions. For construction of well pads, limited grading is proposed for the Project that would not result in changes to the permeability of the site nor alter the existing drainage patterns. As such, the post-development runoff volume, time of concentration, and peak flow velocity would not be altered from that of the pre-development condition.

1.4 Potential Stormwater Pollutants

Table 5 summarizes expected stormwater pollutants of concern based on land use and site activities.

Table 5. Pollutants of Concern

Pollutant	Potential to Impact Stormwater (Y/N)	Additional Information and Comments
Pathogens (Bacterial/Virus)	N	--
Nutrients – Phosphorous	N	Disturbance of previously treated agricultural soils may result in Sediment high in phosphorous content
Nutrients - Nitrogen	N	Disturbance of previously treated agricultural soils may result in Sediment high in nitrogen content
Noxious Aquatic Plants	N	--
Sediment	Y	Overland flows over unpaved surface may result in sediment in stormwater runoff
Metals	Y	Leaks/spills in Project area may result in metals in stormwater runoff
Oil and Grease	Y	Leaks/spills in Project area may result in oil and grease in stormwater runoff
Trash/Debris	Y	Improperly disposed of trash/debris may result in trash in stormwater runoff
Pesticides/Herbicides	N	Disturbance of previously treated agricultural soils may result in Sediment high in Pesticides/Herbicides content --
Other	N	--

SECTION 2 Best Management Practices

This section describes the Best Management Practices (BMPs) that will be implemented and maintained throughout the life of the project. The BMPs will be used to prevent and minimize water pollution that can be caused by stormwater runoff. **Table 6** details the BMPs selected to be implemented at the Project site based on the potential pollutants.

Table 6. Non-Structural Source Control BMPs

Pollutant Source	Pollutant	BMP	Existing?	New/Revised?
Stormwater run-on and runoff	Erosion, sediment, contaminated stormwater	• Stabilize drainage with rocks, gravel, vegetation, or riprap • Provide perimeter control to isolate sediment (loose dirt). Includes earthen berms, fiber rolls, silt fence, etc.	X	
Vehicle Track Out	Sediment, Dust	• Provide tracking control devise • Conduct street sweeping	X	
Work Areas	Trash	• Regularly monitor and clean trash • Provide employee training for good housekeeping	X	
Equipment Areas (OECs, ITLUs, pipes)	Isopentane, sediment	• Control drainage patterns with berms • Use water truck for dust control • Conduct routine inspections	X	X
Stored materials and equipment maintenance	Oil, grease, hydraulic fluid, anti-freeze, metals	• Provide good housekeeping training • Store materials in secondary containment • Spill kit and response training	X	

In addition to the activities listed above, ORMAT follows all approved operational guidelines that are currently in place. Temporary and permanent soil erosion control BMPs will be implemented in conformance with the BMP Fact Sheets provided in the California Stormwater Quality Association (CASQA) Stormwater Best Management Practice Handbook – Industrial and Commercial (2019).

2.1 Non-Structural BMPs

The following are prevention practices utilized to minimize the probability of pollution of stormwater discharge.

2.1.1 Good Housekeeping

As a component of this program, good housekeeping practices are performed so that facility is kept in a clean and orderly condition. Proper housekeeping practices include:

- Periodic cleanup of equipment, as needed, based upon facility inspections,
- Sweeping impervious surfaces, as needed, based upon facility inspections,
- Proper waste disposal practices and covering of waste storage areas at all times,
- Proper storage and covering of materials at all times,
- Removal of any oil-stained soil/gravel, especially around equipment locations and loading areas,
- Cleaning of significant oil and grease stains on surfaces that drain to the stormwater drainage areas, and
- Cleaning the exterior of oil containers on hydraulic machinery upon discovery of an accumulation of hydraulic fluid.

2.1.2 Preventative Maintenance

As a component of this program, operations and maintenance staff perform preventative maintenance of stormwater management devices to assure their proper operation. Preventative maintenance of stormwater management devices includes the following:

- Cleaning of accumulated sediment, potential contaminants, and debris from the Site;
- Inspection of secondary containment structures as part of the regular daily visual inspections;
- Maintenance and inspection of secondary containment structures, as needed, based upon inspections;
- Daily inspection and maintenance of equipment and associated piping and valves as required by preventive maintenance procedures;
- Inspection and maintenance of rainfall protection coverings for waste storage bins and receptacles on a periodic basis; and
- A comprehensive preventive maintenance schedule is performed on all facility operations equipment as part of routine procedures.

2.1.3 Spill Response

A limited amount of spill cleanup equipment is stored onsite. This equipment is found within hazardous material storage areas. The volume of containment areas surrounding each potential source is designed to hold the contents of a spill from the largest vessel / container.

2.1.4 Material Handling and Storage

All hazardous waste such as fuel or oils needed for onsite use would be stored in 55-gallon drums and other Department of Transportation (DOT) approved packaging within a contained area located on the Site. A bill of lading, non-hazardous waste manifest or uniform hazardous waste manifest is used to document all such shipments to and from the site.

2.1.5 Employee Training

A combined annual Storm Water Compliance / SPCC Plan training program is conducted for the Pollution Prevention Team members and operations personnel. Participants undergo stormwater management

training for all areas and operations at this facility, as well as reviewing the spill response, control and countermeasure procedures. Other stormwater training is done on an as-needed basis.

2.1.6 Waste Handling/Recycling

At times, product or oily waste streams are transferred from the facility in 55-gallon drums. A bill of lading, non-hazardous waste manifest or uniform hazardous waste manifest is used to document all such shipments. Operations or contractor personnel closely monitor loading of transport vehicles. Collection and satellite accumulation containers for hazardous and non-hazardous waste are kept covered to prevent contact with stormwater. Appropriate spill control equipment and supplies are kept readily available in case of a spill.

2.1.7 Record Keeping and Internal Reporting

All inspection, sampling, maintenance, corrective action records, and any other information that is a part of this plan are maintained at the facility office. All records are maintained for a period of at least three (3) years.

2.1.8 Erosion Control and Site Stabilization

BMPs which may be used to prevent soil erosion include routing runoff along earthen swales or drainage areas, and preventing run-off with berms along certain sections of the well pads or roads. Temporary BMPs used at the Site to prevent soil erosion include the use of sandbags, crushed rock, and silt fence. These BMPs are used as and where needed, especially in areas that are undeveloped or in the process of being developed.

SECTION 3 Operation and Maintenance Plan

The Surprise Valley Project would be located within APN 026-080-018; APN: 026-100-004; APN 026-100-014; APN 026-100-006; and APN 026-100-008. North of Lake City within the Surprise Valley region of Modoc County CA along Surprise Valley Road. The following non-structural water quality best management practices (BMPs) are proposed for the Project:

- Good Housekeeping
- Preventative Maintenance
- Spill Response
- Material Handling and Storage
- Employee Training
- Waste Handling/Recycling
- Record Keeping and Internal Reporting
- Erosion Control and Site Stabilization

3.1 Maintenance Responsibility

Ormat Surprise Valley LLC (subsidiary of ORMAT) is the property lessee and is responsible for BMP maintenance. Access agreement currently exist to implement the proposed project and to maintain the BMPs. ORMAT funds will be used to support activities to maintain BMP functionality during construction and testing. ORMAT maintenance staff are expected to perform the maintenance.

3.2 Maintenance Actions and Frequency

Maintenance actions are generally grouped into two categories: routine and intermittent. Due to the temporary nature of the proposed project Routine and intermittent maintenance is not expected. Maintenance will be completed as needed during construction and testing. Maintenance inspections will be conducted aft er precipitation events as required by the Construction SWPPP. During each maintenance visit, the maintenance crew will evaluate existing drainage paths and infrastructure by inspecting for the maintenance indicators in **Table 7**. When a maintenance indicator is observed, the action described in the “Maintenance Actions” column will be taken. When a maintenance indicator is observed, the required maintenance action will be taken.

Table7. Maintenance Indicators and Actions for BMPs

Typical Maintenance Indicator	Maintenance Action
Erosion due to concentrated stormwater runoff flow	Repair eroded areas and make appropriate corrective measures such as adding berm or stone at flow entry points, or re-grading as necessary.
Accumulated sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to stormwater drainage structures.

Standing water	Remove any obstructions or debris or invasive vegetation, loosing or replace top-soil to allow for better infiltration, or minor re-grading for proper drainage.
Obstructed inlet or outlet structures	Clear obstructions.
Damage to structural components such as inlet or outlet structures	Repair or replace as applicable.

SECTION 4 References

California Stormwater Quality Association (CASQA). 2019. Industrial and Commercial Best Management Handbook. 2019.

