U.S. Department of the Interior
Bureau of Land Management

Grassy Mountain Mine Project

Draft Environmental Impact Statement

Bureau of Land Management

Vale District Office

100 Oregon Street

Vale, OR, 97918

August 1, 2025

Table of Contents

1. Introduction

In October 2022, Calico Resources USA Corp. (Calico or project proponent), a wholly owned subsidiary of Paramount Gold Nevada Corp. (Paramount), submitted a revised Plan of Operations (PO) for the proposed Grassy Mountain Mine and Mineral Processing Project to the BLM Vale District, Malheur Field Office, in Malheur County, OR. The Project is located near the western edge of the Snake River Plain in southeastern Oregon, approximately 22 miles south-southwest of Vale, Oregon, and about 70 miles west of Boise, Idaho. The Project location is shown in Appendix A, Figure 1.

The location of the Proposed Action includes all or portions of the Public Land Survey System (PLSS) sections (Willamette Base & Meridian) in Malheur County, summarized in Table 1. The surface disturbance associated with this project is listed in Table 2.

Table 1. Willamette Base & Meridian legal description for the Grassy Mountain Mine and ancillary facilities.

Township	Range	Section(s) and Quarter(s)
Mine and ancillary facilities		
22S	44E	Section 5 SESE, SESW, SWSE, SWSW. Section 6 SESE. Section 7 NENE, NESE, NWSE, SENE, SESE, SWNE, SWSE. Section 8 NENE, NENW, NESE, NESW, NWNE, NWNW, NWSE, NWSW, SENE, SENW, SESE, SESW, SWNE, SWNW, SWSE, SWSW.
Access road and powerline ROWs		
22S	44E	Section 5 Lot 3, NESW, NWSW, SENW, SESW, SWSW
21S	44E	Section 3 Lot 1, Lot 2, NESE, SENE, SESE Section 10 NENE, SENE Section 11 NESW, NWSW, SESW, SWNW, SWSW Section 14 NWNW, NWSW, SWNW, SWSW Section 21 SESE Section 22 NENE, NESE, NWSE, SENE, SESW, SWSE, SWSW Section 23 NWNW Section 28 NENE, NENW, NWNE, SENW, SWNW Section 29 NESE, NWSE, SENE, SWSE Section 32 NENW, NESW, NWNE, SENW, SESW, SWSE
20S	44E	Section 1 Lot 1, NESE, SENE Section 12 NENE, NWSE, SENE, SESW, SWNE, SWSE Section 13 NENW, NWSW, SENW, SWNW, SWSW Section 14 SESE Section 23 NENE, NESE, NWSE, SENE, SESW, SWSE Section 26 NENW, NWSW, SENW, SWNW Section 27 NESE, SESE Section 34 NENE, NESE, SENE, SESE
20S	45E	Section 6 Lot 6, Lot 7 Section 7 Lot 1
19S	44E	Section 2 SWSW Section 3 SESE Section 10 NENE, NESE, SENE Section 11 NWNW, NWSW, SWNW, SWSW Section 14 NWNW, NWSW, SWNW, SWSW

Township	Range	Section(s) and Quarter(s)
		Section 15 NENE, NESE, SENE, SESE Section 22 NENE, NESE, SENE Section 23 NWNW, NWSW, SWNW, SWSW Section 26 NENW, NESE, NWNE, NWNW, SENE, SESE, SWNE Section 35 NENE Section 36 NESW, NWNW, NWSW, SESW, SWNW

1.1. Proposed Project

Calico owns the surface and mineral estates on private land comprised of three patented mining claims. Additionally,-Calico owns and controls 455 lode mining claims and 48 mill sites on BLM-administered public lands where BLM regulates mineral exploration and mining. Calico proposes to construct, operate, reclaim, and close an underground precious metal milling operation and conduct up to 10 acres of exploration. The project would consist of a mine, a process plant area, an access road, power line, and water supply wells. The mine would be located on private lands while the supporting facilities would be located on BLM administered lands. Access to the mine would be along Twin Springs Road, though road improvements would be needed to accommodate larger vehicles. The Proponent proposes to mine approximately two million short tons[1] (mst), also known as U.S. tons, of mill grade ore, and approximately 0.3 mst of waste rock for a mine life of approximately eight years. The project would result in approximately 488 acres of surface disturbance on 19 acres of private land and 469 acres of BLM administered lands including 6.8 acres of surface disturbance to straighten or widen segments of the 19.7-mile-long access road. The PO defined the planning boundary is a total of 1655 acres and the project footprint is a total of 488 acres.

Other facilities proposed to support the mining operation and process the ore would include a Tailings Storage Facility (TSF) capable of holding up to approximately 3.64 mst of tailings; a Temporary Waste Rock Storage Facility (TWRSF); a run of mine (ROM) ore stockpile; a carbon-in-leach (CIL) processing facility; and an ore crushing facility and grinding mill. Gold and silver contained in the ore would be extracted using a conventional cyanide leach process.

1.2. Purpose and Need

The need for the action is established by the BLM's responsibility under the Mining Law of 1872, the Federal Land Policy and Management Act of 1976 (FLPMA), and the BLM's surface management regulations at 43 CFR 3809. Under these statutes and regulations, the BLM is required to review the proposed PO to ensure that Calico's activities include appropriate reclamation and do not cause unnecessary or undue degradation of public lands.

The BLM's purpose is to consider and analyze the reasonably foreseeable environmental effects associated with approving, denying, or conditionally approving the Grassy Mountain Mine Project proposal to open, reclaim, close an underground mine, develop mine processing facilities and a basalt quarry, conduct exploration drilling, construct a transmission line, and upgrade an existing access road.

---

[1] All million short tons equal 2000 pounds.

1.3. Decision to be Made:

The BLM's decision is to consider the following: 1) approval of the Plan of Operations (PO) to authorize the proposed activities without modifications or additional mitigation measures; 2) approval of the PO with additional mitigation measures that the BLM deems necessary to prevent unnecessary or undue degradation of public lands; or 3) denial of the PO, and associated activities if the BLM determines that the proposal does not comply with 43 CFR 3809, 43 CFR 3715, and 43 CFR 2800 regulations.

1.4. Resource Management Plan Conformance

The *Southeastern Oregon Resource Management Plan and Record of Decision*, 2002, as amended in 2024 is the resource management plan (RMP) covering the Vale District. The Proposed Action conforms to the record of decision (ROD) and RMP. The RMP specifically states:

> *Objective 2: Provide opportunities for exploration and development of locatable mineral resources while protecting other sensitive resources.*
>
> […]
>
> *Management Actions: The planning area will be open to mineral location and development except in selected SMA's. Pursue protective withdrawals (subject to Secretarial approval and, for proposals greater than 5,000 acres, subject to congressional review) in ACEC's listed as withdrawal in Table 13, in streams identified as administratively suitable for designation as wild under the NWSRS as listed in Table 14; for BLM administrative sites and developed recreation sites as listed in Table 5, proposed BLM recreation sites when development is approved and for special status plant sites near Harper (Malheur fiddleneck). These withdrawals would be for a maximum of 20 years and subject to review at the end of that period to determine the necessity of continuing the withdrawal* (p.30-31).

The RMP was updated and amended in 2015 by the Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment (ARMPA) and associated ROD. The 2015 ARMPA specifically states:

> *MD MR 11: To the extent consistent with the rights of a mining claimant under existing laws and regulations, limit surface disturbance, and provide recommendations for net conservation gain of Greater Sage-Grouse habitat.*
>
> *MD MR 12: If a 3809 Plan of Operation is filed on mining claims in PHMA or GHMA, identify and evaluate mitigation measures to avoid or minimize adverse effects on PHMA and GHMA, through the Plan of Operation NEPA process, as appropriate and to the extent allowable by law. For notice and casual use levels of activity, apply RDFs (to the extent consistent with applicable law) in Appendix C.*

MD MR 13: Sagebrush Focal Areas are recommended for withdrawal from the General Mining Law of 1872, as amended, subject to valid existing rights (p. 2-24).

In 2025, the 2015 Oregon Greater Sage-Grouse Approved Resource Management Plan was Amended (2025 ARMPA). There are no changes between the 2015 and 2025 amendments that affect the project area.[2]

1.5. Applicable Laws, Regulations, Policies, and Permits

The Proposed Action and alternatives analyzed in this EIS are consistent with federal laws and regulations; state and local government laws and regulations; and other plans, programs, and policies to the extent practical within federal law, regulation, and policy.
The BLM has prepared this EIS in accordance with the National Environmental Policy Act (NEPA) and the following statutes and implementing regulations, policies, and procedures that govern the BLM's actions:

The General Mining Law of 1872, as revised
Clean Air Act 1963
National Environmental Policy Act 1969
The Mining and Mineral Policy Act of 1970
Clean Water Act 1970
The Safe Drinking Water Act
Endangered Species Act 1973
The Migratory Bird Treaty Act
The Bald and Golden Eagle Protection Act
The Federal Land Policy and Management Act of 1976 (43 United States Code 35)
The National Historic Preservation Act
BLM's Surface Management regulations for locatable minerals at 43 CFR Subpart 3809
BLM's Surface Use and Occupancy under the Mining Laws regulations at 43 CFR Subpart 3715
BLM's Mineral Materials disposal regulations at 43 CFR Part 3600
Oregon Administrative Rule (OAR) Chapter 632, Division 37

1.6. Issues

1.6.1. Issues Analyzed in Detail:

Air Quality: How does the project affect air emissions, fugitive dust, tailpipe emissions from equipment, mercury, and criteria and toxic air?

Geology: How would mining, milling, processing, and reclamation impact the availability of quantities of in-place geologic material? How would the potential of geologic hazards impact the project area?

[2] This project was initiated before the signing of the 2025 GRSG ARMPA utilizing the 2015 ARMPA. There were no changed between the two amendments for this project area, however both plans will be cited as (2015 ARMPA, 2025 ARPMA) for this EIS.

Range Management and Livestock Grazing: How does the project affect range management/ livestock grazing?

Socioeconomics: How does the project affect socioeconomics in Malheur County?

Soil: How does the project affect soil disturbances and erosion?

Transportation and Access: How does the project affect transportation and access routes within Malheur County and BLM managed roads?

Water Resources and Geochemistry: How does the project affect water quality, quantity including the potential for acid generation and metals leaching, and surface, sub-surface, and groundwater?

Visual Resources: How would the project affect visual resources?

Wildlife: How does the project affect wildlife, including Sensitive Species and Threatened and Endangered Species?

1.6.2. Issues Not Analyzed in Detail

For a complete list and analysis, see Appendix B.

2. Alternatives

2.1. No Action Alternative

Under the No Action Alternative, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur.

2.2. Proposed Action

The Proposed Action consists of opening, reclaiming, closing an underground mine on private lands. On BLM administered lands, Calico would develop a processing plant, mine support facilities, and a basalt quarry, conduct up to 10 acres of notice level exploration, construct a transmission line, and upgrade the main access road within the 1,655-acre planning boundary (Appendix A, Figure 2.). A surety[3] bond would be secured prior to any groundbreaking disturbance to cover any reclamation ineffectiveness.

[3] A surety bond is a legally binding contract that guarantees that one party (the principal) will fulfill their obligations to another party (the obligee). This bond would provide BLM with the resources required to reclaim the site in the event Calico is unable to perform the required reclamation.