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Figures





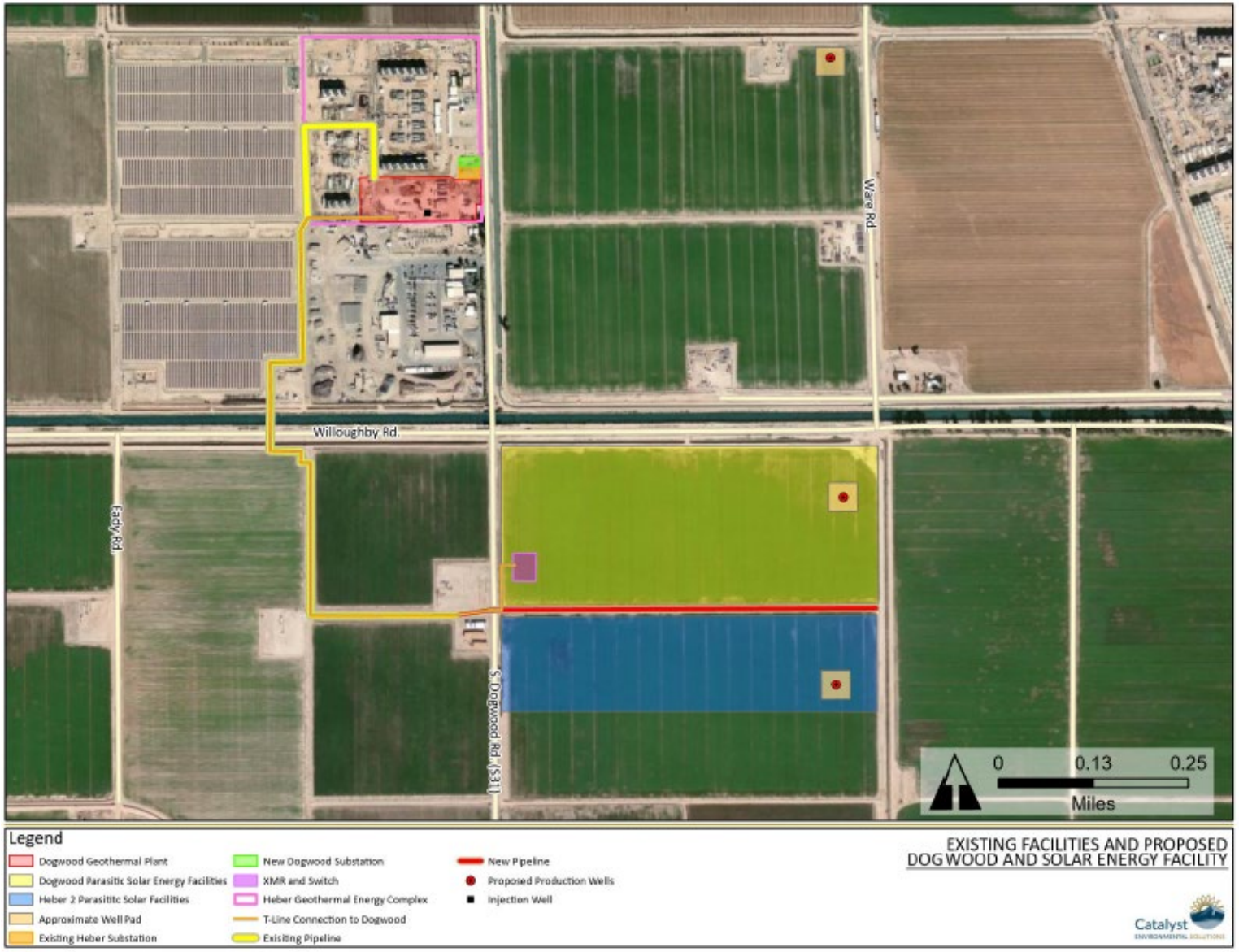


Figure 1. Dogwood Geothermal Energy Project Proposed Facilities

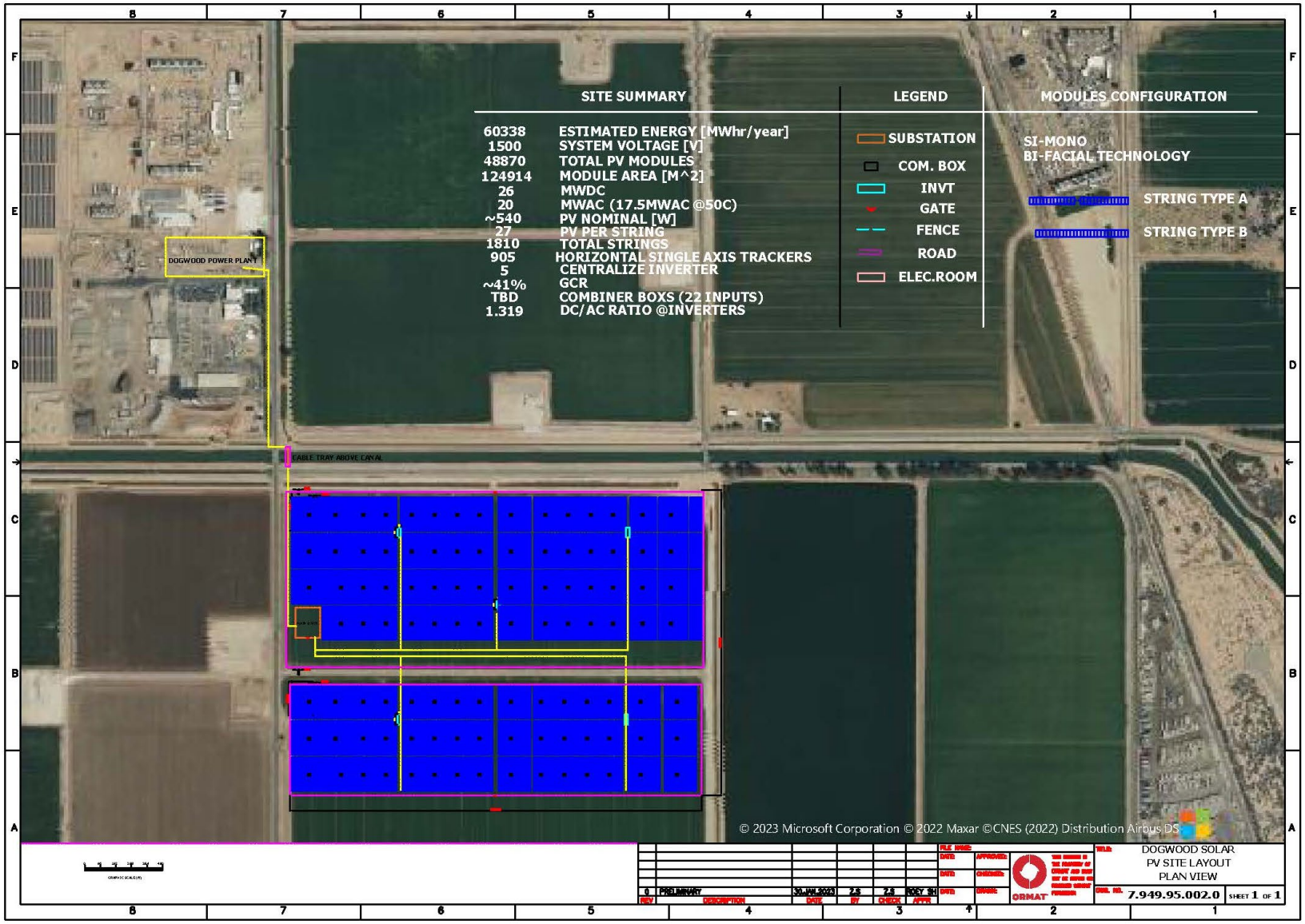


Figure 2. Dogwood and Heber 2 Solar Site Plan

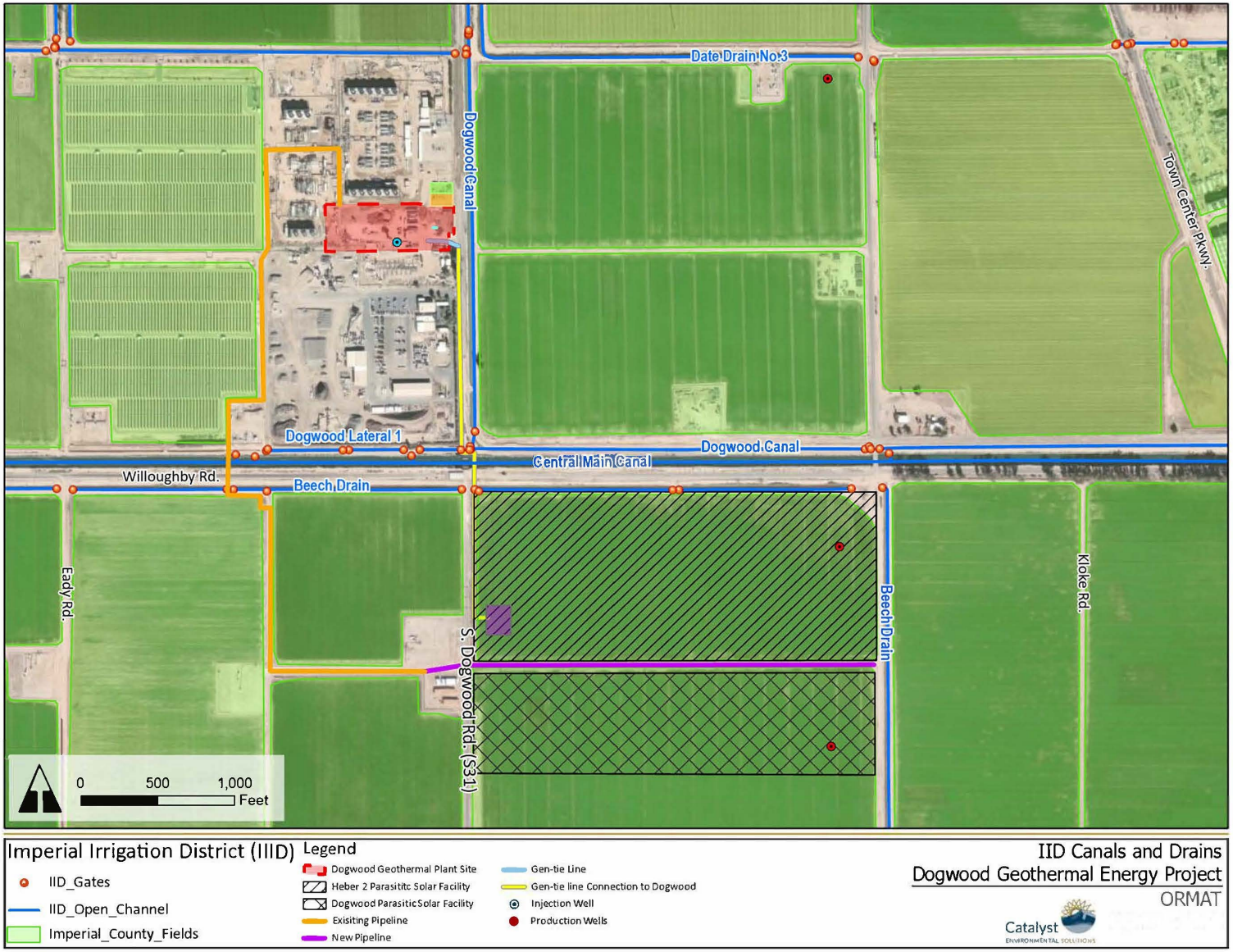


Figure 3. IID Canals and Drains.

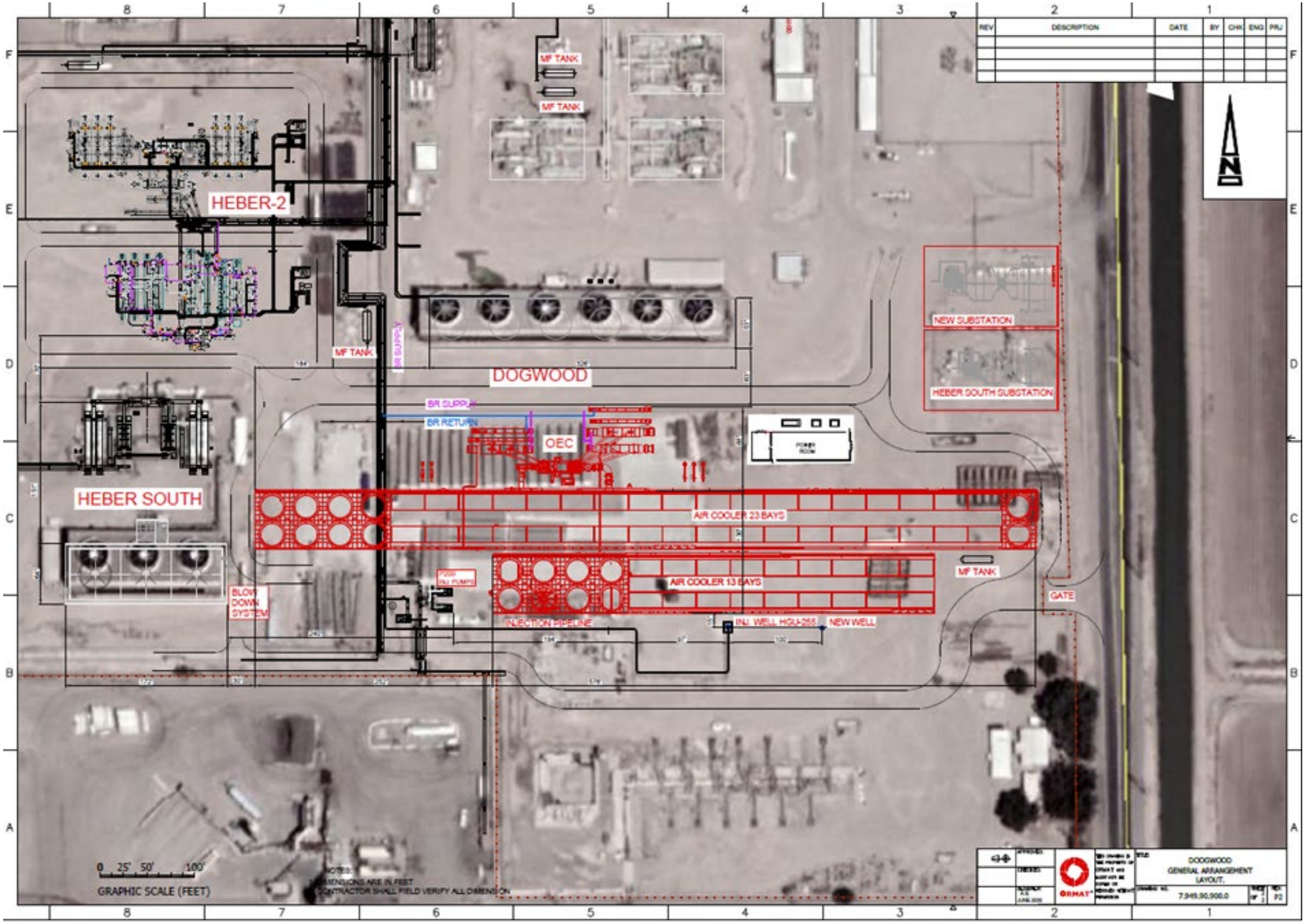


Figure 4. Dogwood Geothermal Site Plan

Appendix E

Noise Technical Report

Catalyst
ENVIRONMENTAL SOLUTIONS



Noise Technical Report

Surprise Valley Geothermal Exploration Project

Prepared for: Modoc County Planning Department

January 15, 2026

Innovative solutions for a complex world

Catalyst
ENVIRONMENTAL SOLUTIONS

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SECTION 1 Introduction

Catalyst Environmental Solutions Corporation (Catalyst) has prepared this report to evaluate the potential for impacts related to noise resulting from implementation of the proposed Surprise Valley Geothermal Exploration Project (Project) in Modoc County, California. This report includes an evaluation of potential impacts associated with temporary increases in noise in the vicinity of the Project site and whether Project-induced noise is in excess of standards established by the applicable local jurisdiction (i.e., Modoc County). Site-specific construction and operations activity information used for noise models are based on information provided by ORMAT.

1.1 Project Overview

1.1.1 Project Location and Description

The Project entails the development of eleven geothermal exploration/test wells southwest of Upper Alkali Lake, and 1.85 miles north of Lake City within the Lake City-Surprise Valley 1 Known Geothermal Resources Area (KGRA) of Modoc County.

Proposed developments would be located within the Lake City USGS quadrangle in sections 12, 13, and 24 Township 44 north Range 15 east; on APN 026-080-018, APN 026-100-004, APN 026-100-014, APN 026-100-006, APN 026-100-007, and APN 026-100-008. The proposed development areas are leased to ORMAT by various private landowners.

Primary access to the general project area is provided by Surprise Valley Road which travels north and south through or adjacent to Project parcels. Existing agricultural roads stemming from Surprise Valley Road provide access to individual well pad development sites and will be improved as necessary to accommodate the proposed development. An additional access road will be constructed on APN 026-100-014 and APN 026-100-004 to provide access to the proposed well pads 43-13 and 82-13 and an additional access road to be constructed on APN 0226-100-006 from Surprise Vally Road to the proposed well pads 35-13 and 46-13. A new access road segment will also be constructed in APN 026-100-008 to provide access to proposed well pad 22-24.

The total project area of disturbance from the proposed development is approximately 39.49 acres as summarized in **Table 1**.

Table 1. Project Area of Disturbance Estimates

Facility	Disturbance (Acres)
Geothermal Exploration Wells (i.e., Well Pads)	37.18
Improved Access Roads	0.2
New Access Roads	2.11
TOTAL	**39.49**

1.1.2 Geothermal Exploration/Test Wells

Eleven test/exploratory wells would explore areas of potentially viable geothermal resources, for future production well development. One test well will be developed on each of the following parcel's APN 026-080-018 and APN 026-100-004; three test wells on APN 026-100-014; two test wells on APN 026-100-006; and four test wells on APN 026-100-008.

During well installation, each well pad would accommodate a drilling rig, support equipment, portable bathroom, baker tanks, and project vehicles. Each well pad would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Each well would be drilled with a rotary drill rig similar to those used to drill oil and gas wells. The test wells would each be drilled and cased to a design depth of approximately 3,000 to 5,000 feet. Following the cementing of the surface casing, blowout prevention equipment (BOPE) would be installed. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic barite (barium sulfate) would be stored at each well pad (as appropriate for the type of material) for use in preventing uncontrolled well flow, as necessary.

Once the well is completed, a well head will be installed, and pressure and flow testing will be conducted. Well testing consists of flowing the well into baker tanks stationed on the well pad and monitoring geothermal fluid for temperatures, pressures, flow rates, chemistry and other parameters. Discharge from test wells would be captured in steal baker tanks and transported off site for disposal at an appropriate facility. No geothermal fluid would be discharged to the surrounding landscape. Successful test wells may be developed into commercial geothermal production wells in the future.

1.1.3 Access Roads

Existing farm roads currently serve as access roads to the majority of proposed well pad development sites. These existing access roads will be the primary ingress and egress to the well pad sites. New access roads will be developed to access the well pads on APN 026-100-004, APN 026-100-014, APN 026-100-006, and APN 026-100-008. Existing access roads may require improvements to accommodate transportation of well and drilling equipment. New and improved access roads would be constructed using a dozer and/or road grader for the Project. Existing access roads may require resurfacing to accommodate the import of drilling equipment. Access roads will be compacted with a roller-compactor and surfaced with gravel as needed. Improvements to existing access roads will be kept within the current road boundaries as feasible. Widening of access roads would only be done in areas where road width is less than 15 feet and is unable to accommodate drilling equipment.

Road construction techniques would vary depending on the specific site and existing road conditions. New roads are typically dozed or bladed following topography where possible. During rough grading the amount of cut and fill will be kept to a minimum while providing for drivability and maintenance. If the base material has adequate aggregate and composition to maintain a stable road surface only grading will be performed. Should additional aggregate/base be needed for stability, it would be laid in even lifts and compacted by grading and water equipment. All aggregate material needed for road construction or improvements will be sourced from local permitted aggregate mines.

1.1.4 Site Reclamation

Testing would determine if future geothermal energy development is feasible. If exploratory testing is successful, the exploration/test wells may be developed in full-size production wells for commercial geothermal energy generation. Any future action would be subject to CEQA review and permitting, as the scale of future development cannot be reasonably assumed prior to successful test well development.

Interim Reclamation would be conducted at the close of construction work of each well pad location, and be maintained throughout the testing period prior to final reclamation. Interim Reclamation will maintain the sites integrity for final reclamation and prevent degradation form the proposed project to the surrounding landscape.

Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas. Prior to final reclamation soil will be seeded and stabilized with an approved erosion control mix to prevent erosion. Disturbed well pad areas not required for use during testing will be stabilized similarly stabilized with an erosion control seed mixture. Temporary BMPs may be used at the Site to prevent soil erosion include the use of sandbags, crushed rock, and silt fence. These BMPs are used as and where needed, especially in areas that are undeveloped or in the process of being developed.

At the end of the permitted or useful life of the test well facilities and if testing yields negative results, no future geothermal energy developments would occur. The Applicant would prepare a Site Reclamation and Restoration Plan that establishes the plan and protocol for dismantling, removing, abandoning, transporting, and disposing of wells and associated equipment, as well as the plan for performing site restoration activities after the facilities are removed. Further, within three years of the cessation of testing, all equipment will be dismantled, all wells capped or abandoned as required by the County and CalGEM and the land involved be made compatible with the surrounding uses or as requested by the County Planning Director. A Bond, Letter of Credit, or other forms of security acceptable to Modoc County in addition to that of the amount set by CalGEM, would be filed with the County that guarantees restoration of the land to its condition prior to the permitted well pad development.

The general objective of the final reclamation phase is to return the site as close as possible to the conditions prior to geothermal development. Reclamation activities would be planned and conducted in accordance with County requirements.

1.1.5 Water Use and Source

Water required for facility construction activities and testing, including grading and dust control, will be imported by truck as needed from a permitted offsite source(s).

1.2 Construction Activities

The Suprise Vally geothermal exploration facilities would be developed on agricultural land currently dedicated to alfalfa production and would require earthwork for development. For the well pads, a 300-

foot by 300-foot (~90,000 square feet) area would be cleared and a chain-link security fence would be installed around each well pad construction site. Site preparation activities for the well pads would include clearing, earthwork, drainage and grading necessary for safe operations and for fire prevention. To ensure the proposed facilities are situated on safe and stable surfaces, minor excavation and compaction activities would be performed. The top 18 inches of the Project site's exposed soil would be removed, extending approximately five feet beyond the proposed facilities. A minimum of 18 inches of Caltrans Class 2 aggregate base will be placed and compacted to the appropriate density (ASTM D1557). On-site soil that has been piled during excavation will be used as backfill material, as necessary.

Construction and testing of the proposed facilities is anticipated to occur over an approximate 28-month period, beginning in late 2026 or when permitting is completed. Project construction would include site preparation activities, but no demolition of existing structures/buildings will occur. **Table 2** below provides a breakdown of the proposed construction schedule by phase and duration.

Table 2. Project Construction Process/Phasing

Construction Phase	Construction Activity	Activity Duration	Phase Duration
Site Preparation	Construction Kick-off/Staging	1 week	5 months
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Flow Testing	Testing Phase	3 months	3 months
Reclamation	Well Head Removal/Well Abandonment/Site Restoration	3 months	3 months

ORMAT has estimated construction equipment and usage for the Project based on experience with similar projects as provided in **Table 3**. Similarly, based on construction activities associated with similar projects, ORMAT anticipates that up to 15 workers would be required for construction of Project components. Vehicle and truck trip generation rates for the Project provided in **Table 4** are estimated assuming roughly 2 trips/worker (to/from site) for a total of 30 trips, and 2 trips/vehicle (in/out) for vendor and haul trips. Trip lengths consist of default CalEEMod values.

Table 3. Project Construction Equipment List by Project Activity

Construction Phase	Equipment	Quantity	Typical L_{max} (dBA) at 50 feet from Source[1]	No. Days Used	No. Hours Operated Per Day
Site Preparation (5 Months)	Heavy Duty Trucks	3	76	60	5
	Excavator	1	81	60	8
	Roller	2	80	60	8
	Light-Duty Truck	8	75	60	4
	Backhoe	1	78	60	8

Construction Phase	Equipment	Quantity	Typical L_{max} (dBA) at 50 feet from Source[1]	No. Days Used	No. Hours Operated Per Day
	Rubber Tired Loader	1	84	60	8
	Grader	1	85	60	8
Well Drilling and (17 Months)	Light tower	2	73	105	12
	Drill Rig	1	84	210	24
	Rig Mud Pump	1	81	210	24
	Rig Generator	1	81	210	24
	Heavy Duty Trucks (Mob/Demob)	8	76	28	8
	Crane	2	81	28	5
	Backhoe	1	78	28	6
	Forklift	1	75	28	6
	Vacuum Truck	1	85	28	10
	Concrete Truck	1	79	4	4
	Concrete Pumper	1	81	4	4
	Light Duty Truck	4	75	28	4
Testing (3 Months)	Generator	1	81	90	24
	Light Tower (27 hp)	2	73	90	12
	Light Tower (9 hp)	2	73	90	12
	Pump (115 hp)	1	81	90	24
	Pump (415 hp)	1	81	90	24
	Light Duty Truck	1	75	90	4
Reclamation (3 Months)	Backhoe	1	78	35	8
	Grader	1	85	35	8

Notes:

1. Adapted from FHWA Roadway Construction Noise Model User's Guide (FHWA 2006)

Table 4. Construction Vehicle Trips

Construction Phase	Trip Type	Number of One-Way Trips per Day[1]	One-Way Trip Length (miles)[2]
Site Preparation	Workers	30	11.9
	Vendor	104	9.0
	Haul	6	20
Well Drilling	Workers	30	11.9
	Vendor	10	9.0
	Haul	26	20
Testing	Workers	30	11.9
	Vendor	4	9.0
	Haul	4	20
Reclamation	Workers	6	11.9
	Vendor	4	9.0
	Haul	4	20

Notes:

[1] All truck trips delivering construction materials are assigned to vendor deliveries. Truck trips associated with water deliveries are assigned to haul trips.

[2] Trip lengths consist of default CalEEMod values with exception of vendors for delivery of Project equipment during construction.

SECTION 2 Fundamental of Noise and Vibration

2.1 Fundamentals of Sound and Environmental Noise

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. When sound becomes excessive or unwanted, it is referred to as noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting, the time of day and the type of activity during which the noise occurs, and the sensitivity of the individual.

Sound (noise) levels are measured and quantified with several metrics. All of them use the logarithmic decibel (dB) scale with 0 dB roughly equal to the threshold of human hearing. A property of the decibel scale is that the sound pressure levels of two separate sounds are not directly additive. For example, if a 50 dB sound is added to another 50 dB sound, the total is only a 3 dB increase (to 53 dB). Thus, every 3 dB change in sound levels represents a doubling or halving of sound energy. Related to this is the fact that a less-than-3 dB change in sound levels is imperceptible to the human ear. Sound power level is the acoustic energy emitted by a source which produces a sound pressure level at some distance. While the sound power level of a source is fixed, the sound pressure level depends upon the distance from the source and the acoustic characteristics of the area in which it is located.

The frequency of sound is a measure of the pressure fluctuations per second, measured in hertz (Hz). Most sounds do not consist of a single frequency but consist of a broad band of frequencies differing in level. The characterization of sound level magnitude with respect to frequency is the sound spectrum. Many rating methods exist to analyze sound of different spectra. The method used for this analysis is A-weighting (there are also B- and C-weighting filters). The A-weighted scale (dBA) most closely approximates how the human ear responds to sound at various frequencies by progressively deemphasizing frequency components below 1,000 Hz and above 6,300 Hz and reflects the relative decreased sensitivity of humans to both low and extremely high frequencies (Federal Highway Administration [FHWA] 2018). **Table 5** lists typical sound levels from representative sources.

Table 5. Typical Noise Levels (Measured at a Distance a Person Would Typically be From the Source)

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 feet	— 100 —	
Gas lawn mower at 3 feet	— 90 —	
Diesel truck at 50 feet at 50 miles per hour	— 80 —	Food blender at 3 feet, Garbage disposal at 3 feet
Noisy urban area, daytime, Gas lawn mower at 100 feet	— 70 —	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	— 60 —	
Quiet urban daytime	— 50 —	Large business office, Dishwasher next room

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime	— 30 —	Library, Bedroom at night
Quiet rural nighttime	— 20 —	
	— 10 —	Broadcast/recording studio
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: California Department of Transportation (CalTrans) 2013

The duration of noise and the time period at which it occurs are important factors in determining the impact of noise. Several methods are used for describing variable sounds including the equivalent level (L_{eq}), the maximum level (L_{max}), and the percent-exceeded levels. These metrics are derived from a large number of moment-to-moment A-weighted sound level measurements. Some common metrics reported in community noise monitoring studies are described below:

- L_{eq}, the equivalent level, can describe any series of noise events of arbitrary duration, although the most common averaging period is hourly. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events, and L_{eq} is the common energy-equivalent sound/noise descriptor.
- L_{max} is the maximum sound level during a given time. L_{max} is typically due to discrete, identifiable events such as an airplane overflight, car or truck passing by, or a dog barking.
- L_{90} is the sound level in dBA exceeded 90 percent of the time during the measurement period. L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when no obvious nearby intermittent noise sources occur.
- L_{50} is the median sound level in dBA exceeded 50 percent of the time during the measurement period.
- L_{10} is the sound level in dBA exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. L_{10} is sometimes called the intrusive sound level because it is caused by occasional louder noises like those from passing motor vehicles.

In determining the daily measure of community noise, it is important to account for the difference in human response to daytime and nighttime noise. Noise is more disturbing at night than during the day, and noise indices have been developed to account for the varying duration of noise events over time as well as community response to them. The Day-Night Average Level (L_{dn}) is such an index. L_{dn} represents the 24-hour A-weighted equivalent sound level with a 10 dBA penalty added to the “nighttime” hourly noise levels between 10:00 p.m. and 7:00 a.m. Because of the time-of-day penalties associated with the L_{dn} index, the L_{eq} for a continuously operating sound source during a 24-hour period will be numerically less. The Community Noise Equivalent Level (CNEL), similar to L_{dn}, applies a 10 dBA penalty for noise levels occurring during the nighttime hours between 10:00 p.m. and 7:00 a.m., and a 5 dBA penalty for noise levels the sound levels occurring during evening hours between 7:00 p.m. and 10:00 p.m. CNEL has

been adopted by the State of California to define the community noise environment for development of the community noise element of a General Plan. Noise is also more disturbing the closer a receptor is to the source; noise levels decrease by 6 dB as the distance from its source doubles (FHWA 2011).

2.2 Fundamentals of Vibration

Ground-borne vibration consists of waves transmitted through solid material. Several types of wave motions exist in solids, unlike air, including compressional, shear, torsional, and bending. The solid medium can be excited by forces, moments, or pressure fields. Ground-borne vibration propagates from the source through the ground to adjacent buildings by surface waves. Vibration may be composed of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in Hz. Most environmental vibrations consist of a composite or "spectrum" of many frequencies and are generally classified as broadband or random vibrations. The normal frequency range of most ground-borne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz.

Vibration may be defined in terms of the displacement, velocity, or acceleration of the particles in the medium material. In environmental assessments, where human response is the primary concern, velocity is commonly used as the descriptor of vibration level, typically expressed in inches per second (in/sec) or millimeters per second (mm/s). The amplitude of vibration can be expressed in terms of the wave peaks or as an average, called the root mean square. The root mean square level is generally used to assess the effect of vibration on humans. Like noise, vibration can be expressed in terms of decibels with a reference velocity of $1x10^{-6}$ in/sec. The abbreviation "VdB" is often used for vibration decibels to reduce the potential for confusion with sound decibels.

Vibration can produce several types of wave motion in solids including compression, shear, and torsion, so the direction in which vibration is measured is significant and should generally be stated as vertical or horizontal. Human perception also depends to some extent on the direction of the vibration energy relative to the axes of the body. In whole-body vibration analysis, the direction parallel to the spine is usually denoted as the z-axis, while the axes perpendicular and parallel to the shoulders are denoted as the x- and y-axes, respectively.

The two primary concerns with project-induced vibration, the potential to damage a structure and the potential to annoy people, are evaluated against different vibration limits. Studies have shown that the threshold of perception for the average person is a peak particle velocity (PPV) in the range of 0.2 to 0.3 mm/s (0.008 to 0.012 in/sec). Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level. Vibration levels for typical construction-related sources of ground-borne vibration are shown in **Table 6** below.

Table 6. Vibration Source Amplitudes for Construction Equipment

Equipment	PPV at 25 feet (in/sec)		Approximate Vibration Velocity Level (Velocity Level in Decibels [VdB])	
	25 feet	50 feet	25 feet	50 feet
Large Bulldozer	0.089	0.031	87	78
Caisson Drilling	0.089	0.031	87	78
Loaded Trucks	0.076	0.027	86	77
Jackhammer	0.035	0.012	79	70
Small Bulldozer	0.003	0.001	58	49

Source: Adapted from CalTrans 2020 and Federal Transit Administration (FTA) 2018

SECTION 3 Regulatory Framework

Federal, state, and local noise regulations and policies that may apply to the proposed Project are described below.

3.1 Federal

3.1.1 Noise Control Act of 1972

USEPA, pursuant to the Noise Control Act of 1972, established guidelines for acceptable noise levels for sensitive receptors such as residential areas, schools, and hospitals. The levels set forth are 55 dBA L_{dn} for outdoor use areas and 45 dBA L_{dn} for indoor use areas, and a maximum level of 70 dBA L_{dn} is identified for all areas to prevent hearing loss (USEPA 1974). These levels provide guidance for local jurisdictions but do not have regulatory enforceability. In the absence of applicable noise limits, the USEPA levels can be used to assess the acceptability of project-related noise.

3.1.2 U.S. Department of Housing and Urban Development

The U.S. Department of Housing and Urban Development (HUD) has also established guidelines for acceptable noise levels for sensitive receivers such as residential areas, schools, and hospitals (24 CFR 51). HUD's noise levels include a two-pronged guidance, one for the desirable noise level and the other for the maximum acceptable noise level. The desirable noise level established by HUD conforms to the USEPA guidance of 55 dBA L_{dn} for outdoor use areas of residential land uses and 45 dBA L_{dn} for indoor areas of residential land uses. The secondary HUD standard establishes a maximum acceptable noise level of 65 dBA L_{dn} for outdoor use areas of residential areas.

3.1.3 Federal Transit Authority

The FTA has published guidance relevant to assessing ground-borne vibration associated with construction activities, which have been applied by other jurisdictions to other types of projects (FTA 2018). For example, engineered concrete and masonry (no plaster) buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage. Buildings extremely susceptible to vibration damage (e.g., historic buildings) can be exposed to ground-borne vibration levels of 0.12 in/sec without experiencing structural damage.

3.2 State

The California Code of Regulations (CCR) has guidelines for evaluating the compatibility of various land uses as a function of community noise exposure, as shown in **Table 7** below.

The extensive state regulations pertaining to worker noise exposure are applicable to the proposed project (for example California Occupational Safety and Health Administration Occupational Noise Exposure Regulations [8 CCR General Industrial Safety Orders, Article 105, Control of Noise Exposure, Section 5095, et seq.]), for workers in a "central plant" and/or maintenance facility, or for those involved in the use of maintenance equipment or heavy machinery.

Table 7. Estimated Existing Noise Exposure for General Assessment

Land Use Category	Noise Exposure Ranges (dB CNEL) Normally Acceptable[1]	Noise Exposure Ranges (dB CNEL) Conditionally Acceptable[2]	Noise Exposure Ranges (dB CNEL) Normally Unacceptable[3]	Noise Exposure Ranges (dB CNEL) Clearly Unacceptable[4]
Residential: Low-density Single Family, Duplex, Mobile Homes	<60	55-70	70-75	>75
Residential: Multiple Family	<65	60-70	70-75	>75
Transient Lodging: Motels, Hotels	<65	60-70	70-80	>80
Schools, Libraries, Churches, Hospitals, Nursing Homes	<70	60-70	70-80	>80
Auditoriums, Concert Halls, Amphitheaters	Undefined	<70	>65	Undefined
Sports Arena, Outdoor Spectator Sports	Undefined	<75	>70	Undefined
Playgrounds, Neighborhood Parks	<70	67-75	>73	Undefined
Golf Courses, Riding Stables, Water Recreation, Cemeteries	<75	Undefined	70-80	>80
Office Buildings, Business Commercial and Professional	<70	67-77	>75	Undefined
Industrial, Manufacturing, Utilities, Agriculture	<75	70-80	>75	Undefined

Source: California Office of Planning and Research (OPR) 2017

Notes:

1. Normally Acceptable: specified land use is satisfactory, based upon the assumption that any buildings involved are of normal construction without any special noise insulation requirements.
2. Conditionally Acceptable: New construction or development should only be undertaken after a detailed analysis of the noise reduction requirements is made and the needed insulation features included in the design.
3. Normally Unacceptable: New construction or development should generally be discouraged. If new development is to proceed, a detailed analysis of the noise reduction requirements is made, and the needed insulation features are included in the design.
4. Clearly Unacceptable: New development or construction should not be undertaken.

3.3 Local

Modoc County is the agency responsible for regulating and controlling noise through the Noise Element of the County General Plan and the Noise Ordinance of the County's Codified Ordinances. The Noise Element of the Modoc County General Plan provides a program for incorporating noise issues into the land use planning process with a goal of minimizing adverse noise impacts to noise-sensitive receptors.

3.3.1 Modoc County General Plan Noise Element

The Noise Element of the Modoc County General Plan (2018) includes the following major objectives:

- Provide sufficient noise exposure information in the General Plan so that existing and potential noise impacts may be effectively addressed in the land use planning and project review processes.
- Develop and implement effective strategies to abate and avoid excessive noise exposures in the County by requiring that effective noise mitigation measures be incorporated into the design of new noise-generating and new noise-sensitive land uses.
- Protect areas within the County where the present noise environment is deemed acceptable.

With those objectives in mind, the Modoc County General Plan Noise Element identifies the following objective and policies applicable to the Project:

- Goal N-1: Protect the Citizens of Modoc County from the Harmful Effects of Exposure to Excessive Noise.
    - Policy N A. Areas within Modoc County exposed to existing or projected future exterior noise levels exceeding 60 dB L_{dn} should be designated as noise-impacted areas.
    - Policy N B. New development of residential or other noise sensitive land uses should not be permitted in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels in outdoor activity areas to 60 dB L_{dn} or less and interior noise levels to 45 dB L_{dn} or less. In areas where it is not possible to reduce exterior noise levels to 60 dB L_{dn} or less, using a practical application of the best available noise-reduction technology, an exterior noise level of up to 65 dB L_{dn} will be allowed. Under no circumstances should interior noise levels be permitted to exceed 45 dB L_{dn} with the windows and doors closed.
    - Policy N E. Noise level criteria applied to land uses other than residential or other noise-sensitive uses should be consistent with recommendations of the California Office of Noise Control.
    - Policy N I. All building permits should be reviewed by the Planning Department for consistency with the Noise Element and other elements.