Table 2. Proposed Action Acreages of Disturbance in the Mine and ROW Areas

Component	Public Acres	Private Acres	Total Acres
Underground Mine	0.5	6.2	6.7
Tailings Storage Facility (TSF)	99.8	0.0	99.8
Temporary Waste Rock Storage Facility (TWRSF)	5.7	0.0	5.7
Process Plant **This includes the Mill, refining plant, administrative building, parking lot, security building, mining contractor yard, reagent storage, assay laboratory, and substation.**	2.5	0.0	2.5
Infrastructure & Ancillary Facilities **Includes the Perimeter Fence at 22,176 ft with a 20-ft construction disturbance width.**	17.8	0.0	17.8
Roads **Includes 19.7 miles of the access road**	31.6	3.3	34.9
Yards & Laydown Areas	9.9	0.1	10.0
Growth Media Stockpiles	7.7	0.0	7.7
Water Supply **Includes the water supply pipeline at 16,164 ft with a 20-ft construction disturbance width and well locations each at 0.25 acre.**	7.9	0.0	7.9
Power Supply **Includes 20-ft area of disturbance for the 25.2 miles of new powerline.**	61.1	0.0	61.1
Stormwater Diversion Channels	11.6	0.2	11.8
Quarry	48.2	0.0	48.2
Reclamation Borrow Areas **The area of disturbance for the Reclamation Borrow Area is the maximum area of disturbance.**	55.9	0.0	55.9
Monitoring	0.0	0.0	0.0
Exploration **The actual location of the exploration activities within the Project Area is currently unknown and is assumed to be equally on public and private lands. Annual exploration work plans will be submitted and reviewed by BLM and DOGAMI as defined at 43 CFR 3809.0-5.**	10.0	0.0	10.0
Disturbed Areas **50-ft buffer on the mining facilities excluding the Reclamation Borrow Areas.**	98.6	9.1	107.8
Total	469.0	18.9	487.9

Note: Source: Calico, 2022

In addition to the proposed surface disturbance shown in Table 2, Calico has conducted mineral exploration drilling on its private lands, which created approximately 11 acres of surface disturbance, and drilled water test holes and shallow geotechnical bore holes and excavated geotechnical test pits for the TSF engineering design work on BLM-administered lands. The surface disturbance on the BLM-administered lands was authorized under two BLM Notices (Notice OR-068894 and Notice OR-69579). All the disturbance associated with the TSF geotechnical and hydrologic investigations has been completely reclaimed and revegetated. The drill holes completed by Calico on the patented claims have been abandoned in compliance with Oregon Administrative Rule (OAR) 690-240-0005, 690-240-0035, and 690-240-0046.

2.2.1. Underground Mine

The underground mine, including the portal, would be developed on 6.2 acres of Calico's patented claims on private land and on 0.5 acres of BLM administered lands. The facilities (Process Plant) needed to support the mine would be constructed on 2.5 acres of BLM-administered lands (Table 2). The mine would be accessed via a 15-foot-wide by 15-foot-high portal leading to a decline with a series of internal ramps. The mining cycle involves drilling, blasting, and mucking for development and production access. Once the drilling cycle is complete, the emulsion blasting agent would be loaded into the holes with the respective nonel blasting cap and booster. Emulsion would be used for most production blasting and development rounds. Boosters, primers, detonators, detonation cord, and another ancillary blasting supplies would be utilized when necessary. Bulk explosives would be stored in a secure powder magazine on the surface in accordance with applicable explosives regulations, including Mine Safety and Health Administration (MSHA), Bureau of Alcohol, Tobacco, Firearms, and Explosives (BATFE), state of Oregon and Malheur County Fire code. Blasting would occur on demand throughout the shift. Before blasting occurs, any affected areas would be cleared of personnel and the blasting location would be announced over the Project's communication system. Underground exploration drilling is anticipated to be sequenced with development of the mine workings.

Drift and fill (D&F) mining would be done to extract the ore. Mining equipment would be diesel- and electric-powered. The orebody is at a depth of approximately 500 feet below ground surface (bgs) and extends to approximately 1,000 feet bgs in total depth. Mining would be performed from five "lifts;" each lift would have a station, which would have a truck loading bay, a power bay, an ore stockpile, and a sump used to collect mine water. From each station, a drift would be cut and mining of the orebody would occur.

Seven drifts would be mined in the upper level of a lift, each being 15 feet by 15 feet. After mining is finished, the drift would be backfilled with quarry rock or waste rock material. After mining the upper level, a second level would be mined below consisting of four drifts that are 20 feet wide by 15 feet high. After the second level is mined and backfilled, a third level would be mined consisting of three drifts; one would be 15 feet wide by 15 feet tall, and two would be 30 feet wide by 15 feet high. Additional information for the mining method sequence and rate is provided in Section 2.4 of the PO.

The Project's groundwater model estimates a low, mid-range, and high range of inflows that considered variations in the recharge rate, geology, hydraulic conductivity, water-bearing zones, groundwater levels, and hydraulic gradients. The estimated underground mining inflow rate ranges between 12 to 78 U.S. gpm with a long-term average of approximately 25 gpm.
Any mine drainage would be collected and used in the drilling and mining process and pumped to the surface to be recycled in the backfilling and milling process. The dewatering system was designed for 200 gallons per minute (gpm) which would accommodate both the maximum inflow rate (78 gpm) and the water that may be needed for equipment operation (76 gpm).
Water at the working face would be pumped to the station sump. From the station sump, the water would either be used for equipment water supply or pumped out to the plant for use in the process circuit. When used for equipment water supply, the sediments would be removed at the

station sump. Excess water at the station sump would be pumped up to the next station sump. The water would continue to be pumped up to the next station until it is pumped out of the underground mine. Additional water management activities and Project water balance are provided in Section 2.5 of the PO.

One shaft would be constructed for secondary egress and ventilation. The ventilation network was designed to comply with U.S. ventilation standards for underground mines to control air quality for worker safety. Airflow of 100,000 cubic feet per minute was selected as a minimum reference for the ventilation design for each level in order to meet MSHA ventilation standards. Required airflows were determined at multiple stages during the Project life using equipment numbers, utilization rates, specific engine types and exhaust outputs, and the number of personnel expected to be working underground.

The planned ventilation would use a push/pull system that would require two exhaust fans on the surface. A raise bore would be used to construct ventilation raises between each Level Station that would be connected to the surface fans. Each vent raise would have a diameter of 12 feet, would be steel-lined and have an escape ladder. Auxiliary fans would take air from the main circuit and push the air to the working face on the level using vent ducting and vent bag. Each level would have an auxiliary fan at the Level Station.

Most of the fill would consist of cemented rock fill (CRF). The composition of the CRF would be approximately seven percent cement, 85 to 90 percent basalt from the Quarry and/or waste rock, and the balance water. Future work is anticipated to determine the feasibility of substituting fly ash for some of the cement content. Rock-fill (RF) would be basalt that is non-acid generating. The maximum daily required amount of backfill would be 1,200 tons. Rock fill would be utilized for areas that would not be accessible from below or besides, and CRF would be the primary means of backfilling to prevent subsidence. The RF and the materials used to construct the CRF would not be acid generating, Additional details are provided in Section 2.4 of the PO.

Underground power would be provided via an underground 480-volt (V) transformer placed near the entrance to the Project Portal at the start of mining. This would supply power to electrical equipment used to develop the main decline and to portable fans. A main powerline would be installed along the rib of the decline to carry 1.4 kV when development has advanced far enough that carrying power at 480 V becomes too inefficient. This line would be connected to a transformer that would be moved underground. Upon completion of the decline to the 3420 level, a second transformer would be installed. Line power would extend to the ventilation shaft to supply power to the ventilation fans.

Primary underground communication would be established via a leaky-feeder, very-high frequency (VHF) radio system. The system would allow for communications between the underground mine and surface operations.

Two emergency personnel refuge stations would be available in case of fire or rockfalls that block access and prevent full evacuation of personnel. These refuge stations would allow staff to safely remain in the underground mine for 48 hours. The refuge stations are mobile, each can accommodate up to 20 people within the protected chamber, and they would be located so that they are always no more than 1,000 ft from areas where the mine operation personnel are working. The primary route for evacuation would be the decline. The secondary route for evacuation would be the vent raises. All vent raises would be steel-lined and equipped with an escape-way ladder for secondary evacuation.

2.2.2. Reclamation and Mine Closure

The proposed post-mining land uses for the Proposed Action are livestock grazing, wildlife habitat, and recreation, with opportunities to consider mineral exploration and development when feasible. Where achievable, areas impacted by the Proposed Action would be returned to conditions that would support the post-closure land uses identified above. Post-mining land uses are in conformance with BLM's Southeast Oregon Resource Management Plan and Malheur County Land Use Plans.

The Proponent's key reclamation objectives for the Proposed Action would prevent the risk of UUD on public lands and ensure a compliance with state and federal law. These objectives are summarized below:

- Provide a stable post-closure landscape that supports defined land uses of livestock grazing or range land, wildlife habitat, and recreational land.
- Coordinate with agencies (DOGAMI, USEPA, ODFW) to implement and monitor the reclamation using quantitative measures for evaluating habitat diversity, wildlife species diversity, and plant community composition, structure and utilization by wildlife.
- Where applicable, ensure safe and existing access to private land.
- Minimize erosion damage and protect water resources through control of water runoff and stabilization of components.
- Establish post-closure surface soil conditions conducive to the regeneration of a stable plant community.
- Revegetate disturbed areas with appropriate plant species in order to generate self-sustaining, stable plant communities compatible with existing land uses; and
- Maintain public safety by stabilizing or limiting access to landforms that could constitute a public hazard.

Reclamation would be performed in the five stages shown in Table 3. Details of the Reclamation Plan are provided in Section 3 and Appendix D1 of the PO.

Table 3. Reclamation Plan Stages

Stage	Action
Stage One (Closure Year 1) Begins immediately following the cessation of mining operations.	• Cessation of ore processing and placement of tailings. • Removal of underground mine equipment and chemicals and reagents. • Closure of the ventilation shaft by plugging with concrete. • Closure of the mine portal with local rock and basalt • TSF underflow passive evaporation on the surface of the TSF (12-month period). • Quarterly groundwater quality monitoring (continues for 5 years). • Noxious weed monitoring and control (continues for 5 years). • Placement of growth media and revegetation of the TSF embankment. • If present, removal of waste rock from the TWRSF. • Closure of the TWRSF and overflow spillway. • Closure of the ore stockpiles. • Removal and disposal of hazardous waste, chemicals, and reagents. • Closure of the fuel storage and dispensing area. • Closure of the Process Plant buildings and ancillary facilities, including foundations and off-site disposal (except some of the support buildings used during the closure period that would be reclaimed in Stage 3 and the administration building that would be reclaimed in Stage 4). • Closure of the Collection Pond. • Closure of the parking areas (except the parking lot adjacent to the administration building, which would remain through Stage 4); and • Closure of the internal access and haul roads not required for Stage 2 and Stage 3 reclamation activities.
Stage Two (Closure Year 2) Begins at the time when the surface of the TSF is suitable for construction activities.	• Regrading of the entirety of the TSF surface. • Closure of approximately 75 percent of the surface of the TSF (the remaining 25 percent would be used for evaporation of seepage collected in the Reclaim Pond); and • TSF underflow passive evaporation on the surface of the TSF (12-month period).
Stage Three (Closure Year 3) Begins the time when the flow rate from the TSF underflow can be passively managed within the E-Cell, resulting in the final closure of the TSF.	• Closure of the remaining 25 percent of the surface of the TSF, and construction of the overflow spillway. • Conversion of the Reclaim Pond to the E-Cell. • Closure of the Quarry. • Closure of the remaining internal mine roads. • Closure of the structures and yards for the visitor parking, security, contractor laydown, contractor office and weather station areas; and • Closure of the Growth Media Stockpiles and Reclamation Borrow Areas.
Stage Four (Closure Year 4-29)	• Closure and removal of the perimeter fence. • Closure and removal of the administration building and adjacent parking lot. • Closure of the water supply, including the wellfield and associated pipelines, and well houses, fences and pads, raw water storage tank, septic tank, and potable water treatment unit. • Closure of the power supply, including generator, overhead lines and poles. • Groundwater quality monitoring would be conducted at a variable schedule: • Quarterly (Closure Year 1-5) • Semi-annually (Closure Year 6-15) • Annually (Closure Year 15-30)

Stage	Action
	• Reduction of Project area access. • Approximately 27 years of post-closure monitoring and inspections.
Stage Five (Closure Year 30) This stage would occur following meeting post-closure success criteria resulting in the conclusion of post-closure monitoring.	• Closure of the groundwater monitoring wells unless the monitoring data suggest that the wells need to be maintained to allow additional sampling and monitoring. • Closure of the final Growth Media Stockpile; and • Closure of the mine access road.

2.2.3. Ore Processing

Construction and operation of mine process and support facilities are proposed just north of the mine portal. Structures would be constructed on conventional shallow foundations.
The Processing Plant would contain the following: 1) a two-stage crushing ball mill; 2) a grinding circuit; 3) a hybrid leach–carbon-in-leach (CIL) with pre-aeration; 4) elution and electrowinning circuit; 5) mercury removal circuit; and 6) cyanide destruction circuit.
The Processing Plant, aside from the crusher, when fully operational would operate at just over 91 percent capacity. Over a 24-hour period, it is anticipated that the crusher would produce 750 short tons per day (stpd) of crushed ore. The crushed ore would then be processed in a ball mill and ground to 150 mesh/106 micrometers. The ground ore would flow to a pre-aeration tank and converted to a slurry. The slurry would overflow into the first leach tank where the lime and cyanide are added. Cyanide would also be added to the second leaching tank. The slurry would then overflow into a series of seven CIL tanks. Carbon would be pumped into the last CIL tank and through the rest of the CIL tanks in a counter flow fashion. The loaded carbon would be pumped from the first CIL tank and screen separated from any slurry.

The leaching process is designed to take place over 24 hours and would require 0.68 pounds of sodium cyanide per short ton of ore, 2.1 pounds of lime per short ton of ore, and consume 0.06 pounds of carbon per short ton of ore.

Gold and silver are stripped from the loaded carbon in an elution circuit. Calico proposes to use a pressure Zadra-style elution circuit. Strip solution (eluate) is made up in the strip-solution tank using raw water dosed with 2 percent sodium hydroxide and 0.2 percent sodium cyanide to form an electrolyte for the electrowinning process. This solution is circulated through the elution column via an eluate heater, which heats the solution, the carbon, and the column to 275 degrees Fahrenheit (°F). The elution system is pressurized to keep the solution from flashing to steam in the heater or elution column. The eluent is cooled in a heat exchanger and then sent to the electrowinning circuit. The stripped/barren carbon is sent to a kiln for reactivation and recycled through the CIL circuit.

The sludge from electrowinning would be dewatered and transported to the mercury retort oven for mercury removal, A description of the mercury removal process is provided in Appendix D4 of the PO. After mercury removal, the sludge would be combined with fluxes and heated in the smelting furnace.

To reduce the cyanide content in the tailings, Calico proposes using a sulfur dioxide (SO_2)/air process to reduce the Weak Acid Dissociable (WAD) cyanide concentration in the tails to less than 15 milligrams per liter. The CIL tailings would be pumped to a tank, lime and copper sulfate would be added, and then sodium metabisulfite (SMBS) is added as an SO_2 source. The detoxified tailings would then be pumped to the Tailings Storage Facility (TSF). The tailings would be approximately 42 to 46 percent solids (by weight) and have an estimated settled density of 80 pounds per square foot. Additional details are provided in Section 2.8 of the PO.

2.2.4. Tailings Storage Facility and Tailings Disposal

The TSF is proposed for construction in the broad valley north and northwest of the Mine Portal and Process Plant. The TSF would fill the native valley and require staged embankment constructions on the north and west sides. The embankments would be constructed in stages using downstream construction techniques. At an average deposition rate of 680 stpd and total available tailings capacity of 3.64 mst, the TSF would have an approximate design life of 15 years, consisting of approximately 8 years of active deposition of tailings into the TSF during the mining and ore processing operations to be followed by closure, reclamation and monitoring. During operations, the TSF would create 99.8 acres of surface disturbance. The TSF would include the following components:

- Embankments constructed of benign basalt generated from the Quarry,
- Geomembrane-lined Tailings Impoundment Area,
- Process water and tailings delivery pipelines,
- Leakage collection system,
- Leakage detection system,
- Light vehicle access roads,
- Stormwater Diversion Channels, and
- Reclaim Pond.

The TSF is designed as a zero-discharge facility in compliance with the guidelines in the Oregon Administrative Rules Division 20 as regulated by the State of Oregon Water Resources Department and Division 43 as regulated by the State of Oregon Department of Environmental Quality. The TSF embankment would be constructed in three phases, with each consecutive phase being built downstream of the existing embankment. This embankment construction method is known as "downstream construction" and is widely acknowledged as the safest and most stable tailings embankment construction method compared to other embankment construction methods.[4]

The embankments would have a maximum overall upstream slope of flatter than 3H:1V (with staged benching) with a downstream slope of 2.5H:1V. The north and west embankments would have a maximum height of 84-feet and 30-feet, respectively. The crest width of the north embankment would be 50-feet, with a 30-foot-wide crest for the smaller west embankment. (Golder, October 2021).

[4] https://miningwatch.ca/sites/default/files/2017-11-unepgrid-minetailingssafety-finalreport_0.pdf

In July 2020, the OWRD issued approval for the TSF and gave the TSF a Low Hazard designation (ODWR 2020). This designation reflects the fact that there are no structures or dwellings downgradient of the TSF that would be at risk of inundation or damage in the unlikely event of dam failure. Therefore, loss of life would be unlikely and damage to property would not be extensive. The stability analyses completed for the project indicate that the design criteria for the TSF meet or exceed the design factor-of-safety requirements for stability. (Golder, October 2021).

The TSF impoundment area would be lined with a geomembrane with continuous primary and secondary leakage collection and leak detection systems. Within the impoundment, the liner system would consist of (from bottom to top) a 6- to 12-inch-thick native-prepared subgrade, a 300-mil-thick enhanced GCL, 80-mil HDPE geomembrane liner, an 18-inch-thick drainage layer, and a 6-inch-thick filter layer. The subgrade would have a maximum particle size of 3 inches and may be comprised 50 percent by weight of 200 screen size fines. The proposed GCL would be constructed with a maximum hydraulic conductivity of 1×10^{-10} centimeters per second. Perforated piping would be located within the drainage layer to promote drainage of the tailings and to reduce hydraulic head on the lining system.
On the upstream embankment slopes, the lining system would be the same but without the overlying piping, drainage layer, and filter layer. Placement of a drainage layer above the geomembrane on the upstream embankment slopes is impractical due to the relatively steep side slopes and erosion potential of a cover from tailings deposition. Additionally, the TSF underdrain channel, TWRSF underdrain channel, and tailings delivery channel from the Process Plant would use the same lining system as the TSF embankment slopes, providing secondary containment.

The TSF is designed so that the supernatant pool, consisting of water produced from the tailings slurry and collected precipitation, would form on the eastern side of the TSF to avoid contact with the embankments. Isolating the supernatant pool away from the embankments adds an extra element of precaution and safety to the TSF design and operation. The Ecological Risk Assessment (SLR 2023) in Appendix G of the PO indicates the supernatant pool would not be detrimental to wildlife.

The freeboard depth is the distance from the supernatant level to the top of the embankments. The TSF is designed to provide a minimum freeboard depth of 5 feet above the maximum supernatant pool water surface, where it is impounded against the geomembrane-lined southern hillside. This freeboard would provide suitable dam storage height above the maximum water surface elevation to contain wave action above the 500-year, 24-hour storm event falling on the TSF impoundment and the upgradient catchment areas below the permanent and temporary diversion channels. Calico developed wave run-up calculations assuming the TSF experiences of a 500-year, 24-hour storm with waves generated from sustained wind loading using the average wind speed in the prevailing wind direction.

The TSF tailings storage capacity would be increased in three phases over the life of the mine by increasing the height of the embankment using downstream construction methods as shown in Table 4.

Table 4. TSF expansion phases

Stage	Amount of Stored Tailings
Stage 1A	0.40 million dry short tons
Stage 1B	0.98 million dry short tons
Stage 2[5]	2.04 million dry short tons

Stability analyses were completed for cross-sections of the north and west TSF embankments. Additional details are contained in PO Section 2.9 and Appendix C3 of the PO. As described in detail in Appendix C3, geotechnical monitoring of the TSF would occur during construction, operation, and closure to monitor performance and to ensure safe and stable construction and operation of the TSF and embankment stability. This monitoring program would measure pore pressures at numerous locations along the embankments to detect and address any excess pore pressures. Flow rates between the primary and secondary TSF containment layers and from the primary TSF collection pipes and the TSF toe drain prior to discharge to the reclaim pond would be measured and compared to the TSF estimated water balance. Regular visual inspections of surface conditions during construction and operation would also be performed. In addition to this Geotechnical Monitoring Plan, Calico would also perform a Tailings Chemical Monitoring Plan as described in Appendix D13 of the PO.

2.2.8 Growth Media Stockpiles, Quarry and Reclamation Borrow Areas

As shown on Table 2, growth media stockpiles, reclamation borrow areas, and a basalt quarry would be developed to support the underground mining operation. These facilities would be reclaimed when mining is completed as described in Section 2.2.9. Calico would enter into a sales contract with BLM for the basalt aggregate to be excavated from the quarry pursuant to BLM's Mineral Materials disposal regulations at 43 CFR Part 3600.
The Quarry would cover approximately 48.2 acres and have a maximum excavated depth of 125 ft, with the lowest quarry elevation at 3,790 ft amsl. The estimated volume of material to be excavated from the quarry would be 3.16 million cubic yards (cy). Quarry benches would be approximately 40-ft vertical faces separated by 60-ft horizontal benches, resulting in an interim sloping configuration of 1.5H:1V. The quarry operation would involve standard surface mining activities including drilling and blasting, the use of shovels, loaders, and scrapers for moving the material, crushing, stockpiling, and screening. Water would be used to control dust at the quarry.

Two growth media Reclamation Borrow Areas covering approximately 55.9 acres would be developed to obtain roughly 1,220,000 cy of growth media to be used during project reclamation. This volume was estimated assuming an average excavation depth of 8 ft and a maximum excavation depth of 15 ft and could change based on actual field conditions encountered during growth media salvage operations. In addition to the growth media obtained from the Reclamation Borrow Areas, Calico would salvage an additional 161,692 cy of growth media from the project facilities during initial project construction activities.

---

[5] This project is being permitted to Stage 2; however, the Dam is permitted to Stage 3 (3.64 million dry short tons).

2.2.5. Temporary Waste Rock Storage Facility

A lined Temporary Waste Rock Storage Facility (TWRSF) is proposed to be constructed in accordance with the following Oregon Administrative Rule (OAR) Divisions:
DOGAMI, Chemical Process Mine Regulations, OAR 632, Division 37;
Oregon Department of Fish and Wildlife (ODFW), Chemical Process Mining Consolidated Application and Permit Review Standards, OAR 635, Division 420; and
Oregon Department of Environmental Quality (ODEQ), Chemical Mining, OAR Chapter 340, Division 43.

The capacity of the TWRSF would be under 0.3 mst. Approximately 0.15 mst would be placed on the TWSRF in the first year of mine operation. By the sixth year, an additional 0.12 mst would be placed on the TWRSF, and at that point, capacity would be reached. The maximum height of the TWRSF would be 35 feet.

In accordance with the minimum requirements of OAR 340-043-0130(3), the TWRSF would have a dual containment system. From bottom to top, the lining system would consist of a 6- to 12-inch-thick native subgrade, a 300-mil-thick enhanced geosynthetic clay liner (GCL), an 80-mil HDPE geomembrane liner, an 18-inch-thick drainage layer, and a 6-inch thick filter layer. The GCL is proposed to be constructed with a maximum hydraulic conductivity of 1×10^{-10} centimeters/second (cm/sec). Perforated piping is in the drainage layer to promote drainage of the TWRSF; the TWRSF drainage would be piped to the TSF.

Independent leak detection and leakage collection and recovery systems (LCRS) would be installed to monitor and manage potential leakage between primary and secondary containment layers within the TWRSF containment pad. Details and design drawings are contained in Section 2.7 of the PO and Appendix C3 of the PO (Calico 2022).

The TWRSF is designed to remain in place during operation only. Due to the temporary nature of the TWRSF, geotechnical stability of the TWRSF was performed for static and pseudo-static conditions using an operational basis earthquake (OBE) with a return period of 475 years. The minimum required static Factor of Safety (FOS) is 1.5; analyses described in Appendix C3, indicate the current design has a FOS of 1.8 for failure through the foundation, and 1.6 for waste rock sliding. The target design minimum for pseudo-static FOS is 1.1. The analyses described in Appendix C3 indicate the current design has a pseudo-static FOS of 1.6 for failure through the foundation, and pseudo-static FOS of 1.4 for waste rock sliding. Additional details are contained in Section 2.7 of the PO (Calico 2022).

2.2.6. Water Supply Wells

Process water will be provided from up to five water supply wells. Four water supply wells are located at the Well Field outside of the perimeter fence to the north of the mine site and one within the perimeter fence immediately northwest of the TSF. Planned water supply wells will be completed approximately 250 to 500 feet below ground surface. Each of the four water supply wells located at Well Field will be protected by small perimeter fences. Water from the Well Field will be piped through a combination of underground and aboveground steel and HDPE piping to a freshwater tank located at the Process Plant, after which, it will be treated then distributed accordingly.

Potable water will be supplied from the freshwater tank. Water will be delivered from the freshwater tank through adsorptive media for arsenic removal, followed by chlorination, prior to storage in the potable water tank. Calico secured conditional approval of the proposed potable water treatment system, Public Water System ID #4195624, by Oregon Health Authority. The approved treatment method uses granular ferric hydroxide for arsenic removal from groundwater. Arsenic will be treated for removal below the maximum contaminant level (MCL) of 0.010 mg/L.
Calico has water rights from the OWRD in the amount of 2 cubic feet per second (cfs), approximately 900 gallons per minute, which is more than the planned water demand for the Project.