Note that Policy N E refers to the now defunct California Office of Noise Control. The California Office of Noise Control land use compatibility guidelines were generally consistent with those provided by the California Office of Planning and Research detailed in **Table 7** above.

SECTION 4 Existing Conditions

4.1 Noise Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels, and because of the potential for nighttime noise to result in sleep disruption. Additional land uses such as schools, transient lodging, historic sites, cemeteries, and places of worship are also generally considered sensitive to increases in noise levels. These land use types are also considered vibration-sensitive land uses, as are commercial and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance.

Some population groups, such as children, the elderly, and acutely and chronically ill persons are considered more sensitive to air pollution than others. Sensitive receptor locations typically include residential areas, hospitals, elder-care facilities, rehabilitation centers, daycare centers, and parks. The Project site is in a rural area surrounded by agricultural fields.

There are no sensitive receptors (i.e., schools, hospitals, etc.) in close proximity (i.e., within 1 mile radius) of the Site. The closest residence is located approximately 650 feet to the northwest of the southern-most well site (Well 22-24). One other residence is within 1,000 feet of a test well site, located approximately 850 feet southwest from Well 43-13. No other sensitive receptors are located within 1,000 feet of Project components.

4.2 Existing Noise Sources and Ambient Noise Levels

Existing ambient noise in the vicinity of the Project sites is consistent with a rural agricultural landscape with the dominant noise sources consisting of vehicular traffic on local roads, air traffic associated with nearby municipal airports, and the operation of agricultural equipment. The major source of vehicular noise is traffic along Surprise Valley Road.

4.3 Existing Vibration Environment

Similar to the environmental setting for noise, the vibration environment is dominated by traffic from nearby roadways. Heavy trucks can generate ground-borne vibrations that vary depending on vehicle type, weight, and pavement conditions. According to the FTA (2018), *Transit noise and Vibration Impacts Assessments*, “if the roadway is fairly smooth, the vibration from rubber-tired traffic is rarely perceptible.” Roads in the Project area are smooth asphalt and it is unlikely that traffic on the local roadway is perceptible.

SECTION 5 Project Noise Prediction

5.1 Methodology

5.1.1 Noise Modeling

The Project construction and operation noise levels were estimated using the computer noise propagation model SoundPLAN Essential (version 6), which calculates noise impacts taking into account terrain features including relative elevations of noise sources, receivers, and intervening objects, ground effects due to areas of pavement and unpaved ground, and atmospheric effects on sound propagation. The following assumptions and parameters are included in the SoundPLAN supported noise source assessment:

- Ground effect acoustical absorption coefficient equal to 0.0, which represents the acoustically reflective “hard” surface for the majority of the geothermal plant site. Vegetated fields surrounding the Project site were assigned a coefficient of 1.0, which represents the acoustically “soft” surface associated with the vegetated ground cover;
- Reflection order of 1, which allows for a single reflection of sound paths on encountered structural surfaces such as buildings and structures; and
- Calm meteorological conditions (i.e., no wind) with 50 degrees Fahrenheit and 70% relative humidity.

5.1.2 Vibration

Anticipated charging systems are designed and manufactured to feature rotating and reciprocating components (e.g., fans) that are well-balanced with isolated vibration within or external to the equipment casings. On this basis, potential vibration impacts due to operation of the stationary sources are not expected. The speed limit on the adjacent roadways is 55 miles per hour and the road surface is in good condition. As trucks enter and exit the site, they would traverse the asphalt drive at very low speeds. As noted in FTA (2018), rubber tires and suspension systems provide vibration isolation, and therefore, it is unusual for ground-borne vibration associated with on-road vehicle movement to be perceptible. As such, vibration impacts associated with Project operation are not expected to be significant and have not been evaluated herein.

5.1.3 Onsite Construction Noise

The potential construction noise levels onsite associated with proposed Project construction activities were estimated for the noisiest construction activities. Accordingly, the noise model conservatively assumes that construction equipment presented in **Table 3** above for well drilling operations in addition to maximum traffic on local roads will be operated simultaneously, and is modeled to the nearest sensitive receptor to project components (i.e., residential receptors near Wells 45-12, 43-13, and 22-14). In actual practice, however, the types and numbers of construction equipment near any specific receptor location will vary over time.

5.1.4 Offsite Noise (Construction Traffic)

Estimated vehicle trips associated with each phase of construction is presented above in **Table 4**. For the purpose of this analysis, the principals of logarithmic summation are applied to estimate the maximum noise increase associated with construction traffic along local surface streets. Specifically, noise levels increase by 3 dBA when the number of similar noise sources double. The increase in delivery/haul trucks and construction worker vehicle trips are not anticipated to double the amount of traffic that currently exist in the surrounding area. As such, the increase in delivery/haul trucks and worker vehicles in the surrounding roadways is not anticipated to incrementally increase noise levels in the surrounding area by 3 dBA or more and are not analyzed further herein.

5.2 Predicted Results

Based on the types and number of equipment to be used, construction activities associated with Project site construction (solar fields and plant site) and well drilling and pipe interconnection are identified to have the greatest potential to increase noise levels in the Project area. For a conservative analysis, the cumulative noise for both phases of construction including drilling of all three production wells and injection well is assumed to occur simultaneously (although only one well would actually be drilled at any given time) and is propagated to the nearest sensitive receptors to estimate the maximum change in noise levels resulting from the proposed Project as summarized in **Table 8** and illustrated in **Figure 1**, **Figure 2**, and **Figure 3**. As shown in **Table 8**, **Figure 1**, **Figure 2**, and **Figure 3**, maximum noise levels associated with temporary construction and testing activities at the nearest sensitive residential receptor would not exceed the Modoc County exterior noise standard of 60 dBA L_{dn}, and would not contribute to an increase of noise levels above 60 dBA L_{eq} during daytime hours or 50 dBA L_{eq} during nighttime hours at the nearest sensitive receptor.

Table 8. Modeled Maximum Project Construction Sound Levels (dBA).

Modeled Receptors	Modeled Daytime Construction Noise Level[1]	Modeled Nighttime Construction Noise Level[1]	Modeled Day/Night Construction Noise Level (L_{dn})	Noise Standard[2] (L_{dn}/Day/Night L_{eq})	Exceed Presumed Standard?
Nearest Residential Receptor (Southwest of Well 45-12)	38.0	30.4	39.1	60/60/50	No
Nearest Residential Receptor (Southwest of Well 43-13)	39.4	34.0	41.7	60/60/50	No
Nearest Residential Receptor (Northwest of Well 22-14)	44.9	33.4	44.4	60/60/50	No

Notes:

1. Modeled noise level is associated with construction equipment. Modeled construction noise levels less than ambient would not be expected to increase noise levels at the modeled receptors.
2. The noise standard for exterior noise levels provided in the Modoc County General Plan Noise Element specifies that exterior noise levels shall not exceed 60 dBA L_{dn} at the nearest sensitive receptor. This standard is equivalent to a daytime L_{eq} 60 dBA, evening L_{eq} of 55 dBA, and nighttime L_{eq} of 50 dBA.