2.2.7. Road Access

The Proposed Action Route is on approximately 19.7 miles of existing roads that begins at the intersection of U.S. Highway 20 (US 20) and Russell Road. It continues south along Cow Hollow Road and Twin Springs Road to the mine site (Appendix A, Figure 3.). Russell Road and Twin Springs Road are maintained by Malheur County and the BLM. Approximately 14 percent of the existing access road would need straightening and/or widening improvements and a gravel road base to handle traffic and heavy equipment. These road modifications would create 6.8 acres of surface disturbance on public lands (SLR, May 2025). The road corridor would be approximately 30 feet wide, which includes a 20-foot-wide road travel width (10 feet on either side of the road centerline), 2-foot-wide shoulders on each side of the road, minimum 1-foot-wide ditches on each side of the road, cut, and fill. Eleven cross drain culverts would be installed. Internal access and haul roads would be located within the mine area for mine operations.

Mitchell Butte Road is identified as an emergency access road and would not require improvements to function as an emergency access route. It is expected that seasonal road maintenance on the Proposed Action Route would be sufficient to provide access for all Project personnel and deliveries. This includes grading with dust suppression in the summer months and snow removal (i.e., plowing in the winter months). The existing BLM and county roads would be maintained by Calico during the construction, operation, and closure of the Proposed Action. Dust suppression on the Proposed Access Route would include the dispersal of water from a water truck equipped with a spray bar. The road would be graded as necessary to maintain the condition of the roadbed.

2.2.8. Power Line

Idaho Power Company (IPC) would provide the electrical power demand for the mine which would total approximately five megawatts throughout the mine life with a reduced power demand during reclamation activities. Electrical power would be supplied via a 34.5-kilovolt (kV) transmission line owned and maintained by IPC, which would apply for the BLM ROW for the power line as the permittee. The existing six miles of transmission line would be upgraded, and a new transmission line would be constructed along and on either side of the BLM and county roads and the mine access road for approximately 19 miles, connecting the Project substation at the mine site. The new transmission line construction would consist of approximately 525 poles approximately 40 feet tall.

The line originates at IPC's Hope Substation approximately seven miles southwest of Vale, Oregon located off Graham Boulevard, in Malheur County, Oregon. From the substation, the proposed route would travel south across Graham Boulevard and US 20 prior to running east along the south side of US 20 to the Hope Road intersection where the route turns south. From that point, the proposed route would continue east through private land, crossing over Recla Drive to the Russell Road and Fulleton Road intersection. The remainder of the route would travel south following Russell Road, which eventually turns into Cow Hollow Road (Figure 3. Appendix A).

The first six miles of the existing transmission line is designated as the rebuild section that ranges from Hope Substation to structure number 131. It is assumed that the rebuild section would use the existing 69kV and 12.5kV conductors and hardware, where applicable, but replace all A-poles to accommodate the planned new 34.5kV distribution. Some poles must be self-supporting steel poles while the rest would be replaced with Douglas fir wood poles between class 4 and class H2. Additional structures are necessary to maintain clearances between the 34.5kV circuit and the 12.5kV circuit for the roughly 1.5 miles of the rebuild route that follows US 20.

The framing for the rebuild portion of the power line is based on IPC standards due to triple circuit structures being atypical. The existing structures that are being replaced on this line consist of one 69kV transmission circuit and one 12.5kV distribution underbuild circuit from structure 1 to structure 51, which use Grade B construction standards. The National Electric Safety Council (NESC) offers minimum guidelines for designing and constructing electric infrastructure; Grade B is the standard for when a high margin of safety is required when the pole supports spans that cross limited access highways, railroads, and navigable waterways. Both circuits originate from Hope Substation. It is assumed that all existing poles would be replaced and relocated to appropriate locations that adhere to IPC standards for transmission construction with the assumption that existing equipment (neutral connections, transformers, fuses, etc.) on the poles would be reused once a pole replacement has been made. Construction details are provided in Sections 1.6 and 2.11.2 of the PO.

For the new construction distribution line, there were multiple issues to take into consideration to spot and designate structure locations. Due to permitting restrictions from BLM, there is a permitting area for the power line that typically located within a 300-foot-wide area that is 150 feet from the centerline of the existing road with the exception of four distinct sections. These sections total linear feet 12,128 linear feet of road and up to 1400 ft in width. The proposed new distribution line maintains IPC and NESC four clearances for guys and structures based on the proposed road alignment.

Both the retrofitted infrastructure along the existing lines and the newly constructed transmission lines will meet Idaho Power's Zone 3 standard for avian protection from electrocution. The Zone

3 standard meets the suggested practices of the Avian Power Line Interaction Committee, and the design protects all species of birds, including eagles, from the risk of electrocution. In addition, to reduce the risk of corvid predation on sage-grouse, new power poles located within 3.3 kilometers of sage-grouse habitat will be fitted with deterrent structures (e.g., Triangular Avian Perch and Nest Diverters), as recommended by ODFW. Additional details are provided in Section 2.11.2 of the PO.

The remaining rebuild portion of the line from structures 52 to 132 would include a new 34.5kV circuit and the continuation of the existing 12.5kV circuit, which use Grade C construction standards. Grade C is the most common type and provides a basic margin of safety; it is used for the typical power and joint-use distribution pole and has two separate grades for line crossings and elsewhere. The terrain that the existing and new road alignment traverses comprises rolling hills and water washouts. Due to the proximity of these washouts/trenches to the new line, structure spotting would be optimized to avoid these areas with as much buffer as possible.

2.2.9. Exploration for up to 10 Acres of Surface Disturbance

Annual exploration work plans would be submitted and reviewed by the BLM and DOGAMI to ensure the proposed activity would not cause UUD. The annual exploration work plan would include:

- A description and location of drill sites and roads that are planned for annual exploration;
- Define how many acres are reclaimed, monitoring results, and future consideration for exploration activity to support the Project; and

Calico would salvage growth media for reclaiming the exploration disturbances during building the exploration roads and drill pads. Additional exploration drilling would be conducted from drill stations in the underground workings, resulting in no additional surface disturbance.

2.2.10. Proposed Project Design Features

Calico has proposed the following Project Design Features (PDF) to ensure a safe and environmentally sound mining and mineral processing operation. The PDF proposed for the Project are described in Table 2-4. Section 2.14 of the PO provides additional information.

2.3. Alternatives Considered but Eliminated

During the Notice of Intent (NOI) scoping period (3/18/24 to 4/17/2024), members of the public raised concerns regarding alternatives. As part of their application to DOGAMI, Calico considered several project alternatives reflecting the public comments.

2.3.1. Open Pit Mining Alternative

One alternative considered but eliminated from detailed analysis was open-pit mining. Open-pit mining is the most cost-effective method when the mineral-bearing ore has a low concentration of gold and is near the surface and when a large volume of ore must be removed to extract economic quantities of gold. Underground mining methods are typically used where the concentration of gold in the mineral-bearing ore is relatively higher and smaller volumes of ore can be removed to yield economic quantities of gold, since underground mining methods are commonly far more expensive than surface mining methods. The intrinsic properties of the ore deposit determine which mining method would be most effective; in this case, underground mining is the proposed method because high-grade ore deposits occur between 400 and 850 feet below the surface and are more concentrated in location. Therefore, the open pit mine was eliminated from detailed study because it is technologically infeasible because it cannot be utilized to reach the deep, high-grade deposits.

2.3.2. Mineral Processing Methods Alternative

During public scoping the alternative process of heap leaching to extract the gold and silver was brought forward. Heap leaching involves stacking of metal-bearing ore into a heap on an impermeable pad, irrigating the ore for an extended period of time with a chemical solution to dissolve the precious metals, and collecting the leachate as it percolates from the base of the heap. Gold and silver are leached with a dilute alkaline solution of sodium cyanide, and the recovery method is dependent on the type of ore being processed. Although heap leaching can be less expensive than processing ore in tanks, it is less efficient at extracting gold than the tank system, and open heap leaching systems increase the risk of environmental exposure to cyanide. For these reasons, heap leaching is not identified as a preferable alternative to conducting cyanide leaching in tanks, where all finely ground ore, leaching chemicals, active carbon, and other materials would be contained and isolated from the environment.

The gold ores to be mined at the Project site consist of high-grade ores of between 0.22 and 0.35 ounces[6] of gold per ton and low-grade ores of between 0.06 and 0.21 ounces of gold per ton. Additional gold deposits are present in smaller concentrations but are not economically viable to process. The Applicant's proposed Project using a crushing plant, ball mill, CIL circuit, elution circuit, electrowinning plant, and smelting operation is a suitable process for the type of gold deposit found at the Project site. Due to the efficiency of the milling process of the high-grade ore, heap leaching is technically infeasible for the grade of ore being processed by Calico.

2.3.3. Tailings Disposal Alternatives

Tailings Dewatering

During public scoping the alternative to de-water the tailings as an alternative method to reduce the risks associated with dam and acid mine failure was brought forward. Calico conducted analyses (Golder 2021) investigating three options for de-watering the tailings. This analysis shows that additional infrastructure and water treatment would be required to de-water the tailings to above 60 percent solids. Additionally, the generation of process water from tailings filtration may negatively affect the process water balance, producing a large volume of process water that would require storage in a separate water storage facility and/or water treatment and discharge, resulting in a facility that is no longer zero discharge. DOGAMI concurred with the analysis and noted that in addition

[6] All ounces are considered troy ounces.

to the required additional water storage and treatment facilities, dewatering the tailings would raise the cutoff grade for the ore, which would adversely impact the financial viability of the mine (Stantec 2024:2-45). The BLM eliminated this proposed alternative because it is not economically feasible.

Different TSF Locations

During public scoping the alternative for a different location for the TSF was brought forward. While alternatives for tailings storage facility locations were evaluated, the design of the tailings facility is largely prescribed by regulation and industry standards with limited alternatives. Golder (2021) conducted four comprehensive field investigations and detailed seismic hazards analyses to determine the optimal location for the TSF from geotechnical, operational, and economic perspectives. The location analyzed as the proposed action optimizes embankment fill, ease of construction, stormwater management, tailings movement to the TSF, disturbance area, geotechnical stability, and post-closure reclamation (Golder 2019). The investigations for the location of the TSF determined that the proposed site met all regulations and industry standards and an alternative TSF location would be inferior from an operational, economic, and technical perspective. BLM eliminated proposed alternative because it is not technically or economically feasible.

2.3.4. Gold Extraction Methods Alternative

Another alternative that BLM has eliminated from detailed study involves the use of thiosulfate instead of sodium cyanide to extract the gold from the ore. DOGAMI's (Stantec 2024: 2-49 - 2-52, 2-58 – 2-61) evaluation of this alternative found that although thiosulfate may be a viable substitute for cyanide, substituting thiosulfate for sodium cyanide would still generate tailings that still result in a process solution containing high concentrations of metals and other analytes. Additionally, the thiosulfate leaching process is utilized for double refractory ore, rock containing fine-grained gold with both sulfide and organic carbon. The type of gold found at Grassy Mountain is not double refractory. Therefore, the use of thiosulfate instead of sodium cyanide has been dismissed because the process is technically infeasible for the type of ore and the effects are substantively similar to the use of sodium cyanide because they both need to be managed in a TSF.

2.3.5. Access Route Alternatives

The portions of the route on Russell Road and northern Cow Hollow Road cross private lands that are used for ranching. Residents of that area are concerned that the mine traffic could: 1) endanger children playing in the area; 2) pose a hazard to livestock; and 3) potentially cause dust pneumonia in livestock. Alternative routes were proposed along Nyssa Road, and Sand Hollow Road.

Table 5. Length in miles of travel for each proposed alternative by ownership.

Ownership	Proposed Alternative (miles)	Nyssa Road Alternative (miles)	Sand Hollow Alternative (miles)
BLM	15	7	16
Bureau of Reclamation (BOR)	0	1	0
Private	7	8	5

All three of these routes' cross private lands and ranches. The concerns about exposure of residents, children, and livestock to increase mine traffic and fugitive dust would be the same on all proposed access roads to the mine but would occur in different locations along the different routes. The design and potential effects are all substantially similar to the proposed action. Design features, such as speed limits, graveling the road, and watering the road have been included to address the commentors' concerns and would be implemented regardless of route. Additionally, due to the similarity of effects, economic considerations were applied for the alternatives. The road improvements for the two alternative routes are disproportionally higher (14% vs 72% or 51% improved) than the proposed route as shown on Table 6 rendering them not as economically feasible as the proposed route.