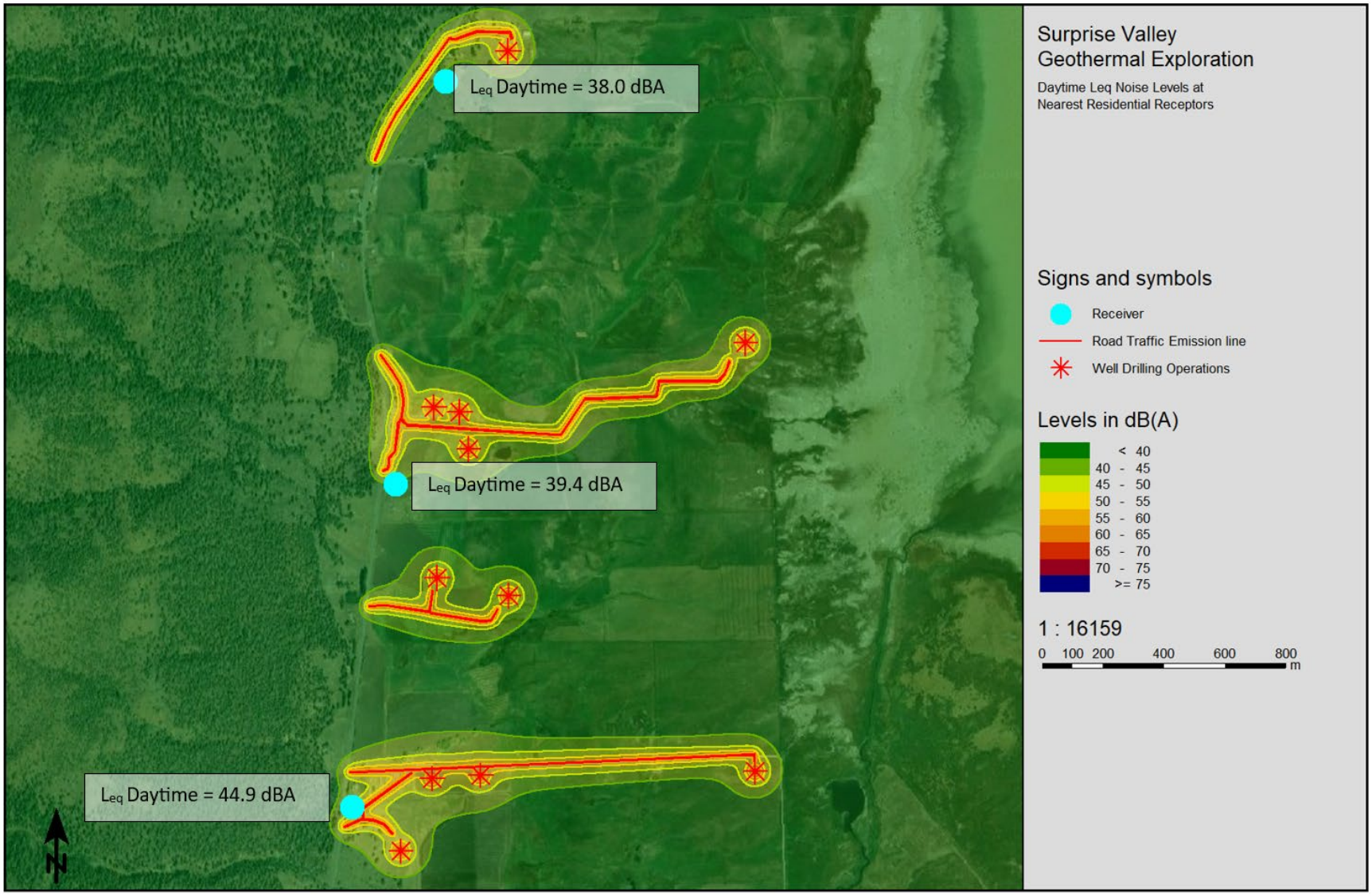


Figure 1. Modeled Project Construction Noise – Daytime L_{eq}

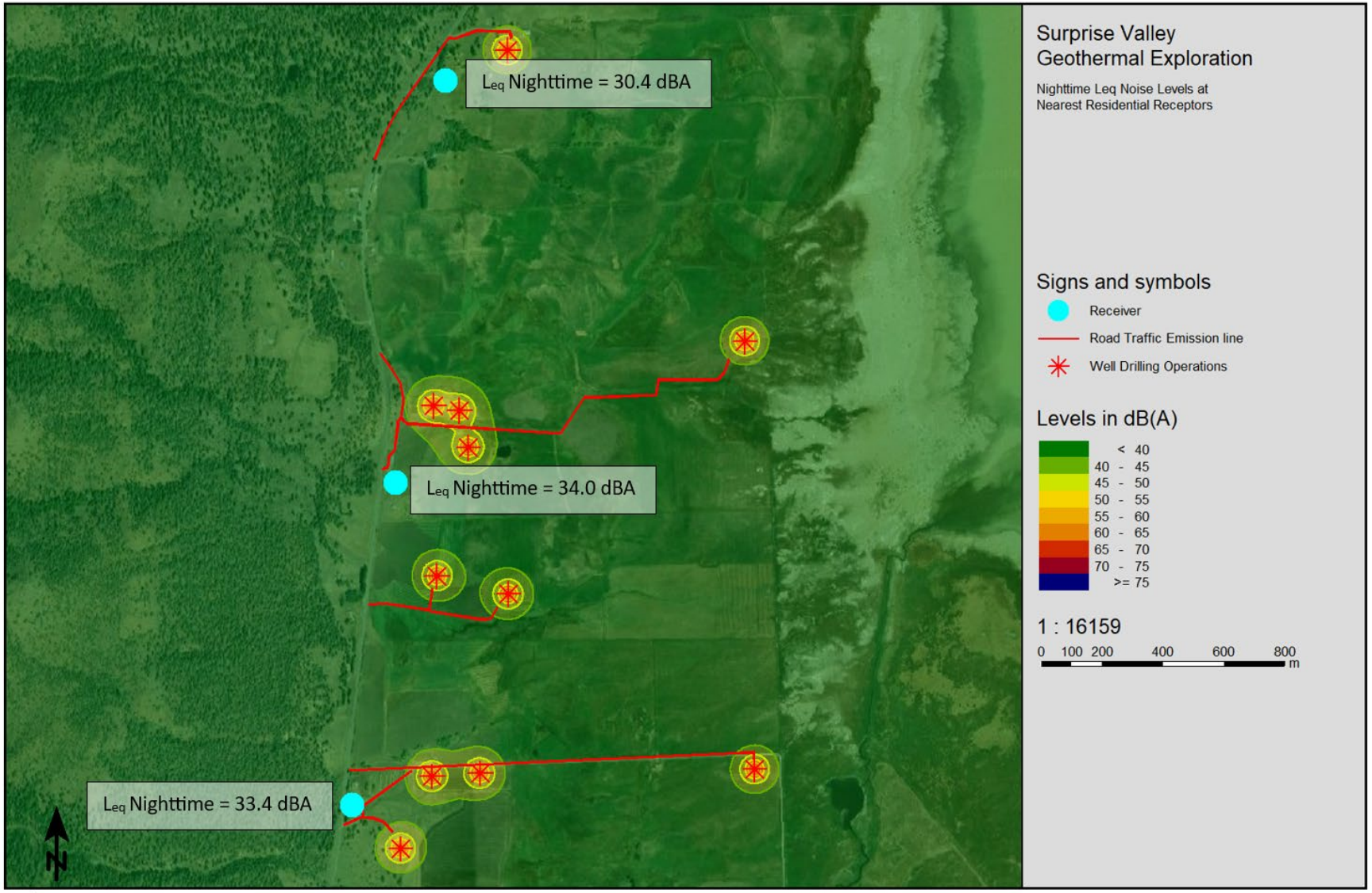


Figure 2. Modeled Project Construction Noise – Nighttime L_{eq}

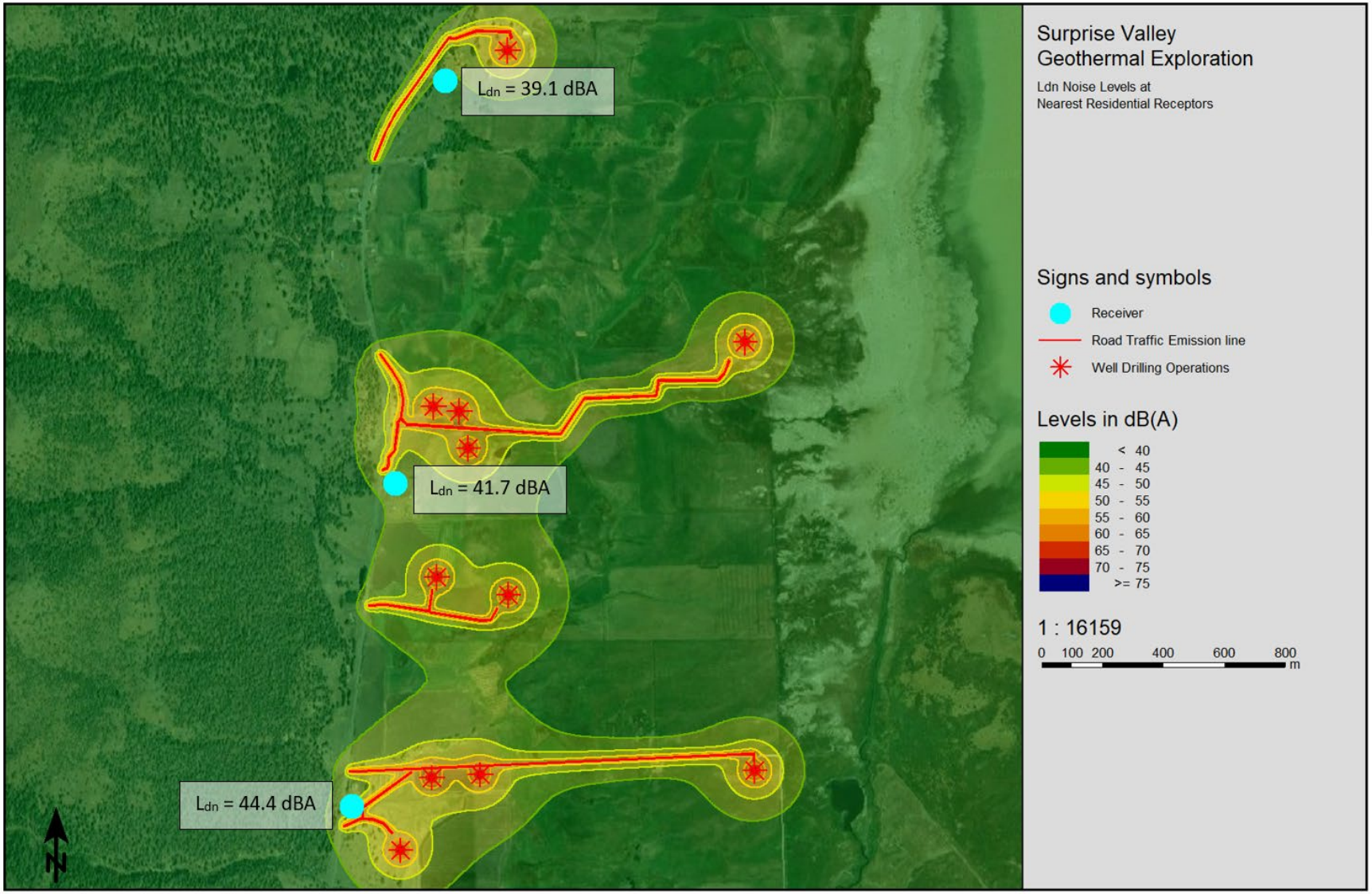


Figure 3. Modeled Project Construction Noise - L_{dn}

SECTION 6 Conclusions

Based on the SoundPLAN modeling of the Project, anticipated operational and construction noise levels would not exceed local thresholds and would comply with local guidelines set forth in the County's Noise Element and Noise Ordinance. Therefore, the Project would not generate significant noise levels that would disturb noise-sensitive land uses (i.e., residential) in the vicinity.

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Appendix F

Transportation Technical Report

Catalyst
ENVIRONMENTAL SOLUTIONS



Transportation Technical Report

Surprise Valley Geothermal Exploration Project

Prepared for: Modoc County Planning Department

January 15, 2026

Innovative solutions for a complex world

Catalyst
ENVIRONMENTAL SOLUTIONS

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SECTION 1 Introduction

Catalyst Environmental Solutions Corporation (Catalyst) has prepared this report to evaluate the potential for impacts related to transportation and circulation resulting from implementation of the proposed Surprise Valley Geothermal Exploration Project (Project) in Modoc County, California. This report includes an evaluation of potential impacts associated with temporary increases in traffic in the vicinity of the Project site and whether Project-induced traffic is in excess of standards established by the applicable local jurisdiction (i.e., Modoc County). Information given in this report is based on transportation and circulation information obtained from available public resources including the Modoc County General Plan (Modoc County 2018), 2019 Modoc County Regional Transportation Plan (Modoc County Transportation Commission 2019), and California Department of Transportation (Caltrans) Traffic Census Program (Caltrans 2024).

1.1 Project Overview

1.1.1 Project Location and Description

The Project entails the development of eleven geothermal exploration/test wells southwest of Upper Alkali Lake, and 1.85 miles north of Lake City within the Lake City-Surprise Valley 1 Known Geothermal Resources Area (KGRA) of Modoc County.

Proposed developments would be located within the Lake City USGS quadrangle in sections 12, 13, and 24 Township 44 north Range 15 east; on APN 026-080-018, APN 026-100-004, APN 026-100-014, APN 026-100-006, APN 026-100-007, and APN 026-100-008. The proposed development areas are leased to ORMAT by various private landowners.

Primary access to the general project area is provided by Surprise Valley Road which travels north and south through or adjacent to Project parcels. Existing agricultural roads stemming from Surprise Valley Road provide access to individual well pad development sites and will be improved as necessary to accommodate the proposed development. An additional access road will be constructed on APN 026-100-014 and APN 026-100-004 to provide access to the proposed well pads 43-13 and 82-13 and an additional access road to be constructed on APN 0226-100-006 from Surprise Vally Road to the proposed well pads 35-13 and 46-13. A new access road segment will also be constructed in APN 026-100-008 to provide access to proposed well pad 22-24.

The total project area of disturbance from the proposed development is approximately 39.49 acres as summarized in **Table 1**.

Table 1. Project Area of Disturbance Estimates

Facility	Disturbance (Acres)
Geothermal Exploration Wells (i.e., Well Pads)	37.18
Improved Access Roads	0.2
New Access Roads	2.11
TOTAL	**39.49**

1.1.2 Geothermal Exploration/Test Wells

Eleven test/exploratory wells would explore areas of potentially viable geothermal resources, for future production well development. One test well will be developed on each of the following parcel's APN 026-080-018 and APN 026-100-004; three test wells on APN 026-100-014; two test wells on APN 026-100-006; and four test wells on APN 026-100-008.

During well installation, each well pad would accommodate a drilling rig, support equipment, portable bathroom, baker tanks, and project vehicles. Each well pad would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Each well would be drilled with a rotary drill rig similar to those used to drill oil and gas wells. The test wells would each be drilled and cased to a design depth of approximately 3,000 to 5,000 feet. Following the cementing of the surface casing, blowout prevention equipment (BOPE) would be installed. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic barite (barium sulfate) would be stored at each well pad (as appropriate for the type of material) for use in preventing uncontrolled well flow, as necessary.

Once the well is completed, a well head will be installed, and pressure and flow testing will be conducted. Well testing consists of flowing the well into baker tanks stationed on the well pad and monitoring geothermal fluid for temperatures, pressures, flow rates, chemistry and other parameters. Discharge from test wells would be captured in steal baker tanks and transported off site for disposal at an appropriate facility. No geothermal fluid would be discharged to the surrounding landscape. Successful test wells may be developed into commercial geothermal production wells in the future.

1.1.3 Access Roads

Existing farm roads currently serve as access roads to the majority of proposed well pad development sites. These existing access roads will be the primary ingress and egress to the well pad sites. New access roads will be developed to access the well pads on APN 026-100-004, APN 026-100-014, APN 026-100-006, and APN 026-100-008. Existing access roads may require improvements to accommodate transportation of well and drilling equipment. New and improved access roads would be constructed using a dozer and/or road grader for the Project. Existing access roads may require resurfacing to accommodate the import of drilling equipment. Access roads will be compacted with a roller-compactor and surfaced with gravel as needed. Improvements to existing access roads will be kept within the current road boundaries as feasible. Widening of access roads would only be done in areas where road width is less than 15 feet and is unable to accommodate drilling equipment.

Road construction techniques would vary depending on the specific site and existing road conditions. New roads are typically dozed or bladed following topography where possible. During rough grading the

amount of cut and fill will be kept to a minimum while providing for drivability and maintenance. If the base material has adequate aggregate and composition to maintain a stable road surface only grading will be performed. Should additional aggregate/base be needed for stability, it would be laid in even lifts and compacted by grading and water equipment. All aggregate material needed for road construction or improvements will be sourced from local permitted aggregate mines.

1.1.4 Site Reclamation

Testing would determine if future geothermal energy development is feasible. If exploratory testing is successful, the exploration/test wells may be developed in full-size production wells for commercial geothermal energy generation. Any future action would be subject to CEQA review and permitting, as the scale of future development cannot be reasonably assumed prior to successful test well development.

Interim Reclamation would be conducted at the close of construction work of each well pad location, and be maintained throughout the testing period prior to final reclamation. Interim Reclamation will maintain the sites integrity for final reclamation and prevent degradation form the proposed project to the surrounding landscape.

Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during final reclamation of disturbed areas. Prior to final reclamation soil will be seeded and stabilized with an approved erosion control mix to prevent erosion. Disturbed well pad areas not required for use during testing will be stabilized similarly stabilized with an erosion control seed mixture. Temporary BMPs may be used at the Site to prevent soil erosion include the use of sandbags, crushed rock, and silt fence. These BMPs are used as and where needed, especially in areas that are undeveloped or in the process of being developed.

At the end of the permitted or useful life of the test well facilities and if testing yields negative results, no future geothermal energy developments would occur. The Applicant would prepare a Site Reclamation and Restoration Plan that establishes the plan and protocol for dismantling, removing, abandoning, transporting, and disposing of wells and associated equipment, as well as the plan for performing site restoration activities after the facilities are removed. Further, within three years of the cessation of testing, all equipment will be dismantled, all wells capped or abandoned as required by the County and CalGEM and the land involved be made compatible with the surrounding uses or as requested by the County Planning Director. A Bond, Letter of Credit, or other forms of security acceptable to Modoc County in addition to that of the amount set by CalGEM, would be filed with the County that guarantees restoration of the land to its condition prior to the permitted well pad development.

The general objective of the final reclamation phase is to return the site as close as possible to the conditions prior to geothermal development. Reclamation activities would be planned and conducted in accordance with County requirements.

1.1.5 Water Use and Source

Water required for facility construction activities and testing, including grading and dust control, will be imported by truck as needed from a permitted offsite source(s).

1.2 Construction Activities

The Project is anticipated to take 28 months to install and test as summarized in **Table 2.**

Table 2. Project Construction Process/Phasing

Construction Phase	Construction Activity	Activity Duration	Phase Duration
Site Preparation	Construction Kick-off/Staging	1 week	5 months
	Site Clearing	1 week	
	Site Preparation/Rough Grading	2 weeks	
	Fine/Pad Grading	1 month	
	Well Pad Construction	3 months	
Well Drilling	Well Drilling and Completion	12 months	17 months
Flow Testing	Testing Phase	3 months	3 months
Reclamation	Well Head Removal/Well Abandonment/Site Restoration	2 months	3 months

The estimated construction schedule and vehicle and truck trip counts associated with construction activities is detailed **Table 3**.

Table 3. Construction Vehicle Trips

Construction Phase	Trip Type	Number of One-Way Trips per Day[1]	One-Way Trip Length (miles)[2]
Site Preparation	Workers	30	11.9
	Vendor	104	9.0
	Haul	6	20
Well Drilling	Workers	30	11.9
	Vendor	10	9.0
	Haul	26	20
Testing	Workers	30	11.9
	Vendor	4	9.0
	Haul	4	20
Reclamation	Workers	6	11.9
	Vendor	4	9.0
	Haul	4	20

Notes:

1 All truck trips delivering construction materials are assigned to vendor deliveries. Truck trips associated with water deliveries are assigned to haul trips.

2 Trip lengths consist of default CalEEMod values with exception of vendors for delivery of Project equipment during construction.

SECTION 2 Regulatory Framework

The following summarizes the regulatory framework as applicable to the proposed Project with respect to transportation and circulation.

2.1 California Department of Transportation

The State of California Department of Transportation (Caltrans) has responsibility over the design, construction, maintenance, and operation of the California State Highway System. Caltrans has jurisdiction over State highway right-of-way and sets maximum load limits for trucks and safety requirements for oversized vehicles that operate on highways. The proposed Project does not include any components which would encroach into Caltrans jurisdiction.

2.2 Modoc County General Plan

The Modoc County General Plan Circulation Element provides the necessary framework to guide the growth and development of the County's transportation-related infrastructure. The County's General Plan includes the following policies that apply to the proposed project:

- C A. All roads should be constructed and improved to minimum County design standards.
- C B. Private roads not constructed to minimum County standards will not be accepted for dedication.
- C C. All roads constructed must meet minimum fire and other emergency standards, including construction, maintenance program, street signs and turn-around space.
- C F. All costs of new on and off-site improvements to County roads should be borne by project developers. Construction or upgrading of bridges in connection with new residential developments should also be borne by project developers.
- C I. The location, distribution and size of transmission lines and pipelines should be consistent with the land uses and development to minimize adverse social or environmental impacts. Such lines should avoid interference with adjacent land uses and assure that aesthetic values will not be degraded.

SECTION 3 Existing Conditions

3.1 Existing Roadway Network

Key roadways in the study area are described here. The discussion is limited to specific roadways that traverse the study intersections and serve the Project site.

3.1.1 Roads

As described in the Modoc County General Plan (Modoc County 2018) and the Modoc County Regional Transportation Plan (Modoc County Transportation Commission 2019), the regional roadway network consists of three highways, U.S. 395 (US-395), State Route 139 (SR-139), and State Route 299 (SR-299), and the regionally significant major collector, County Road 1 (Surprise Valley Road), and minor collector, County Road 9 (Fandango Pass Road).

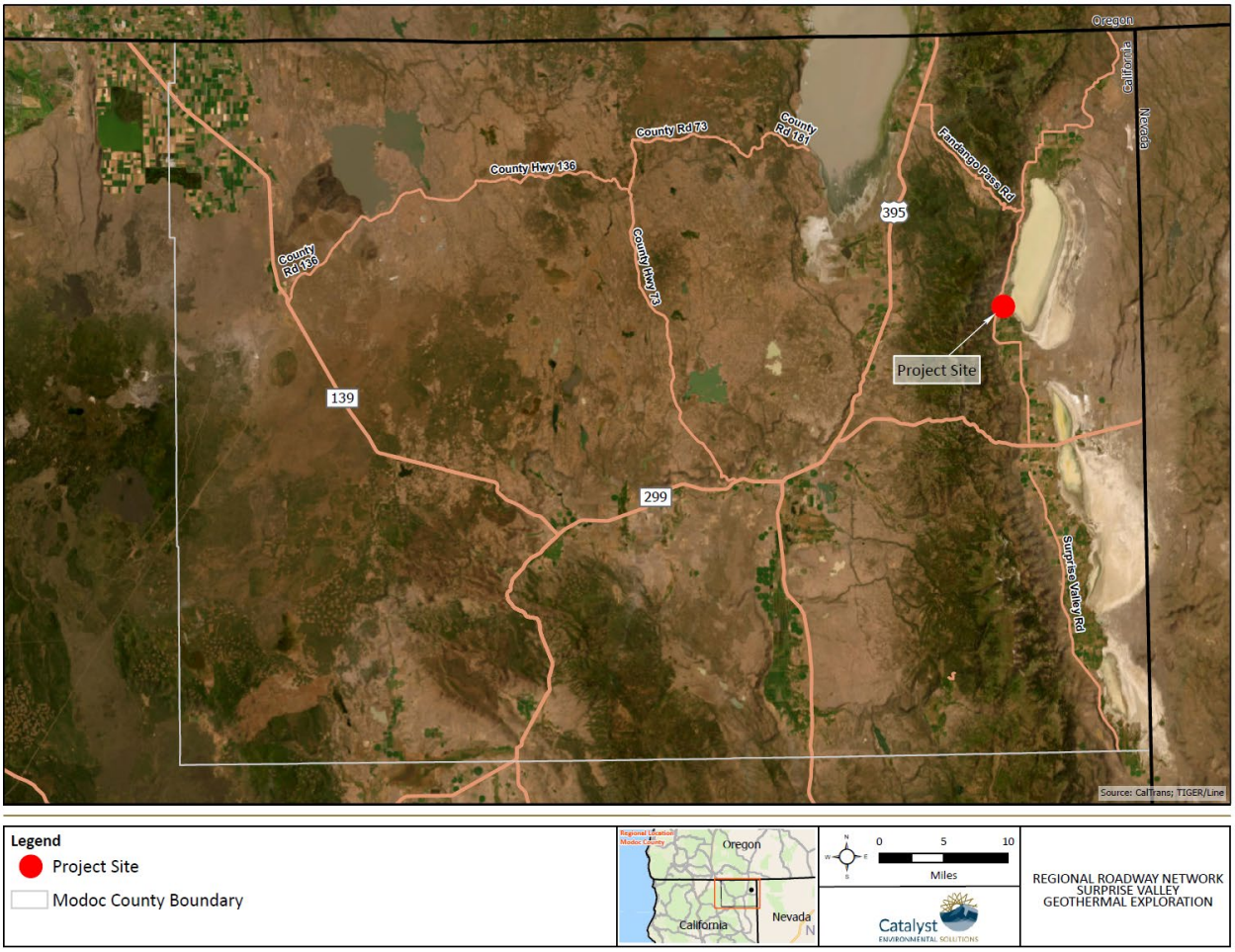


Figure 1. Regional Network in Project Area

3.1.2 Freeways

There are no roadways designated as freeways within Modoc County.