Table 6. Travel Routes and Distance (Road engineering report, Calico)

Route	Study Road Length (Miles)	Area Disturbance (Acres)	Percent Reconstructed Alignment
Proposed Route	19.7	6.8	14%
Sand Hollow Road Alternative			
Sand Hollow Rd. Alternative	21.2	145.4	72%
Sand Hollowed Engineered	19.4	144.9	78%
Primary Route Section	1.8	0.5	12%
Nyssa Road Alternative			
Nyssa Rd. Alternative	22	77.8	51%
Nyssa Rd. Engineered	7.9	67.8	80%
Primary Route Section	7	3	19%
Paved Section to East	7.1	0	0%

Therefore, these alternative routes are being eliminated because they are substantially similar in design and potential effects.

3. Affected Environment and Environmental Consequences

3.1. Introduction

This chapter describes the existing conditions of resources based on identified issues that have the potential to be affected by activities related to the Proposed Action and the No Action Alternative described in Chapter 2. Identified resources that have been carried forward for analysis are discussed here in Chapter 3. These resources include:

- Air Quality
- Geology
- Range Management and Grazing
- Social and Economic Values
- Soils
- Surface, Subsurface, and Groundwater
- Transportation and Access Routes
- Visual Resources
- Wildlife

3.2. Past, Present and Reasonably Foreseeable Environmental Effects Scenario

Table 7 represents all the reasonably foreseeable actions and provides the total overlap of those actions with Grassy Mountain Mine. The incremental contribution of all effects to the project is considered the reasonably foreseeable environmental effects (RFEE).

Table 7. Past, Present and Reasonably Foreseeable Environmental Action Scenario

Action	Timeframe (past, present or reasonably foreseeable)	Total project boundary (Acres)	Overlap Between Projects (Acres)	Precent of overlapping potential effects within the project boundary 1655 (%)
Grassy Mountain Mine	Reasonably foreseeable	1,655	1,655	--
Dry Creek Allotment	Past, present, and reasonably foreseeable	68,252	7.25	0.43%
Nyssa Allotment	Past, present, and reasonably foreseeable	67,865	480.75	29%
Boardman to Hemingway Transmission Line (segment) ROW (300 miles x 500 ft) including ancillary facilities and temporary construction sites	Reasonably foreseeable	3,321	2.8	0.001%
Total:			490.8	29.43%

No Action Alternative

The total disturbance acres of the Grassy Mountain Mine are 19 acres of private lands. If the No action alternative was selected, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time on its valid mining claims. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur. The private lands that overlap with grazing allotments are not calculated into the BLM grazing permit AUMs. It is the responsibility of landowners to fence livestock out of their private lands within BLM administered lands, therefore, there would be no loss of AUMs. Because there is no loss of AUMs from actions taken on private lands, there are no contributions to the incremental reasonably foreseeable environmental effects for the no action alternative.

Preferred Alternative

The total project boundary acres of the Grassy Mountain Mine equal approximate 1,655 acres, including both private and BLM administered lands. Within all past, present and reasonably foreseeable actions (PPRFFA) in Table 7, there a total of 29.43 % of overlapping effects from all actions. The only resource that shows an effect is to livestock grazing AUMs and is addressed in the Range Management section, 3.6. No additional resources would be affected because there are no more incremental contributions from PPRFFA. Reasonably foreseeable environmental effects will not be further addressed in this document.

3.3. Common to all Assumptions

It is an assumption that proposed action would be completed within the proposed timelines. The effects that are disclosed in Chapter 3 are representative of the different phases thought the actions during life of the project. It is reasonable to assume that unforeseen circumstances (e.g., natural disasters) may occur, and can cause time delays in the project. For this reason, during project implementation, the time estimated in the analysis (e.g., 0-2 years for construction) may not accurately reflect when the effects from the action would occur, however the effects disclosed for the action are accurate for the phase identified.

Table 8. Proposed Timeframe and Project Phases

Time frame (years)	Phase 1	Phase 2	Phase 3	Phase 4
0-2	Construction			
2-10		Operational mining, milling, and monitoring		
10-14			Closure and decommissioning (post-closure monitoring)	
14-30				Post-closure Monitoring

3.4. Air Quality

How does the project affect air emissions, fugitive dust, tailpipe emissions from equipment, mercury, and criteria and toxic air?

3.4.1. Affected Environment

The area of analysis for air quality includes the local airshed, which is defined as a 50-kilometer (31-mile) radius buffer of the operational project area (OPA) (Appendix A, Figure 4.). This area includes Malheur County and a small portion of Baker County in Oregon, as well as portions of Washington, Payette, Canyon, and Owyhee counties in Idaho to the east. The nearest Class I area is the Strawberry Mountain Wilderness Area, is approximately 120 kilometers northwest of the OPA. Three other Class I areas - Eagle Cap Wilderness, Hells Canyon Wilderness, and Sawtooth Wilderness - are within 200 kilometers to the north and east. The proposed project lies with in the Eastern Oregon Intrastate Air Quality Control Region (AQCR 191), designated as unclassifiable/attainment, indicating compliance with all National Ambient Air Quality Standards (NAAQS) per 40 Code of Federal Regulations (CFR) 81.338. Consequently, federal General Conformity regulations do not apply. All neighboring counties within the 50-kilometer radius are also designated unclassified/attainment by the U.S. Environmental Protection Agency (USEPA) (40 CFR 81, Subpart B), the Oregon Department of Environmental Quality (ODEQ) and Idaho Department of Environmental Quality (Stantec 2024). The current NAAQS are presented in Table 9; ODEQ adopts these standards without changes, except for additional sulfur dioxide (SO_2) standards.

Table 9. National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	National Standard	Form
Carbon monoxide (CO)		Primary	8-hour	9 ppm	Not to be exceeded more than once a year
			1-hour	35 ppm	
Lead (Pb)		Primary and Secondary	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
Nitrogen dioxide (NO_2)		Primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentration, averaged over 3 years
		Primary and Secondary	Annual	53 ppb	Annual mean
Ozone (O_3)		Primary and Secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	**$PM_{2.5}$**	Primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)[1]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Sources: USEPA 2025a; Oregon Administrative Rules, ODEQ, Chapter 340, Division 202 – Ambient Air Quality Standards and Prevention of Significant Deterioration Increments (340-202-0070)

[1] ODEQ-Specific AAQS

SO_2 annual = 20 ppb; Form - Annual arithmetic mean for any calendar year

SO_2 3-hour = 50 ppb; Form – Average concentration not to be exceeded more than once per calendar year

SO_2 24-hour = 100 ppb; Form – Average concentration not to be exceeded more than once per calendar year

µg/m^3 = micrograms per cubic meter; ppb = parts per billion; ppm = parts per million

The OPA is characterized by rural, undeveloped land used primarily for grazing and dispersed recreation. The project site is distant from high-traffic roads and active industrial operations, with the nearest regulated emissions sources located over 15 miles away, primarily near the small towns of Vale or Nyssa, OR. Background pollutant concentrations are expected to be low, though elevated particulate concentrations may occur due to wildfire smoke or wind-driven dust from exposed soils (Stantec 2024).

The ambient air quality background concentrations account for existing natural and anthropogenic pollutant emissions. Table 10 provides regional background air pollutant concentrations obtained from the August 2024 Oregon Department of Geology and Mineral Industries (DOGAMI) *Environmental Evaluation* prepared for this Project (Stantec 2024). These background pollutant concentrations have been used to estimate ground-level air quality effects from the Proposed facility air emissions, as described in the *Grassy Mountain Mine New Source Review Analysis Modeling Report* (ASI 2022a) and the 2024 DOGAMI *Environmental Evaluation* report. The American Meteorological Society/Environmental Protection Agency Regulatory Modeling System (AERMOD) was used for the analysis and is the recommended model for short-range analyses (i.e., up to 50 kilometers) (Stantec 2024, ASI 2023a).

Table 10. Regional Background Pollutant Concentrations

Pollutant	Averaging Time	Concentration	Source	Method
$PM_{2.5}$	Annual	4.6 $\mu g/m^3$	Site data collection	October 2014–September 2015: adjusted annual average (fewer dates affected by wildfire smoke)
	24-hour	21 $\mu g/m^3$		October 2014–September 2015: second high (fewer dates affected by wildfire smoke)
PM_{10}	24-hour	23 $\mu g/m^3$		
SO_2	1-hour	4.17 ppb	AQS (16-001-0010) Meridian, Idaho	2014–2016 (99th percentile)
	3-hour	0.623 ppb		2014–2016 (annual mean)
NO_2	1-hour	43.63 ppb	AQS (16-001-0010) Meridian, Idaho	2014–2016 (98th percentile)
	Annual	10.72 ppb		2014–2016 (annual mean)
CO	1-hour	0.244 ppm	AQS (16-001-0010) Meridian, Idaho	2014–2016 (annual mean)
	8-hour	0.244 ppm		
O_3	8-hour	0.063 ppm	AQS (16-001-0010) Meridian, Idaho	2014–2016 (4th high average)
Pb	3-month	1.99E-04 $\mu g/m^3$	AQS (16-001-0010) Meridian, Idaho	2014–2016 (annual mean divided by 4)

Sources: Bison Engineering, Inc. 2015; USEPA 2017

AQS = Air Quality System

All gaseous concentrations are in parts per million/billion (ppm/ppb); particulate matter is in micrograms per cubic meter ($\mu g/m^3$).

The region's air quality is influenced by pollutant emissions and meteorological conditions. . Based on Oregon State University Prism Group (https://prism.oregonstate.edu/explorer/, June 16, 2025) weather tracking models, average precipitation in the vicinity of the project site averages approximately 12-inches of precipitation annually. The analysis area experiences a semi-arid climate with warm summers and cool winters. Based on data from the Calico-Vale meteorological station located approximately 4 kilometers west of the Project, the dominant wind direction in the area is typically from the north/northeast and southwest (EM Strategies 2018). Primary greenhouse gases (GHGs) include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2) which trap heat in the atmosphere (citation needed). The USEPA provides guidelines for evaluating GHG emissions under the National Environmental Policy Act (NEPA), using carbon dioxide equivalent (CO2e) to standardize comparisons across local, state, national, or global scales (citation needed).

Mercury, a naturally occurring element, exists in elemental and compound forms. The project's ore processing would generate small mercury emissions from a mercury retort oven, controlled to comply with USEPA National Emissions Standards for Hazardous Air Pollutants (NESHAP) for gold mine ore processing (40 CFR 63, Subpart EEEEEEE). This regulation mandates mercury emissions standards, performance testing, continuous monitoring, recordkeeping, and a Title V operating permit. The project, classified as a metallic minerals processing facility, is also subject to USEPA New Source Performance Standards (NSPS) for particulate matter and opacity (40 CFR 60, Subpart L). Additionally, the project requires a construction air permit from ODEQ, with an application already submitted alongside other environmental permits for a consolidated permit issued by the Oregon Department of Geology and Mineral Industries (DOGAMI).

3.4.2. Environmental Consequences

3.4.2.1. Analysis Method

Air quality effects were assessed using dispersion modeling to compare estimated emissions against baseline conditions, NAAQS, and health risk thresholds. GHGs were quantified using the USEPA Greenhouse Gas Equivalence Calculator.

3.4.2.2. No Action Alternative

Under the No Action Alternative, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time where they have valid mining claims. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur. The air quality effects associated with the Proposed Action would not occur and existing air quality conditions would remain unchanged. No emissions inventory has been prepared for the previously authorized explorations operations. However, it is reasonable to assume that air quality under the No Action alternative would be similar to that described for existing conditions.

3.4.2.3. Proposed Action

The Proposed Action would generate fugitive and point source emissions of particulate and gaseous pollutants. Fugitive emissions would result from blasting, drilling, ore and borrow crushing, tailings storage, pond reclamation operations, carbon-in-leach tanks, material handling, vehicle traffic, and wind erosion of disturbed areas. Point source emissions would originate from space heating equipment, carbon regeneration kiln, electrowinning cells, mercury retort oven, sludge melting furnace, cement batch plant, diesel emergency generator and fire water pump, lime silo, and fuel storage tanks. Mobile diesel and gasoline equipment and vehicles would contribute additional emissions during construction, operations, and reclamation (Stantec 2024, ASI 2023a).

3.4.2.3.1. Project Emissions and Air Permitting

The Proposed Action is classified as a minor source for Prevention of Significant Deterioration (PSD) construction and operations permitting, based on maximum estimated emissions of criteria pollutants and hazardous air pollutants (HAPs). However, emissions of particulate matter (PM) and PM10 exceed Oregon‘s significant emissions rate (SER) thresholds of 25 and 15 tons per year, respectively, triggering an ODEQ Type B New Source Review (NSR) construction permit. The requirements for the permit application have been completed. Table 11 summarizes estimated emissions by activity/source type (process, mining and fugitive, non-road - i.e., off-road mobile sources)Error! Reference source not found. (Stantec 2024).

Table 11. Grassy Mountain Estimated Emissions (tons/year)

Activity	PM	PM_{10}	$PM_{2.5}$	CO	NO_x	SO_2	VOCs	HAPs[1]	GHG[2]
Process	10.47	4.68	1.47	7.97	5.89	0.66	1.57	4.31	4,474
Mining and fugitive	38.48	10.78	1.08	10.89	1.69	0.001	--	2.77	--
Non-road	0.53	0.53	0.53	10.53	9.69	0.02	9.62	3.34	1,840
Facility total	49.48	15.99	3.08	29.39	17.27	0.67	11.19	10.42	6,313

Source: ASI 2022b
VOCs=volatile organic compounds
[1] *Includes fugitive HAPs, tank leaks, and hydrogen cyanide (1.93 tons/year from process).*
[2] *Measured in CO_2e = carbon dioxide equivalent.*

In 2023, Calico submitted a Standard Air Contaminant Discharge Permit (ACDP) Application under the Oregon Consolidated Permitting program. The permit would be issued by DOGAMI with review/coordination by ODEQ and other state and local agencies. ODEQ also operates an air toxics program called Clean Air Oregon (CAO), which has air toxics risk assessment requirements to protect human health and environmental effects from industrial/commercial facilities through the air permitting program (Stantec 2024, ASI 2023a).

3.4.2.3.1.1. Project Dispersion Modeling – Criteria Pollutants

Error! Reference source not found.ODEQ guidance (ODEQ 2022) requires new facilities with a Standard ACDP to demonstrate compliance with short-term NAAQS for NO2 (1-hour), PM2.5

(24-hour), and SO2 (1-hour). A screening analysis compares facility-wide short-term emissions to ODEQ's significant emission thresholds (SETs), as shown in Table 12.

Table 12. Potential Project Short-Term Emissions Comparison to SETs

Activity	$PM_{2.5}$ 24-hour (lb/day)	NO_2 1-hour (lb/hour)	SO_2 1-hour (lb/hour)
Process	18.5	31.06	0.46
Mining and Fugitive	10.0	5.38	0.01
Nonroad	5.1	3.88	0.01
Facility Total	33.6	40.32	0.48
SET	5	3	3

Source: ASI 2022a

The Proposed Action exceeds SETs for PM2.5 and NO_2, necessitating dispersion modeling for these pollutants, as well as PM10 due to SER exceedances. The USEPA's AERMOD model was used to evaluate impacts, with results shown in Table 12. (Stantec 2024, ASI 2023a).

Table 13. Model-Predicted Maximum Effects of the Applicant's Proposed Project

Pollutant	Averaging Period	Modeled Effect ($\mu g/m^3$)	Background (µg/m3)	Total Effect ($\mu g/m^3$)	NAAQS (µg/m3)	In Compliance?
PM_{10}	24-hour	24.6	23	47.6	150	Yes
$PM_{2.5}$	24-hour	3.7	21	24.7	35	Yes
NO_2	1-hour	140.0	5.1	145.1	188	Yes

Source: Modified from ASI 2022a

Error! Reference source not found.Error! Reference source not found.The modeled concentrations, combined with background levels, comply with NAAQS, indicating short-term, localized air quality impacts. Secondary PM2.5 emissions (from NO_2 and SO2 precursors) were also assessed, with a maximum effect of 0.009 $\mu g/m^3$, as shown in Table 13 (Stantec 2024, ASI 2023a).

Table 14. Maximum Secondary PM2.5 Compliance Demonstration

Pollutant	Averaging Period	Primary Effect (µg/m3)	Secondary Effect (µg/m3)	Background (µg/m3)	Total Effect (µg/m3)	NAAQS (µg/m3)	In Compliance?
$PM_{2.5}$	24-hour	3.7	0.009	21	24.67	35	Yes

Source: ASI 2022a

Ozone compliance was demonstrated, with precursor emissions (NO_2 and VOCs) resulting in an 8-hour ozone concentration of 0.09 ppb, below the significant impact level of 1 ppb (Stantec 2024, ASI 2023a).

Table 15. Maximum Ozone 8-hour Concentration and Compliance Demonstration

Source	NOx Emissions (tons/year)	Ozone from NOx Precursors (ppb)	VOC Emissions (tons/year)	Ozone from VOC Precursors (ppb)
Project	21.3	0.08	12.2	0.01
Project 8-hour ozone concentration				0.09
NAAQS compliance demonstration (significant impact level)				1
Project impact less than significant impact level?				Yes

Source: Modified from ASI 2022a
ppb=parts per billion

3.4.2.3.1.2. Class I and II Federal Protected Natural Resource Areas Effects

The Strawberry Mountain Wilderness, 120 kilometers northwest, is the closest Class I area. A Q/D screening analysis (emissions over distance) for NO_2, SO2, PM2.5, and PM10 yielded a value of 0.3, well below the significance threshold of 10 (Table 16), indicating minimal Class I impacts. (USFS 2010)Error! Reference source not found., (Stantec 2024).

Table 16. Q/D Analysis for Strawberry Mountain Wilderness

Air Quality Related Value Pollutant (lb/day)	Emissions (Q) (tons/year)	Distance (D) (km)	Q/D tons/year-km	Q/D<10?
228	42	120	0.3	Yes

Error! Reference source not found.For Class II areas, a PSD increment assessment confirmed compliance with allowable increments for PM2.5 and PM10 (Table 16) (Stantec 2024).

Table 17. Maximum Secondary PM2.5 Compliance Demonstration

Pollutant	Averaging Period	Primary Impact (µg/m3)[1]	Secondary Impact (µg/m^3)	Total Impact (µg/m3)	Class II PSD Allowable Increment (µg/m3)	In Compliance?
PM2.5	24-hour	4.4	0.009	4.409	9	Yes
PM10	Annual	2.21	N/A	2.21	17	Yes
PM10	24-hour	24.6	N/A	24.6	30	Yes

Source: Modified from ASI 2022a
[1]High second high design values (ASI 2022a, ASI 2022b)

3.4.2.3.1.3. CAO Risk Assessments

The CAO program requires assessing HAPs and toxic emissions to determine health risks. A Level 3 Risk Assessments, using AERMOD and Method C Risk Equivalent Emission Rate (REER), evaluated risks based on risk-based concentrations (RBCs) (Table 18). All modeled risks were below ODEQ's Source Permit Risk Action Levels (Table 19), confirming CAO compliance. The CAO analysis includes point, volume, area, and line sources (Stantec 2024). See Appendices D and E of the CAO Risk Assessment Report developed by ASI for additional detail (ASI 2023a, ASI 2023b).

Table 18. Facility-Wide Toxic Emissions and Risk-Based Concentrations ***(Source: ASI 2023)***

Chemical Abstract Service No. or DEQ ID	Toxic Pollutant	Residential Chronic[7]		Non-Resident Chronic[7]				Acute[7]	Facility Total Emissions	
		Cancer RBC	Non-Cancer RBC	Child Cancer RBC	Child Non-Cancer RBC	Worker Cancer RBC	Worker Non-Cancer RBC	Non-Cancer RBC	ton/year	lb/day
7440-36-0	Antimony and compounds	--	3.0E-01	--	1.3E+00	--	1.3E+00	1.0E+00	5.5E-04	4.8E-03
7440-38-2	Arsenic and compounds	2.4E-05	1.7E-04	1.3E-03	2.4E-03	6.2E-04	2.4E-03	2.0E-01	1.8E-03	2.2E-02
7440-41-7	Beryllium and compounds	4.2E-04	7.0E-03	1.1E-02	3.1E-02	5.0E-03	3.1E-02	2.0E-02	2.2E-05	1.9E-04
7440-43-9	Cadmium and compounds	5.6E-04	5.0E-03	1.4E-02	3.7E-02	6.7E-03	3.7E-02	3.0E-02	1.7E-04	6.9E-03
18540-29-9	Chromium VI, chromate and dichromate particulate	3.1E-05	8.3E-02	5.2E-04	8.8E-01	1.0E-03	8.8E-01	3.0E-01	3.3E-04	3.2E-03
7440-48-4	Cobalt and compounds	--	1.0E-01	--	4.4E-01	--	4.4E-01	--	3.2E-05	2.7E-04
7439-92-1	Lead and compounds	--	1.5E-01	--	6.6E-01	--	6.6E-01	1.5E-01	8.6E-04	3.8E-02
7439-96-5	Manganese and compounds	--	9.0E-02	--	4.0E-01	--	4.0E-01	3.0E-01	1.4E-03	2.4E-02
7439-97-6	Mercury and compounds	--	7.7E-02	--	6.3E-01	--	6.3E-01	6.0E-01	4.4E-03	9.8E-02
C365	Nickel compounds, insoluble	3.8E-03	1.4E-02		6.2E-02		6.2E-02	2.0E-01	4.8E-04	1.8E-02
7440-39-3	Barium and compounds	--	--	--	--	--	--	--	8.5E-03	7.4E-02
7440-50-8	Copper and compounds	--	--	--	--	--	--	1.0E+02	5.3E-04	2.0E-02
7440-62-2	Vanadium (dust and fume)	--	1.0E-01	--	4.4E-01	--	4.0E-01	8.0E-01	3.0E-04	2.4E-03
7440-66-6	Zinc and compounds	--	--	--	--	--	--	--	3.1E-03	1.1E-01
1313-27-5	Molybdenum trioxide	--	--	--	--	--	--	--	8.1E-05	7.2E-04
7440-22-4	Silver and compounds	--	--	--	--	--	--	--	3.5E-05	3.4E-04
7631-86-9	Silica, crystalline	--	3.0E+00	--	1.3E+01	--	1.3E+01	--	3.2E+00	3.1E+01
115-07-1	Propylene	--	3.0E+03	--	1.3E+04	--	1.3E+04	--	5.7E-02	2.2E+00
106-99-0	1,3-Butadiene	3.3E-02	2.0E+00	8.6E-01	8.8E+00	4.0E-01	8.8E+00	6.6E+02	2.0E-02	9.6E-01
75-05-8	Acetonitrile	--	6.0E+01	--	2.6E+02	--	2.6E+02	--	6.0E-03	5.6E-02