3.1.3 Major Highways

Major arterial roadways typically consist of four to six travel lanes with two to three lanes travel in each direction separated by either a raised or painted median. However, state highways in Modoc county are all two-lane pave routes totally 177.6 distance miles, which consist of U.S. 395, State Route 299 (SR-299), and State Route 139 (SR-139), described as follows:

- **U.S. 395 (US-395)** US-395 runs in a south to north direction from the Lassen County line through the City of Alturas to the Oregon border. This highway is a common route for recreational travelers going from Eastern California and Nevada to destinations in Central and Eastern Oregon.
- **State Route 139 (SR-139)** SR-139 traverses the western portion of Modoc County through the communities of Adin, Canby, and Newell on its way to Tulelake in Siskiyou County.
- **State Route 299 (SR-299)** SR-299 runs generally west to east from the southwestern portion of Modoc County through the communities of Adin, Canby, Alturas, and Cedarville to the Nevada state line.

3.1.4 Collectors

The regional roadway system also features several important collectors that generally run in either an east-west or north-south orientation. The important north-south collector includes County Road 1 (Surprise Valley Road), and the important east-west collector includes County Road 9 (Fandango Pass Road).

3.1.5 Scenic Highways

No designated state scenic highways occur in Modoc County; however, SR-139 and SR-299 between Tulelake and Adin are considered eligible for State Scenic Highway Designation.

3.1.6 Existing Traffic Volumes

Table 4 summarizes the existing Annual Average Daily Trips (AADT) for road segments in the vicinity of the proposed Project.

Table 4. Existing Road Conditions

Segment	Direction	Limits	ADT
SR-299	E-W	Jct. Lake City Road (County Road 1)	1,050
SR-139	E-W	Jct. County Road 91	1,200
US-395	N-S	Oregon State Line	820
US-395	N-S	Jct. SR-299 East	1,700

Source: CalTrans 2024

3.2 Transit Network

The Modoc Transportation Agency operates Sage Stage and is the primary public transportation provider in the region, providing demand response service in and around the City of Alturas and three intercity service routes to Klamath Falls, Oregon, Redding, California and Reno, Nevada. The bus system currently provides two types of public transportation services: intercity/commuter (fixed-route with deviation) and local demand response service that is referred to as Dial-A-Ride. This service is provided within a 10-mile radius of Alturas, including to and from Modoc Estates and Cal Pines subdivisions. Sage Stage provides curb-to-curb service to the general public and door-to-door access for elderly and disabled persons. Due to limited resources and highly fluctuating demands, all Sage Stage services are operated on a reservation basis.

To support intercity travel and interregional trips accessing specialized health care and other services in distant urban centers, the Sage Stage operates three intercity routes. These routes link Alturas to regional centers in Reno, Nevada three times per week; in Redding, California and Klamath Falls, Oregon once weekly. For passenger convenience, the bus drops off and picks up riders at specific destinations, such as hospitals, health care facilities, airports, bus and train stations, and popular locations within the city limits.

Strong Family Health Center, DART, Veteran's Services, and Modoc County social service programs provide some transit services to specified populations. TEACH Senior Citizen Services, TEACH, and many Modoc County human resource programs primarily rely on Sage Stage for their client's transportation needs.

3.3 Bicycle Facilities

In California bikeways are separated into four types:

- **Class I: Multi-Use Paths** - Class I multi-use paths (frequently referred to as "bicycle paths") are physically separated from motor vehicle travel routes, with exclusive rights-of-way for non-motorized users like bicyclists and pedestrians. They require physical buffers to ensure safety and comfort of the user.
- **Class II: Bicycle Lanes** - Bicycle lanes are one-way facilities that carry bicycle traffic in the same direction as the adjacent motor vehicle traffic. They are typically located along the right side of the street (although can be on the left side) and are between the adjacent travel lane and curb, road edge, or parking lane. They are not physically separated from motor vehicle traffic.
- **Class III: Bicycle Routes** - A bicycle route is a suggested bicycle corridor marked by signs designating a preferred street between destinations. They are recommended where traffic volumes and roadway speeds are low (35 mph or less).
- **Class IV: Separated Bikeways (Cycle Tracks)** - Separated bikeways are bicycle-specific facilities that combine the user experience of a multi-use path with the on-street infrastructure of a conventional bicycle lane. Separated bikeways are physically separated from motor vehicle traffic and are designed to be distinct from any adjoining sidewalk. Physical protection measures can include raised curbs, parkway strips, reflective bollards, or parked vehicles. Separated bikeways can be either one-way or two-way, depending on the street network, available right-

of-way, and adjacent land use. The safety of two-way separated bikeways must be carefully evaluated because few motor vehicle drivers are accustomed to two-way separated bikeways and they may tend to look only to the left when deciding whether it is safe to proceed across the separated bikeways.

None of the roadway segments within proximity of the Project site are designated a bikeway classification.

SECTION 4 Project Trip Generation

4.1 Construction Trips

Project construction activities will require workers to arrive and depart the Project site daily. Additionally, some heavy-truck traffic will occur to deliver and remove equipment and materials to/from the site. Apart from the direct construction traffic described above, some ancillary trips would also occur related to non-heavy truck deliveries, construction management staff, periodic inspections, etc. Project construction scheduling and phasing is detailed in **Table 2** above. A maximum of approximately 15 workers will be onsite during the construction period.

Construction activities at the site is expected to occur between 7:00 AM and 7:00 PM weekdays (with exception of 24-hour drilling and testing operations). Typically, each worker would be expected to arrive and depart the site at least once, resulting in a daily trip rate of two vehicle trips per worker per day for each worker. Due to the rural location of the Project site, there are no established peak commuter periods that would be exacerbated by Project-related traffic. However, for a conservative analysis, all workers traveling to/from the site are assumed to occur during peak AM and PM hours.

Vendor and haul trips consist of heavy vehicle trips to the site includes delivery of construction equipment and materials, as well as transport of equipment and other materials to be removed from the site. Heavy-vehicle trips would not be expected to occur uniformly over the course of the construction period, but rather on occasion as delivery and removal of equipment/materials is required. For the purposes of this temporary construction traffic generation evaluation, a maximum of 104 daily vendor truck trips (i.e., 52 deliveries per day) and 6 haul trips (i.e., 3 deliveries per day) were conservatively assumed to occur in conjunction with the estimated construction worker load of 15 workers. The daily distribution of truck trips over the course of the 12-hour workday is also expected to be variable; for this analysis, a conservative estimate of 20 percent of daily trips was assumed to occur during both the AM and PM peak hours. As trucks are larger and heavier than passenger cars, the reduced acceleration, braking, and handling characteristics, a Passenger Car Equivalence (PCE) factor of 2.5 is applied to each truck trip to account for the effects of these heavy vehicles within the traffic stream on flat terrain (Per the HCM methodology).

Construction trip generation is summarized in **Table 5** below. Accordingly, the total number of vehicle trips generated by Project construction is conservatively estimated at 305 PCE trips per day, with 84 total trips during the AM peak hour and 84 total trips during the PM peak hour.

Table 5. Construction Vehicle Trips

Trip Type	Qty	Maximum Daily Volumes (ADT)			AM Peak Hour			PM Peak Hour		
		Rate[1]	PCE[2]	Volume	In	Out	Total	In	Out	Total
Workers	15 Workers	2/worker	1.0	30	30	0	30	0	30	30
Vendor	52 vehicles	2/vehicle	2.5	260	26	26	52	26	26	52
Haul	3 vehicles	2/vehicle	2.5	15	1	1	2	1	1	2
			Total	**305**	**57**	**27**	**84**	**27**	**57**	**84**

Notes:

1. Trip generation rate is calculated at 2 trips/worker and 2 trips/vehicle (in/out) for vendor and haul trips.
2. PCE = Passenger Car Equivalence Factor

4.2 VMT Assessment

Construction of the proposed exploration wells and access roads may result in nominal and short-term increases in vehicle trips by construction workers and construction vehicles on area roadways. These trips would include construction workers commuting to and from the Project Site, haul truck trips associated with the transfer and disposal of materials, and material and equipment deliveries. The number of construction-related trips would vary each day, depending on construction phase, planned activity, and material needs. **Table 6** summarizes the maximum estimated Project daily VMT for construction and operations.

Table 6. Maximum Project Daily VMT

Trip Type	Number of One-Way Trips	One-Way Trip Length (miles)[2]	Daily VMT (miles)
Workers[1]	30	11.9	357
Vendor[3]	104	9.0	936
Haul[3]	6	20	120
Temporary Construction Maximum Total Daily VMT			1,413

Notes:

1. A maximum of 15 construction workers are assumed.
2. Trip lengths consist of default CalEEMod values with exception of vendors for delivery of Project equipment during construction.
3. All materials deliveries are assigned to vendor trips and water deliveries are assigned to haul trips.

In their Technical Advisory on Evaluating Transportation Impacts on CEQA (December 2018), the Governor's Office of Planning and Research (OPR) recommends the use of VMT metrics when analyzing land use projects and plans. Absent substantial evidence indicating that a project would generate a potentially significant level of VMT, or inconsistency with a Sustainable Communities Strategy (SCS) or general plan, projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than significant transportation impact. Per CEQA Guidelines, §15064.3 subdivision (a), 'vehicle miles traveled' refers to the amount and distance of automobile travel attributable to a project." Here, the term "automobile" refers to on-road passenger vehicles, specifically cars and light trucks and is not applied for heavy-duty trucks. Accordingly, construction of the Project would result 30 on-road passenger vehicle trips which is much fewer than the screening threshold for small projects of

110 on-road passenger vehicle trips. As such, the Project can be assumed to result in less than significant impacts on transportation and circulation.

4.3 Traffic Impacts

Lone site access is provided via Surprise Valley Road, which is classified as a Regional Arterial in the 2019 Modoc County Regional Transportation Plan (2019). As summarized in **Table 4** above, the AADT on County Road 1 (i.e., Lake City Road/Surprise Valley Road) at SR-299 is approximately 1,050 vehicles per day. The presence of Project-related construction trucks, with their slower speeds and larger turning radii, may temporarily reduce roadway capacities in the immediate vicinity of the Project site. These nominal impacts of construction traffic would be most noticeable in the immediate vicinity of the Project site and less noticeable farther away and on regional roadways. Construction traffic-related impacts would be temporary and only occur during the construction phase (28 months). Although Project construction would cause incremental, short-term increases in traffic, construction-related trips are expected to be approximately 140 per day. Construction worker trips are generally not considered net new trips for VMT purposes, as they represent a temporary redistribution of existing regional commutes and workers would otherwise travel to alternative job sites. In addition, the Project would generate less than 110 passenger vehicle trips per day which can be assumed to not result in significant transportation impacts per CEQA Guidelines, §15064.3. Therefore, Project construction and operation would not conflict with any applicable transportation plans (i.e., Modoc County Regional Transportation Improvement Plan [Modoc County Transportation Commission 2019]).

For any work requiring an encroachment permit, a Temporary Traffic Control Plan would be developed and submitted to the County Public Works Department for approval. The Temporary Traffic Control Plan would include measures to mitigate traffic impacts to the satisfaction of the County Public Works Department. Traffic control would be in accordance with the current California Temporary Traffic Control Handbook or as directed by the Modoc County Traffic Engineer. Further, all other proposed facilities would be constructed within the property boundaries of the Project site and would not affect emergency vehicle access to the facility or any roadway. Therefore, no impacts to emergency access to the plant site or surrounding area would occur under the Project.

SECTION 5 Conclusions

Based on the VMT Assessment, the project meets the VMT project type screening criteria for small projects as it would generate less than 110 passenger trips per day. Therefore, the proposed Project meets the applicable screening criteria which allows a determination of a less-than-significant impact on VMT, thus a project-specific VMT assessment is not required. In addition, the Project would generate a maximum of 84 AM Peak Hour trips and 84 PM Peak Hour trips during construction. Based on existing traffic volumes on adjacent roadways, the presence of Project-related construction trucks, with their slower speeds and larger turning radii, may temporarily reduce roadway capacities in the immediate vicinity of the Project site. These nominal impacts of construction traffic would be most noticeable in the immediate vicinity of the Project site and less noticeable farther away and on regional roadways. Construction traffic-related impacts would be temporary and only occur during the construction phase (28 months). The access road improvements may require an encroachment permit from the County Public Works Department for any work onto, into or within the County road or street right of way. For any work requiring an encroachment permit, a Temporary Traffic Control Plan would be developed and submitted to the County Public Works Department for approval. The Temporary Traffic Control Plan would include measures to mitigate traffic impacts to the satisfaction of the County Public Works Department. Traffic control would be in accordance with the current California Temporary Traffic Control Handbook or as directed by the Modoc County Traffic Engineer. Further, all other proposed facilities would be constructed within the property boundaries of the Project site and would not affect emergency vehicle access to the facility or any roadway. Therefore, no impacts to emergency access to the plant site or surrounding area would occur under the Project.

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Appendix G

Weed Control Plan

Catalyst
ENVIRONMENTAL SOLUTIONS



Weed Control Plan

Surprise Valley Geothermal Exploration Project

Prepared for:

February 2026

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SECTION 1 - Introduction

1.1 Plan Purpose

The purpose of this Weed Control Plan (Plan) is to provide an overview of the strategy employed by the Applicant (Ormat Surprise Valley LLC) to control targeted noxious weeds within the Surprise Valley Geothermal Exploration Project (Project) Area. This Plan complies with the CDFA's Adaptive Integrated Pest Management for Invasive Agricultural Pests Program as revised in July 2025. The Applicant and its contractors are responsible for carrying out the methods described in this Plan. This Plan is applicable to the construction and operation of the Project but may be modified in consultation with the California Department of Food and Agriculture (CDFA), to address circumstantial and potentially unforeseeable issues not readily predictable prior to construction or operation activities.

1.2 Goals and Objectives

The goal of the preventative and control measures outlined in this document is to promote the containment and control weeds during the construction, operation, and maintenance of the Project. The Project Proponents objective is to assist federal, state, and local agencies' weed control efforts, to comply with requirements designed to help prevent the spread of all weeds, noxious and other, and to implement weed control measures on areas of the Project that are identified to be of special concern. In carrying out these measures, the Applicant will target selected areas within the Project where weed species are problematic within the current natural vegetation community in comparison to the least disturbed or naturally occurring and currently described vegetation habitat occurring at or nearby the Project. These preventative and treatment measures are described in Section 3.

1.3 Project Description

Ormat Surprise Valley LLC (Applicant) proposes to develop up to eleven geothermal test wells on nine well pads to assess the potential of the Lake-City Surprise Valley 1 Known Geothermal Resource Area for commercial geothermal energy generation (Figure 1). The proposed well pads would be located in areas leased to the Applicant on APN 026-080-018; APN 026-100-014; APN 026-100-006; APN 026-100-008, and APN 026-100-004 in Modoc County, California.

There are two primary components of this exploration project – 1) geothermal well pads and test wells; and 2) the access roads to the well pads. All developments would occur within a 39.5-acre disturbance area.

The Applicant proposes to develop up to eleven geothermal test wells on nine well pads drilled to a depth of 3,000-5,000 feet on APN 026-080-018; APN: 026-100-004; APN 026-100-014; APN 026-100-006; APN 026-100-007; and APN 026-100-008 in Modoc County, California. During well installation, each well pad would accommodate a drilling rig, support equipment, portable bathroom, baker tanks, and project vehicles (Figure 2). Well testing would consist of flowing the exploration well into baker tanks stationed on the well pad and monitoring the captured geothermal fluid for temperatures, pressures, flow rates, chemistry and other parameters.

Three new access roads would be developed to access well pads. The proposed access roads would stem off from Surprise Valley Road to the well pads. Existing access roads may require improvements to accommodate transportation of well and drilling equipment. Improved roads may be widened and surfaced as needed.

1.4 Project Location and Setting

The Applicant proposes to develop up to eleven geothermal test wells southwest of Upper Alkali Lake, and 1.85 miles north of Lake City within the Surprise Valley region of Modoc County (Figure 1). The proposed facilities would be located within the Lake City USGS quadrangle in sections 12, 13, and 24 Township 44 north Range 15 east; on APN 026-080-018; APN: 026-100-004; APN 026-100-014; APN 026-100-006; and APN 026-100-008. The proposed development areas are leased to the Applicant by various private landowners. The Project area is relatively flat and presently used for the production of alfalfa or associated agricultural facilities.

The well pads would occur in areas designated as Prime Farmland, Farmland of Statewide Importance, Farmland of local importance or Grazing land by the California Department of Conservation (CDOC). The Project parcels are zoned as Unclassified and general land use designation is Exclusive Agriculture or Exclusive Agriculture/ General Agriculture. APN 026-100-004-000, APN 026-080-009-000, APN 026-100-014, APN 026-100-008, and APN 032-030-001 are under Williamson Act contracts.

The Project area is located in a Known Geothermal Resource Area (KGRA) as Lake City-Surprise Valley 1 (California Energy Commission, 2020), and Surprise Valley is identified as a geothermal resource area in the County of Modoc 1998 General Plan (update 2018). Geothermal prospecting in this area has taken place since 1951, and the region has been designated as a KGRA by USGS since 1974 (Warner Mountain Energy Corporation, 2023). While exploration has occurred in this region since its designation as a KGRA, no commercial development of geothermal energy resources has occurred.

Primary access to the general Project area is provided by Surprise Valley Road which travels north and south through or adjacent to Project parcels. Existing agricultural roads stemming from Surprise Valley Road provide access to individual well pad development sites and will be improved as necessary to accommodate the proposed development. Up to 1.2 miles of new access roads would be developed to provide direct access to the well pads (Figure 2).

Figure 1: Project Location

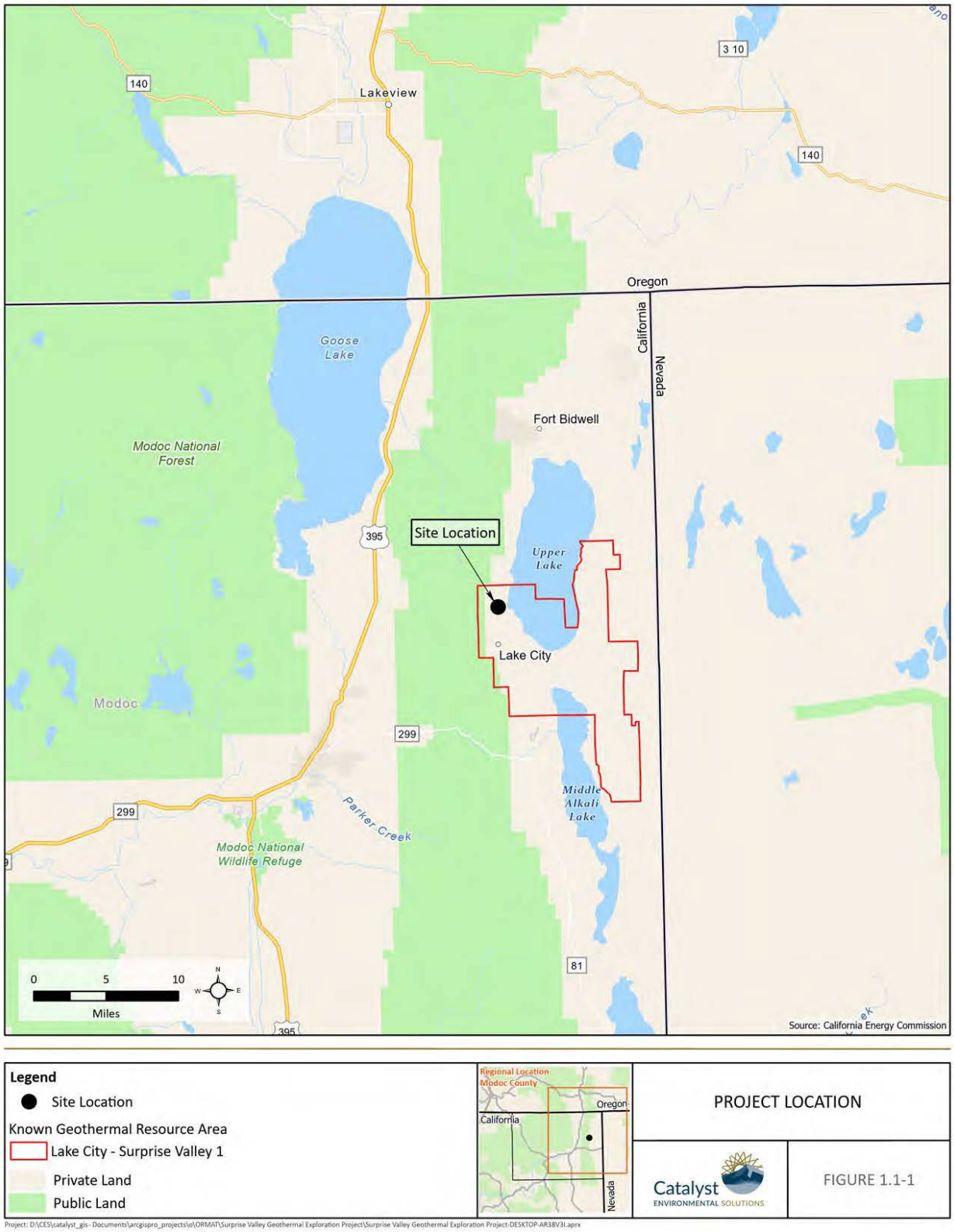
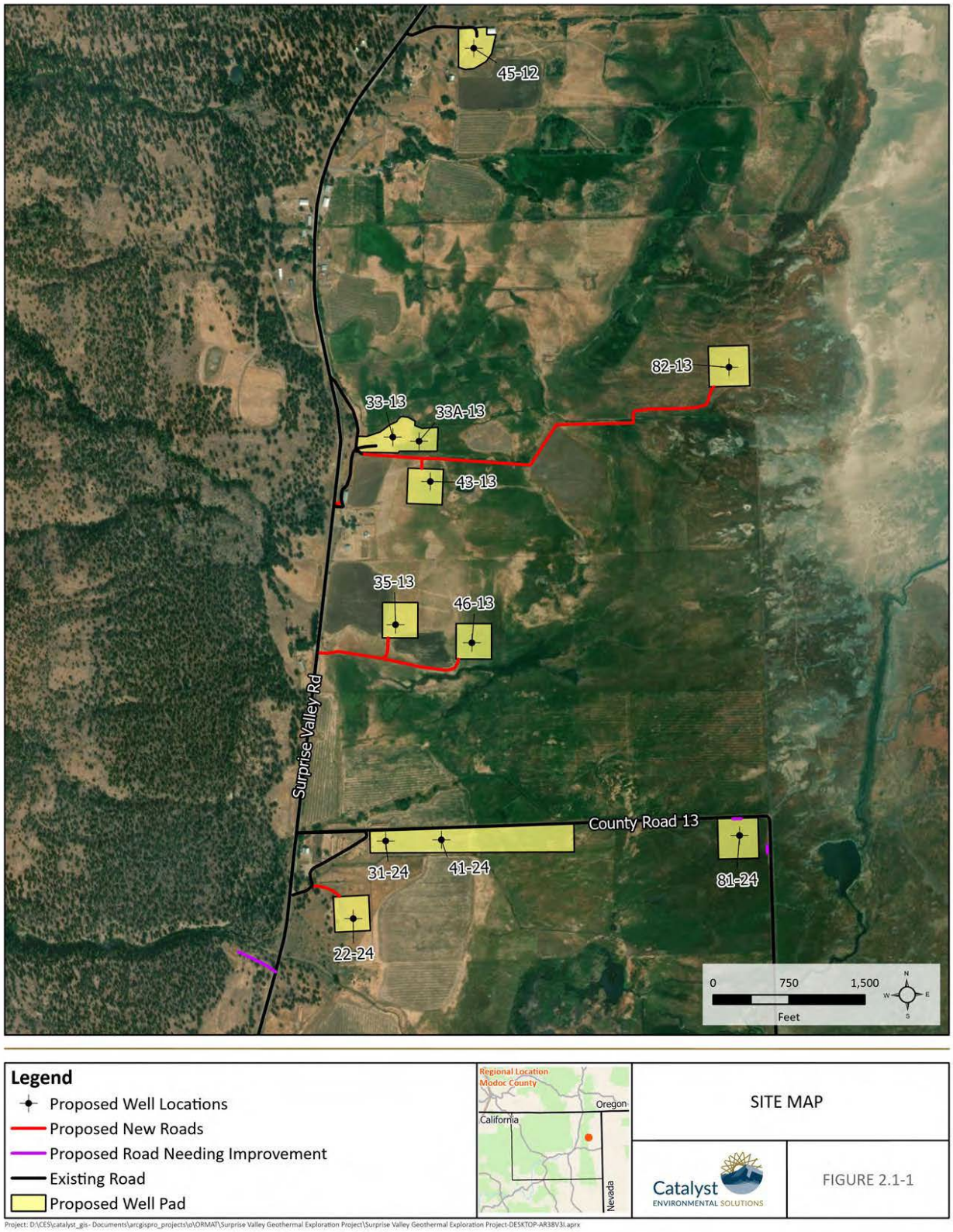


Figure 2: Site Map



SECTION 2 - Noxious Weed Inventory

Invasive weeds pose a serious threat to many native plants in California. They specialize in colonizing highly disturbed ground with their ability to establish quickly and grow faster on disturbed sites than other plants. Many invasive weeds do not have any natural predators (e.g., animals, insects). Some are extremely drought tolerant, shade tolerant, or fire-adapted. Many of the species on the California noxious weeds list are considered extremely invasive, but not all invasive plant species present in California are listed as noxious.

The introduction and spread of noxious weeds during construction activities has the potential to impact natural habitats. A noxious weed is a plant that has been defined as a pest by federal or state law. In California, the California Department of Food and Agriculture (CDFA) maintains a list of plants that are considered threats to the well-being of the state. Each noxious weed identified by the CDFA receives a rating that reflects the importance of the pest, the likelihood that eradication or control efforts would be successful, and the present distribution of the pest within the state. Below is a description of ratings categories that apply to the study area:

- *Category A* - A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. A-rated pests are prohibited from entering the state because they have been determined to be detrimental to agriculture.
- *Category B* - A pest of known economic or environmental detriment and, if present in California, it is of limited distribution. B-rated pests are eligible to enter the state if the receiving county has agreed to accept them.
- *Category C* - A pest of known economic or environmental detriment and, if present in California, it is usually widespread. C-rated organisms are eligible to enter the state as long as the commodities with which they are associated conform to pest cleanliness standards when found in nursery stock shipments.

2.1 Surprise Valley Cooperative Weed Management Area

Cooperative Weed Management Areas (CWMAs) have been established throughout California by the California Department of Food and Agriculture (CDFA) and the U.S. Forest Service. CWMAs are formal partnerships of agencies, tribes, and landowners working together to manage invasive species across boundary lines. The CDFA Plant Health and Pest Prevention Services Divisions works in partnership with Counties throughout California to work towards successful weed control and prevention of new infestations within the established CWMAs. CDFA supports CWMAs through grant funding, outreach, and coordination with other organizations and agencies in California. The Project site is present within the Surprise Valley CWMA, which includes Modoc County, California and Washoe County, Nevada.

2.2 Existing Conditions

Natural terrestrial communities identified in the study area during the field surveys include juniper woodland and wet meadow. Other terrestrial communities (semi-natural or non-natural) observed

during the field study consist of cropland and pasture. Modified streams are also present in and adjacent to the study areas. Each of the communities is briefly described below. Sensitive natural communities are limited to the wet meadows and streams. Sites not mapped as wet meadows or streams were found to be of low sensitivity.

2.2.1 Western Juniper Woodland (Juniperus occidentalis Woodland Alliance)

Western juniper woodland is identified on the California Natural Communities List as Alliance 89.400.00. Neither the alliance nor any of its five associations are listed as sensitive on the California Natural Community List (CDFW 2025b). Juniper woodland habitats are characterized as open to dense aggregations of junipers (California, Utah, or western) in the form of arborescent shrubs or small trees. Associated species may include white fir, (Abies concolor), Jeffrey pine (Pinus jeffreyi), ponderosa pine (Pinus ponderosa), whitebark pine (Pinus albicaulis), singleleaf pinyon pine (Pinus monophylla). Shrub species typically associated with juniper habitats include antelope bitterbrush (Purshia tridentata), California buckwheat (Eriogonum fasciculatum), wax currant (Ribes cereum), gray horsebrush (Tetradymia canescens), green Mormon-tea (Ephedra viridis), sickle-leaf mountain-mahogany (Cercocarpus ledifolius), big sagebrush (Artemisia tridentata), black sagebrush (Artemisia nova). Typical forbs and grasses include Sandberg's bluegrass (Poa secunda), bighead clover (Trifolium macrocephalum), Idaho fescue (Festuca idahoensis), one-spike oatgrass (Danthonia unispicata), bottlebrush squirreltail (Elymus elymoides), and bluebunch wheatgrass (Pseudoroegneria spicata).

Juniper woodland habitats can be found from sea level to above 10,000 feet, but maximum development is from 2,450 to 4,900 feet. Juniper woodland habitats may occur on virtually all exposures and slopes, but are most often on level to gently rolling terrain. Junipers may be found on soils ranging from rocky and well drained to drier or poorly drained.

Juniper berries are an important food source for many species of wintering birds. Juniper foliage is also consumed by several mammals and may be an important food source for some of these animals, especially during harsh winters.

Portions of the study area are within western juniper woodland. The community is best developed along the access road to the existing wellhead west of Surprise Valley Road. In this location, ponderosa pines are co-dominant with western junipers. An open shrub layer is present, with species including antelope bitterbrush, bitter cherry (Prunus emarginata), and sickle-leaf mountain-mahogany (Cercocarpus ledifolius). Common herbaceous species include bulbous bluegrass (Poa bulbosa), rye (Secale cereale), Scotch thistle (Onopordum acanthium), and woolly mullein (Verbascum thapsus). The western juniper woodland community also slightly encroaches into Well Pad 22-24, and borders portions of the access roads to Well Pads 22-24, 33-13, and 45-12.