[7] *Concentrations are in units of micrograms per cubic meter (μg/m³)*

Chemical Abstract Service No. or DEQ ID	Toxic Pollutant	Residential Chronic[7]		Non-Resident Chronic[7]				Acute[7]	Facility Total Emissions	
		Cancer RBC	Non-Cancer RBC	Child Cancer RBC	Child Non-Cancer RBC	Worker Cancer RBC	Worker Non-Cancer RBC	Non-Cancer RBC	ton/year	lb/day
107-02-8	Acrolein	--	3.5E-01	--	1.5E+05	--	1.5E+05	6.9E+00	4.4E-03	1.7E-01
67-64-1	Acetone	--	3.1E+04	--	1.4E+05	--	1.4E+05	6.2E+04	4.1E-04	3.8E-03
67-63-0	Isopropyl alcohol	--	2.0E+02	--	8.8E+02	--	8.8E+02	3.2E+03	7.8E-04	7.3E-03
107-13-1	Acrylonitrile	1.5E-02	5.0E+00	3.8E-01	2.2E+01	1.8E-01	2.2E+01	2.2E+02	1.1E-03	1.1E-02
71-43-2	Benzene	1.3E-01	3.0E+00	3.3E+00	1.3E+01	1.5E+00	1.3E+01	2.9E+01	4.1E-02	9.8E-01
108-88-3	Toluene	--	5.0E+03	--	2.2E+04	--	2.2E+04	7.5E+03	7.8E-02	8.5E-01
100-41-4	Ethyl Benzene	4.0E-01	2.6E+02	1.0E+01	1.1E+03	4.8E+00	1.1E+03	2.2E+04	1.6E-02	1.3E-01
100-42-5	Styrene	--	1.0E+03	--	4.4E+03	--	4.4E+03	2.1E+04	5.4E-04	5.1E-03
108-67-8	1,3,5-Trimethylbenzene	--	6.0E+01	--	2.6E+02	--	2.6E+02	--	1.7E-04	1.6E-03
91-20-3	Naphthalene	2.9E-02	3.70E+00	7.6E-01	1.6E+01	3.5E-01	1.6E+01	2.0E+02	7.1E-03	1.2E-01
7782-49-2	Selenium and compounds	--	--	--	--	--	--	2.0E+00	2.1E-04	9.9E-03
91-57-6	2-Methyl naphthalene	--	--	--	--	--	--	--	9.6E-07	8.6E-06
56-49-5	3-Methylcholanthrene	--	--	--	--	--	--	--	5.4E-08	3.0E-07
57-97-6	7,12-Dimethylbenz[a]anthracene	--	--	--	--	--	--	--	4.8E-07	2.6E-06
83-32-9	Acenaphthene	--	--	--	--	--	--	--	3.0E-04	1.5E-02
208-96-8	Acenaphthylene	--	--	--	--	--	--	--	3.6E-04	1.8E-02
75-07-0	Acetaldehyde	4.5E-01	1.4E+02	1.2E+01	6.2E+02	5.5E+00	6.2E+02	4.7E+02	7.1E-02	3.5E+00
7664-41-7	Ammonia	--	5.0E+02	--	2.2E+03	--	2.2E+03	1.2E+03	8.1E-01	1.6E+01
120-12-7	Anthracene	--	--	--	--	--	--	--	3.6E-04	1.8E-02
56-55-3	Benz[a]anthracene	2.1E-04	--	7.8E-03	--	1.5E-02	--	--	3.5E-04	1.7E-02
50-32-8	Benzo[a]pyrene	4.3E-05	2.0E-03	1.6E-03	8.8E-03	3.0E-03	8.8E-03	2.0E+03	3.2E-06	1.6E-04
205-99-2	Benzo[b]fluoranthene	5.3E-05	--	2.0E-03	--	3.8E-03	--	--	6.0E-04	3.0E-02
191-24-2	Benzo[g,h,i]perylene	4.7E-03	--	1.7E-01	--	3.4E-01	--	--	3.1E-07	1.3E-05
207-08-9	Benzo[k]fluoranthene	1.4E-03	--	5.2E-02	--	1.0E-01	--	--	6.0E-04	3.0E-02
218-01-9	Chrysene	4.3E-04	--	1.6E-02	--	3.0E-02	--	--	3.2E-04	1.6E-02
53-70-3	Dibenz[a,h]anthracene	4.3E-06	--	1.6E-04	--	3.0E-04	--	--	3.1E-04	1.5E-02

Chemical Abstract Service No. or DEQ ID	Toxic Pollutant	Residential Chronic[7]		Non-Resident Chronic[7]				Acute[7]	Facility Total Emissions	
		Cancer RBC	Non-Cancer RBC	Child Cancer RBC	Child Non-Cancer RBC	Worker Cancer RBC	Worker Non-Cancer RBC	Non-Cancer RBC	ton/year	lb/day
206-44-0	Fluoranthene	5.3E-04	--	2.0E-02	--	3.8E-02	--	--	3.6E-04	1.8E-02
86-73-7	Fluorene	--	--	--	--	--	--	--	1.9E-03	9.3E-02
50-00-0	Formaldehyde	1.7E-01	9.0E+00	4.3E+00	4.0E+01	2.0E+00	4.0E+01	4.9E+01	1.61E-01	7.6E+00
110-54-3	Hexane	--	7.0E+02	--	3.1E+03	--	3.1E+03	--	1.2E-01	7.8E-01
193-39-5	Indeno[1,2,3-cd]pyrene]	6.1E-04	--	2.2E-02	--	4.3E-02	--	--	3.1E-04	1.5E-02
106-46-7	p-Dichlorobenzene (1,4-Dichlorobenzene)	9.1E-02	6.0E+01	2.4E+00	2.6E+02	1.1E+00	2.6E+02	1.2E+04	3.6E-05	2.0E-04
85-01-8	Phenanthrene	--	--	--	--	--	--	--	3.5E-03	1.7E-01
129-00-0	Pyrene	--	--	--	--	--	--	--	7.6E-04	3.7E-02
1330-20-7	Xylene (mixture)	--	2.2E+02	--	9.7E+02	--	9.7E+02	8.7E+03	1.1E-01	2.2E+00
74-90-8	Hydrogen cyanide	--	8.0E-01	--	3.5E+00	--	3.5E+00	3.4E+02	1.9E+00	1.2E+01
12185-10-3	Phosphorus (white)	--	9.0E+00	--	4.0E+01	--	4.0E+01	2.0E+01	2.8E-05	2.5E-04
108-90-7	Chlorobenzene	--	5.0E+01	--	2.2E+02	--	2.2E+02	--	1.8E-05	8.9E-04
7647-01-0	Hydrochloric acid	--	2.0E+01	--	8.8E+01	--	8.8E+01	2.1E+03	1.7E-02	8.3E-01
C200	Diesel particulate matter	1.0E-01	5.0E+00	2.6E+00	2.2E+01	1.2E+01	2.2E+01	--	3.7E+00	2.9E+02
192-97-2	Benzo[e]pyrene	--	--	--	--	--	--	--	2.4E-08	4.6E-07
198-55-0	Perylene	--	--	--	--	--	--	--	4.6E-08	8.9E-07
92-52-4	Biphenyl	--	--	--	--	--	--	--	9.7E-05	5.3E-04
110-82-7	Cyclohexane	--	6.0E+03	--	2.6E+04	--	2.6E+04	--	2.2E-03	1.2E-02
108-95-2	Phenol	--	2.0E+02	--	8.8E+02	--	8.8E+02	5.8E+03	5.1E-04	2.8E-03
95-63-6	1,2,4-Trimethylbenzene	--	6.0E+01	--	2.6E+02	--	2.6E+02	--	2.3E-02	1.3E-01
98-82-8	Isopropylbenzene (cumene)	--	4.0E+02	--	1.8E+03	--	1.8E+03	--	4.6E-03	2.5E-02

Table 19. Nearest Exposure Receptors by Risk Class

Risk Category	Exposure Scenario		Maximum Risk Location		Maximum Risk	Source Permit Risk Action Level
			Easting (m)	Northing (m)		
Cancer	Chronic	Residential	472000.0	4820000.0	0.2	0.5
		Child	480485.0	4869487.0	<0.002	
		Worker	474243.0	4839495.0	<0.05	
Non- Cancer	Chronic	Residential	479000.0	4834500.0	<0.02	0.5
		Child	480485.0	4869487.0	<0.0004	
		Worker	474243.0	4839495.0	<0.02	
	Acute		471268.3	4835965.9	0.3	0.5

Source: ASI 2023a, ASI 2023b

3.4.2.3.2. Greenhouse Gas Emissions

The Proposed Action would emit approximately 6,313 tons/year of CO2e, equivalent to 769 households' annual energy consumption or 1,336 gasoline cars driven for a year (USEPA 2025b). This represents 0.032% of Oregon's 2023 permitted GHG emissions (19.5 million short tons) (ODEQ 2024). Minimization measures, such as biodiesel use, optimized mine operations, and material recycling, would reduce GHG impacts (citation needed – or analysis quantifying the efficacy of these mitigation measures).

3.4.2.3.2.1. Emissions Control Measures

Calico would implement the following control measures, to reduce air pollutant emissions.:
Use of Tier 4 diesel engines compliant with NSPS and NESHAP standards, maintained with ultra-low sulfur diesel.
Periodic wetting of borrow area stockpiles to control fugitive dust.
Wet ore processing to minimize crusher dust emissions.
Baghouse and carbon adsorption for diesel melting furnace emissions (0.004 grains/dscf).
Wet scrubber and carbon filter for carbon regeneration kiln emissions.
Retort condenser and activated carbon for mercury retort and electrowinning emissions.
Water sprays and dust collection systems for cemented rock fill batch plant.
Lime silos would use bin vents for particulate emissions controls.
Periodic application of water and chemical suppressants to control fugitive dust from unpaved aboveground haul roads (Stantec 2024, ASI 2023a).

In summary, the Proposed Action would result in short-term, i.e., up to 24-hour[8], localized increases in $PM_{2.5}$, PM_{10}, SO_2, NO_2, and ozone concentrations for air resource effects regarding criteria pollutants. There would also be localized increases in annual PM emission concentrations; however, neither of these short-term increases would result in an exceedance of the NAAQS. Additionally, the Proposed Action would comply with the CAO program regarding

[8] CAO evaluates annual and short-term (daily/ 24-hour) human health risks impacts.

air toxics; therefore, air toxics effects would be short-term during the eight years of operations and at a minor adverse level below risk action levels.

3.4.2.3.3. Irretrievable and Irreversible Impacts

Air pollutant and GHG emissions from the Proposed Action are unavoidable during construction, operations, and reclamation. Impacts would cease post-reclamation with successful revegetation to stabilize dust emissions. Pollutant concentrations would remain within NAAQS, except for limited exceedances noted, and return to pre-mining levels after closure.

3.4.2.3.4. Reasonably Foreseeable Environmental Effects

There are no reasonably foreseeable future environmental effects based on Section 3.2, Table 7.

3.5. Geology

How would mining, milling, processing, and reclamation impact the availability of quantities of in-place geologic material? How would the potential of geologic hazards impact the project area?

3.5.1. Affected Environment

The geology of the Grassy Mountain deposit has been determined through fieldwork consisting of geologic mapping and sampling, extensive drilling (much of which has been located on private land), and incorporation of information from existing geologic studies, reports, and maps. The results of this work, particularly Abrams 2018 and Ausenco 2020 and 2022, are summarized below. Abrams 2018 defines the Geology Study Area to include the entire Access Road and a 4,000-meter buffer around the Mine and Process Area.

Grassy Mountain is the largest of twelve epithermal hot spring precious metal deposits that have been identified to date in the Lake Owyhee volcanic field in southeastern Oregon. This volcanic field is located at the intersection of three tectonic provinces: the buried margin of the craton; the northern basin and range; and the Snake River Plain. These volcanic rocks erupted between 15.5 and 10.4 million years ago and consist of silicic ash-flow sheets, rhyolite tuffs, rhyolitic intrusives, and basalts.

North- and northwest-trending basin and range-type fracture zones produced regional extension and subsidence that facilitated the formation of through-going fluvial systems and extensive lacustrine basins. Large volumes of fluvial sediments, sourced from the exhumed Idaho Batholith to the southeast, were deposited in conjunction with volcanism and hot spring activity during the waning stages of the development of the volcanic field. The resulting regional stratigraphic section is comprised of a thick sequence of middle-Miocene volcanic rocks and coeval and Pliocene-age non-marine lacustrine, volcaniclastic, and fluvial sedimentary rocks.

Appendix A, Figure 5., is a simplified geologic map that shows the distribution of these rocks in the mine and process area. The north- and northwest trending faults in this area are not shown on this map. Appendix A Figure 6., shows the generalized geology along the access road.

Bedrock outcrops near the mine and process plant are mainly composed of olivine-rich basalt and siltstones, sandstones, and conglomerates of the upper-Miocene Grassy Mountain Formation. These rocks are locally covered with relatively thin, unconsolidated alluvial and colluvial deposits. Erosion-resistant basalts cap local topographic highs. The Grassy Mountain Formation is the host rock for the Grassy Mountain ore deposit. It ranges from 300 to over 1,000 feet thick and is comprised of silicified sedimentary rocks consisting of conglomerates, arkosic sandstones, fine-grained sandstones, siltstones, mudstones and sinters (hot spring deposits). Sinter hot spring deposits are interbedded with the silicified sediments of the Grassy Mountain Formation (Abrams 2018).

The Grassy Mountain gold-silver deposit is located beneath a prominent, 150-foot high, silicified and iron-stained hill. Bedding is horizontal at the hilltop, and dips at ten to 25 degrees to the north-northeast on the northern and eastern flanks of the hill. The northwest-trending Antelope Fault traverses the west side of the hill causing the bedding dip to steepen to 30 to 40 degrees in the footwall of this fault.

Exploration drilling, which has mainly focused on Calico's private land, identified the Grassy Mountain deposit in 1988. The underground deposit discovered to date measures approximately 1,600 feet long by 1,000 feet wide by 600 feet thick. The higher-grade mineralized zone occurs between 400 and 850 feet below the surface. Low-grade gold mineralization begins at depths of 60 feet below the present topographic surface and surrounds the higher-grade mineralized zone as a broad disseminated halo.