2.2.2 Wet Meadow

The wet meadows present in the study area do not fit within an established alliance in the MCV. For the purposes of analysis, the wet meadows in the study area are considered sensitive natural communities. The single most important characteristic of a wet meadow is its hydrology. Seasonality and reliability of yearly water inflows and outflows largely determine the vegetational stability of wet meadows. Therefore, wet meadow habitats exist indefinitely unless the hydrologic regimes are altered. Wet

meadows generally have a simple structure consisting of a dense layer of grasses and grass-like species; trees and shrubs are typically absent. Canopy and herbaceous groundcover are dense (60-100%). Wet meadows support a great variety of plant species; important genera common to wet meadows throughout the state include Agrostis, Carex, Danthonia, Juncus, Salix, and Scirpus (Mayer and Laudenslayer 1988).

Elk (Cervus canadensis) and mule deer may feed in wet meadows, seeking forbs and palatable grasses. Wet meadows are generally too saturated to provide suitable habitat for small mammals. However, in late summer, small mammals may visit wet meadows that have dried. Waterfowl, especially mallard ducks, frequent streams flowing through wet meadows. Yellow-headed blackbird (Xanthocephalus xanthocephalus) and red-winged blackbird occasionally nest in wet meadows with tall vegetation and with adequate water to discourage predators. The striped racer (Masticophis lateralis lateralis) is the common snake of wet meadows in the Sierra Nevada and Cascade Range. Various frog species are abundant in wet meadows throughout California (Mayer and Laudenslayer 1988).

The wet meadows in the study area are supported by a high-water table as well as surface runoff from snowmelt, which is spread over the landscape through irrigation ditches. Characteristic plant species in the on-site wet meadows include Baltic rush (Juncus balticus), Nebraska sedge (Carex nebrascensis), Olney's bulrush (Schoenoplectus americanus), meadow foxtail (Alopecurus pratensis), and arrowgrass (Triglochin maritima). The lowermost wet meadows tend to support species adapted for alkaline conditions. Alkaline depressions are present adjacent to well pad 82-13; the dominant plants in these unique habitats are saltgrass (Distichlis spicata), salt-marsh bird's-beak (Cordylanthus maritimus), and horned sea blite (Suaeda calceoliformis).

Generally speaking, wet meadow habitat in the project area receives irrigation in the early season. Once the vegetation reaches maturity, the irrigation water is diverted to allow the site to dry out. The grass is then cut, dried, and baled as hay. Irrigation is then restored and continues until the end of snowmelt. After the hay has been removed, cattle are introduced and are allowed to graze until the end of the season.

The wet meadow community is abundant in the project vicinity and covers nearly the entirety of three proposed well pads (82-13, 81-24, and 46-13). Additionally, as further discussed below, potential wet meadow wetlands are present on other well pad sites (43-13, 35-13) but the wetland assessment could not be completed because the vegetation had been mowed prior to our site visit (see Section 4.7 below).

2.2.3 Riverine/Streams

Riverine/stream habitat is characterized by intermittent or perennially flowing water. Riverine habitat includes rivers and streams (creeks). These are considered sensitive natural communities for the purposes of this Project. In inland areas, small streams converge to form larger streams; larger streams converge to form rivers, which discharge into the ocean. In coastal areas, many streams discharge directly into the ocean. Streams and rivers typically exhibit distinct microhabitats, such as pools, riffles, and runs.

Riverine habitat may be utilized by a variety of fish and wildlife species. Pools and backwater areas also provide breeding habitat for amphibians. Waterfowl forage for aquatic plants and invertebrates in slow-moving sections of riverine habitat. Small mammals such as beaver, river otter, and muskrat may build nests in or along riverine habitat. Riverine systems may also provide spawning and rearing habitat for various fish species. Numerous species of macroinvertebrates occur in riverine habitats, often beneath submerged rocks (e.g., stoneflies, mayflies, and caddisflies), in mud (e.g., clams and mussels), or at the water surface (e.g., water striders, backswimmers, water boatmen, and mosquito larvae). Stream habitats are often further enriched by the presence of vegetation along their banks. Overhanging trees and shrubs provide shade and contribute to a decrease in water temperatures. Additionally, roots from trees and fallen vegetation within the stream increase habitat complexity and bank stability, and provide shelter for rearing fish, amphibians, and invertebrates.

In the study area, riverine habitat is represented by small intermittent streams. The streams are fed primarily be snowmelt in the Warner Mountains. The streams are diverted for irrigation when they reach the western edge of the Surprise Valley. The streams dry shortly after the last of the snow melts.

2.2.4 Dryland Grain Crops/Dry Pasture

This land cover type is not described in the MCV but includes agricultural lands used for grain crops and grazing. Cropland habitat is characterized by a lack of conformity with regular habitat stages, instead being regulated by the crop cycle which is either annual or perennial. The cropland habitat in the study area consists of dryland grain fields. The seeds are planted in the fall or early spring by drilling in rows, which produces a solid stand with nearly 100 percent cover. The crop is then harvested in the summer. Dry pasture habitat consists of unirrigated grazing land in a variety of habitats, including woodlands, shrublands, and grasslands. In the study area, high-intensity grazing has resulted in the removal of most of the palatable vegetation and an increased density of weedy species. Dryland crop habitats and dry pasture habitats are of low value to wildlife species and are not considered as sensitive natural communities.

2.2.5 Noxious Weeds

Three Category C noxious weeds (Russian thistle (*Salsola tragus*), bindweed (*Convolvulus arvensis*), and downy brome (*Bromus tectorum*)) were observed in the study area during the botanical survey. An additional nine observed plant species were listed with Cal-IPC invasiveness ratings between “moderate” and “high”: poison hemlock (*Conium maculatum*), Canadian thistle (*Cirsium arvense*), heart-podded hoary cress (*Lepidium draba*), broadleaved peppergrass (*Lepidium latifolium*), slender wild oats (*Avena barbata*), tall fescue (*Festuca arundinacea*), common velvet grass (*Holcus lanatus*), wall barley (*Hordeum murinum*), sheep sorrel (*Rumex acetosella*), and Himalayan blackberry (*Rubus armeniacus*).

SECTION 3 - Weed Management

The Applicant will maintain and control, within feasibly practicable means, weeds and weed infestations within the Project Area as prescribed by the CDFA's Adaptive Integrated Pest Management for Invasive Agricultural Pests Program. The methods proposed to comply with the Adaptive Integrated Pest Management for Invasive Agricultural Pests Program are described below.

3.1 Training

Prior to the initiation of construction activities, all construction personnel will be instructed on the importance of controlling weeds. As part of start-up activities, the Applicant will provide information and training regarding weed management. The importance of preventing the spread of weeds in areas not infested, and controlling the proliferation of weeds already present will be emphasized. Prior to construction, areas of concern previously identified will be identified and clearly discernable in the field, flagging will be utilized to help identify these areas of concern. The flagging will alert project personnel and prevent access into areas until weed management control measures have been implemented.

3.2 Prevention

The best weed management action is to prevent noxious weeds from becoming established in the first place. Preventing weeds from invading a site is the most effective and least costly method for control. Invasive species may be introduced through a variety of methods. Invasive species may be introduced to a site inadvertently through reclamation materials or by soil and/or other materials attached to vehicles/equipment, etc.

As appropriate, the Applicant will implement the following standard practices for the prevention of invasive species introduction or spread:

- Use certified weed-free source materials such as gravel, mulch, straw bales or wattles or other erosion control and construction materials, and seed mixes. California County Agricultural Commissioners and the CDFA ensure that gravel[1], mulch, and forage comply with national standards set by the North American Invasive Species Management Association (NAISMA).
- Invasive ornamental plants will not be used for landscaping or reclamation.
- Vehicle traffic will be restricted to defined roads or overland travel routes to reduce potential mechanical transport of noxious weeds.
- Equipment will be cleaned prior to leaving the site when working in areas of established noxious or invasive weed species populations. Cleaning may be carried out using power or high-pressure equipment to remove seeds, roots, rhizomes, or any plant material from the equipment. Cleaning should focus on tracks or tires and undercarriage. Cleaning may be completed using dry, compressed air or high-pressure water.

[1] CDFA's Certified Weed Free Producers Links:
https://www.cdfa.ca.gov/is/i_&_c/pdfs/CFM-CertifiedProducersByCounty-2023.pdf

- Control noxious weeds with methods (e.g., mechanical, chemical) and procedures appropriate for the target species as recommended by the CDFA and Surprise Valley CWMA.
- The Project Proponent will implement revegetation of disturbed lands outside of the final project footprint following construction and will ensure adequate vegetative cover to help control or prevent the introduction of weeds.

3.3 Detection

Prior to ground disturbance, a qualified botanist will conduct a survey of the project limits, including all areas scheduled for ground disturbance, material sites, construction and machinery parking areas, and staging areas. If noxious weeds are present, the surveyor will document and delineate the population locations for inclusion in this Plan. Subsequent surveys and reassessment may be required if the initial survey is completed outside of the primarily observed noxious weed growing season.

3.4 Control and Management

Once an invasive or noxious weed species is identified, a plan of action will be developed and implemented for its control or eradication. Risk factors for invasives depend on species biology, introduction pathways, and environmental effects. If multiple species are present, treatment priorities will be coordinated with CDFA and the Surprise Valley CWMA.

There are many methods available to manage weeds, including mechanical/physical removal and chemical (e.g., herbicide) treatment. The categories of weed management are briefly described below. Multiple methods may be required for proper control of weeds. Integrated Pest Management (IPM) is a process of selecting and using a combination of management techniques to control a particular weed species of infestation efficiently and effectively. The tools used from IPM are species specific, site dependent, and focus on the ecology of the entire plant community. IPM control techniques may include hand pulling, mowing and cutting, prescribed burn, grazing, biological controls, herbicides, and other cultural control methods such as re-vegetation, fertilization, irrigation, or cultivation (NDA, 2026b).

Recommended mechanical and chemical treatments for Modoc County priority weed species are provided in Table 1. If weed species not presented in Table 1 are identified, consult with the Surprise Valley CWMA and review recommendations provided by the California Invasive Plant Council or the University of California Integrated Pest Management Program (DiTomaso, 2013; University of California IPM, 2024).

3.4.1 Mechanical Control

Hand pulling is a viable treatment method for small infestations where few plants are present. This method is best implemented before the plant has matured and produced seeds. This method is appropriate for annual and biennial plants and works best for plants that do not have deep, complex root systems and which only reproduce by seed. Hand pulling is not effective for plants that reproduce through rhizomes or vegetatively and will not be effective if seed banks have been established.

Mowing and cutting is effective if the infested area is flat and relatively dry. This method is also appropriate for dense infestations of weeds such as Scotch thistle. Mowing and cutting is appropriate for annual or biennial plants that reproduce by seeds rather than vegetatively. Mowing and cutting must be repeated throughout the growing season for maximum effect. This technique rarely kills the entire weed. Additionally, mowing or cutting at the incorrect time of year, such as after plants have produced seeds, can lead to spread of the plant rather than control.

Prescribed burning is used for annual plants that reproduce by seed and when non-target plants are largely absent. This method requires intensive planning for safety and containment as well as a plan for restoration post-burn. Burning may not eliminate seed banks.

Livestock grazing includes the targeted use of sheep, goats, or cattle to selectively overgraze noxious weeds. The weeds must be palatable and non-toxic to livestock. Grazing is most effective early in the growth cycle before seeds have been produced and while the infestation is at a low level even if widespread.

3.4.2 Chemical Control

The use of herbicides is an effective management strategy for some species of weeds, particularly those that are not amenable to mechanical removal such as hand pulling or those that reproduce through rhizomes. Herbicides are recommended when a pure stand of a single weed species is present and desirable non-target plants are scare or absent. There are numerous herbicide formulations that target various species of weeds. Selective herbicides kill specific types of plants, such as grasses or broadleaf weeds (e.g., 2,4-D; triclopyr). Nonselective herbicides kill all types of plants (e.g., glyphosate). Contact herbicides kill the plant only where the chemical touches it and therefore must be applied thoroughly. Systemic herbicides are absorbed through the leaves and roots and kill the entire plant (e.g., glyphosate; 2,4-D; triclopyr; picloram). Soil-applied materials such as preemergence herbicides may be selective or nonselective (UC IPM 2024).

Application of herbicides must be conducted by qualified personnel following label instructions to prevent harm to non-target plants, wildlife, humans, and waterways. Herbicides potentially used to treat weed infestations include but are not limited to the following:

- 2,4-D
- Aminocyclopyrachlor
- Aminopyralid
- Chlorsulfuron
- Clopyralid
- Dicamba
- Glyphosate
- Imazapic
- Imazapyr
- Indaziflam
- Metsulfuron
- Picloram
- Sulfometuron
- Triclopyr

3.4.3 Biological Control

The CDFA definition of biological control, also known as biocontrol, is the use of natural enemies (i.e. insects) to reduce weed infestations. The use of biological control agents is becoming more common;

however, biocontrol agents must be approved for release by the U.S. Animal Plant Health Inspection Service (APHIS) and only a portion of California's noxious weeds have approved agents.

3.4.4 Cultural Control

Cultural control is the implementation of methods that favor the growth of desired plants. Methods include re-vegetation, fertilization, irrigation, and cultivation of preferred plants. These methods are recommended for land management and are especially useful during restoration or when noxious weed control has been achieved and the goal moves towards establishing desired vegetation. These methods cannot be used before large noxious weed infestations have been effectively eliminated. Weed-free seed mixes are imperative. Re-introduction of weeds may occur if the prevention and training measures described previously are not consistently implemented.

3.4.5 Monitoring

Following treatment, the area will be re-evaluated to determine if treatment was successful. The timing and follow-up visits will be on an as-needed basis. For example, if only a few individual plants/weeds were identified and pulled, monitoring may not be needed until the next growing season or scheduled monitoring event. Monitoring inspections will record the date, location, and findings of invasive or noxious weeds. Continuing treatments will be scheduled as-needed based on the findings of monitoring.

Table 1. Surprise Valley CWMA Priority Weed Species.

Common Name	*Scientific Name*	*CDFA Weed Category*	*Cal-IPC Rating*	*Growing Habits*	*Recommended Control*
Yellow starthistle	*Centaurea solstitialis*	-	H	Grows in open hills, grasslands, woodlands, fields, roadsides, and rangelands. It is considered one of the most serious rangeland weeds in the state (Cal-IPC).	**Mechanical:** Mowing may be used on plants with a high branching pattern, specifically during the late spiny or early flowering stage (UC IPM 2024). **Chemical:** Apply aminopyralid between December and March or apply clopyralid between January and March (UC IPM 2024).
Scotch thistle	*Onopordum acanthium*	-	H	Grows primarily in northeastern California. Forms dense, tall, impenetrable stands in fertile soils (Cal-IPC).	**Mechanical:** Small infestations can be removed by digging the plant below the soil surface, or mow before flowering (DiTomaso 2013). **Chemical**: Apply clopyralid, aminopyralid, or chlorsulfuron on the rosette stage (DiTomaso 2013).

Common Name	Scientific Name	CDFA Weed Category	Cal-IPC Rating	Growing Habits	Recommended Control
Medusahead	*Taeniatherum caput-medusae*	-	H	Grows best on clay soils in disturbed sites, grassland, rangeland, openings in chaparral, oak woodlands, and rarely in agronomic fields. Prefers at least 9 inches of rain per year (DiTomaso 2013).	**Mechanical:** Tillage will control existing medusahead plants if accomplished before seed set, but negative impacts to the soil may outweigh the weed control benefits of tillage in rangeland or wildland areas (DiTomaso 2013). **Chemical:** Apply preemergence herbicides in fall, or postemergence herbicides in spring once seedlings are up (DiTomaso 2013).
Perennial pepperweed	*Lepidium latifolium*	-	H	Grows well in flood plains, irrigation structures, pastures, wetlands, riparian areas, roadsides, and residential sites. Spreads through root fragments and seeds (UC IPM 2024).	**Mechanical:** Mowing is not effective in reducing perennial pepperweed stands. Hand pulling or tillage will control seedlings, but will not control established plants (UC IPM 2024). **Chemical**: apply 2,4-D, chlorsulfuron, glyphosate, imazamox, imazapyr, or imazethapyr on flower buds (UC IPM 2024).

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