The Grassy Mountain ore deposit contains features which are typical of hot spring gold deposits, including a mineralized quartz-adularia stockwork of irregularly distributed veinlets and veins, colloform banding, hydrothermal breccias, and relict bladed or boxwork textures in veins where quartz has replaced calcite. The gold is mainly electrum (a naturally occurring alloy of native gold and silver) that is typically located along fracture margins or within microscopic voids. Visible gold occurs locally in stockwork zones. The average silver to gold ratio of the Grassy Mountain deposit is 2.5:1.

Silicification occurs as pervasive silica flooding and as cross-cutting veins and stockworks. The silicified zone has plan dimensions up to 3,000 feet (north-south) by 2,500 feet (east-west). Silicification is surrounded by widespread, clay-altered tuffaceous siltstone, mudstone, and arkose with minor disseminated pyrite. As discussed in Section 3.12, permeability and hydraulic conductivity are very low in the silicified zone associated with the ore deposit.

The low-grade gold zones are typically associated with sinter (hot springs) silicification, whereas the high-grade gold zones are associated with multi-stage quartz-adularia-gold-silver veinlets, stockworks, and breccias. The stacked sinter terraces, multiple generations of silicification and quartz veinlets, and the presence of hydrothermal breccia zones, indicate that a long-lived hydrothermal hot spring system formed the Grassy Mountain ore deposit.

3.5.1.1. Mineral Reserves and Resources

The Ausenco 2022 feasibility study for the Grassy Mountain Project is based on data obtained from 286 exploration drill holes and detailed metallurgical, mine planning and geotechnical studies. The feasibility study identified proven and probable mineral reserves[9] of approximately 380,370 ounces of gold and 554,300 ounces of silver that are targeted for production in the mine plan and milling operation in the proposed PO. Metallurgical recovery for these reserves ranges from 92.8 percent for gold and 73.5 percent for silver.

The feasibility study also quantifies the measured, indicated, and inferred mineral resources[10] for the Grassy Mountain ore deposit. (Identified mineral resources do not include mineral reserves.) The deposit contains 360,000 ounces of gold and 1,523,000 ounces of silver of measured resources, 387,000 ounces of gold and 1,484,000 ounces of silver of indicated resources, and 56,000 ounces of gold and 125,000 ounces of silver of inferred mineral resources (Ausenco 2022, Tables 1-1 and 1-3).

Although the mineral resources are not economic to mine at this time, underground and surface exploration drilling would be performed with the objective of discovering additional mineralization that could potentially upgrade a portion of the identified mineral resources into reserves, and potentially discover new mineralized zones that could become economically viable. Up to 10 acres of surface disturbance would be created in association with the surface exploration drilling.

3.5.1.2. Geologic Hazards

As discussed in Abrams 2018, the Geology Study Area is located in a region of low seismic risk. No active or potentially active faults are known in the Geology Study Area. The closest fault with historic surface rupture, the Lost River Fault, is located near Challis, Idaho, approximately 110 miles northeast of the Geology Study Area. The closest potential Holocene age faults are located over 20 miles north of the Geology Study Area. In Abrams 2018, Figure 13, shows a map that the probability of an earthquake in the Geology Study Area with a magnitude greater than 5.0 over the next ten years is less than 0.03.

The nearest fault is located approximately 5 miles southwest of the Project, along Twin Springs Creek (Personius 2002). The fault is Class B, meaning there is evidence of a fault or deformation, but the fault does not appear to extend deep enough to cause significant earthquakes.

The Project area has the lowest seismic activity rating in Oregon (ODOT 2016). Project facilities were designed to International Building Code standards to withstand a maximum considered earthquake (MCE). Seismic design parameters for the Project were developed based on a design MCE with a magnitude of 6.09 on the Richter scale (Abrams 2018; McGinnis and Red Quill Ventures 2015).

---

[9] Mineral reserves are well characterized, economic grade deposits.
[10] Inferred mineral resources is inferred mineral resources.

The MCE has a 2,500-year recurrence interval; thus, there is very low probability for this level of seismic hazard to occur during the construction, operation, and reclamation phases of the Project. In the unlikely event that an earthquake of this magnitude were to occur during this timeframe, the project facilities are designed to sustain no permanent structural damage from such an event, and to be protective of human safety. There are no known active landslides in the greater Project area (Abrams 2018). The nearest active volcanoes are 200 miles to the west in the Cascade Range. (Abrams 2018).

3.5.2. Environmental Effects

3.5.2.1. Methods and Assumptions

The area of analysis for geology and minerals effects includes the Project area for the permit, including the Mine and Process Area and the Access Road and Transmission Line Area. The analysis uses units of volumes (e.g. ounce, tons, cubic yards) to disclose impacts to geologic materials. Geologic materials include soil, common minerals, and locatable minerals. To analyze effects to mineral extraction and the potential of geologic hazards, the timeframes are stage 1: years 0 to 2 (construction), stage 2: years 2 to 10 (operational mining and milling), stage 3: years 10 to 14 (closure and decommissioning), and stage 4: years 10 to 30 (post closure and monitoring). The short-term effects are defined as stage 1, the long-term effects are defined as stage 2 to 4, and the irreversible and irretrievable effects occur forever (permanent effect).

3.5.2.2. No-Action Alternative

Under the No Action Alternative, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time on its valid mining claims. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur. No topographical features would be modified, created or destroyed on BLM administered lands.

3.5.2.3. Proposed Action

3.5.2.3.1. Common Minerals[11]

The 0.3 mst of waste rock that would be mined from underground and would be temporarily stored in the 5.7-acre TWRSF, which would occur in stages 1-4. During the life of the mining operation, this material would be used to produce the RF and CRF that would be returned to the underground mine as backfill. Returning the mined waste rock to the underground workings would create an irretrievable and irreversible effect primarily on 6.2 acres of Calico's private land where the majority of the underground mine would be developed but also impacts 0.5 acres of public land.

[11] Common minerals are mineral deposits that include the most basic natural resources, such as soil, sand, gravel, dirt, and rock, used in everyday building, and other construction uses.

Roughly 3.16 million cy of basalt aggregate would be excavated from a basalt quarry over the ten-year combined construction and operation phases of the mine would be relocated to various places within the Project and used to construct roads, the tailings embankment, rip rap, and for other purposes. This material would remain in its relocated places following reclamation of the roads, TSF, and other mining support facilities constituting a permanent relocation of this geologic material and an irretrievable and irreversible effect.

The milling process would create about 3.64 mst of tailings that would be permanently stored in the 108-acre TSF, which would relocate this material from the subsurface to the surface, constituting an irreversible effect to the geologic material.

The 1,220,002 cy of growth media to be obtained from the two Growth Media Reclamation Borrow Areas (55.9-acre footprint) and the 161,692 cy of growth media that would be salvaged from the project facilities during project construction would be temporarily stockpiled. When mining ceases, the 1,382,000 cy stockpiled growth media would be relocated and used at various locations throughout the mine site during project reclamation, constituting a permanent relocation of this geologic material and an irretrievable and irreversible effect.

3.5.2.3.2. Mineral Reserves and Resources

Mining and milling of the proven and probable ore gold and silver reserves would involve recovering approximately 380,370 ounces of gold and 554,300 ounces of silver from the mined ore, transporting the recovered precious metals to an off-site refinery and ultimately selling the refined gold and silver. This would represent an irretrievable and irreversible effect to the mined geologic reserve. However, the unmined mineral resource or any presently undiscovered mineral deposits in the area would not be affected because the geologic resources would remain available for future mine development if warranted. The presence of the 108-acre reclaimed TSF would not preclude the potential future development of an underground mine beneath this facility.

3.5.2.3.3. Geologic Hazards

Because the Project area is located in an area with low seismic activity, the project facilities have been designed to withstand the MCE, there are no active landslides in the area, and the nearest active volcano is roughly 200 miles away, no effects to the project area from geologic hazards are anticipated.

3.5.2.3.4. Irretrievable and Irreversible Impacts

The following components of the Proposed Action would create irretrievable and irreversible effects to federal minerals because the in-place geologic materials would be excavated, processed in some form, and either used as construction material on-site or the valuable minerals would leave the lands. The volume of geologic material to be produced and stored is approximately 3.64 mst of tailings; excavating 3.16 million cy of basalt aggregate from the quarry; and using 1,382,000 cy of growth media from the borrow area for reclamation. Because Calico owns the gold and silver on its private lands, mining the roughly 2 mst of gold and silver ore and the 0.3 mst of waste rock, and recovering the roughly 380,370 ounces of gold, and

554,300 ounces of silver from the ore would not be an irretrievable and irreversible effect to federal mineral resources.

3.5.2.3.5. Reasonably Foreseeable Environmental Effects Scenario Analysis

There are no reasonably foreseeable future environmental effects based on Section 3.2, Table 7.

3.6. Range Management and Livestock Grazing

How would the alternatives affect range management/grazing?

3.6.1. Methods and Assumptions

A review of GIS data was used to identify the allotments, pastures and range improvements that intersect with proposed project. This data was used to determine the number of acres, range improvements and Animal Unit Months (AUMs; the amount of forage needed to sustain one cow or its equivalent for a period of one month;43 Code of Federal Regulations [CFR] 4100.0-5), that would be impacted by the proposed project. The degree of effect on range resources was determined by considering the portion of the analysis area that the project would affect compared to the total acreages available for livestock grazing.

3.6.2. Affected Environment

The analysis area for this resource is the PO boundary, approximately 1,655 acres, and includes the access route, transmission line, mine site and associated facilities. There are two allotments that are partly within the PO boundary: Dry Creek and Nyssa (Appendix A, Figure 7.). Additionally, the emergency access route for the mine travels through the Mitchell Butte allotment; however, no disturbance is proposed for the road, and the Proposed Action would not routinely utilize the road; therefore, this allotment is not included in the analysis.

The Dry Creek Allotment comprises 68,252 acres divided into seven pastures, with three pastures and one enclosure within the project boundary totaling 19,628 acres (Table 20). The entire allotment has 5,052 AUMs utilized by two permittees who graze both cattle or sheep. The pastures within the project area have approximately 2,418 AUMs. The season of use to graze sheep is May 1 through May 22, and the season of use to graze cattle is October 1 through March 31, November 1 through February 28, and April 1 through April 30, respectively, for the three pastures within the area of analysis. Existing range improvements in the Dry Creek Allotment include livestock fencing, wells, reservoirs, springs, troughs and cattleguards.

The Nyssa Allotment comprises 67,865 acres divided into twelve pastures. There are four pastures and one enclosure within the area of analysis totaling 48,398 acres. The entire allotment has 5,883 active AUMs with 1,089 suspended AUMs for a total of 6,972 AUMs, used by seven permittees who graze cattle or sheep. The four pastures within the area of analysis have approximately 2,906 AUMs. Cattle grazing occurs between April 1 through October 31. Sheep grazing occurs between April 1 and May 4. Existing range improvements in the Nyssa Allotment include livestock fencing, water pipeline, wells, reservoirs, springs, troughs and cattleguards.

Table 20. Grazing Allotments and Pastures within the PO Boundary

Allotment	Pasture	Acres	AUM*	Acres within PO Boundary	Acres Closed to Grazing	% of Acres closed to Grazing per Pasture	Percentage Acres within the PO Boundary
Dry Creek	Cow Hollow Seeding	1,599	433	13	0	0	0.81%
	Double Mountain	12,640	1985	253	0	0	2%
	Russell FFR	5,386	NA	142	0	0	2.50%
	Little Double Mountain Spring Exclosure (pipeline)	3	NA	1	0	0	33%
	Total	19628	2418	409	0	0	2.08%
Nyssa	Sagebrush	11,877	1139	216	0	0	2%
	Ryefield Seeding	3,720	517	286	145	3.90	8%
	Grassy Seeding	3,035	387	30	30	0.99	1%
	Grassy Mountain (Owyhee Ridge Well, Rye Field Spring, Schweizer Stock Pond)	29,764	863	710	710	2.39	2.50%

Allotment	Pasture	Acres	AUM*	Acres within PO Boundary	Acres Closed to Grazing	% of Acres closed to Grazing per Pasture	Percentage Acres within the PO Boundary
	Owyhee Ridge Trough Enclosure (Owyhee Ridge Trough)	2	NA	2	2	100.00	100%
	Total	48,398	2906	1,244	887	7.27	2.57%

*Based on average actual use

3.6.3. Environmental Consequences

3.6.3.1. No-Action Alternative

Under the No Action Alternative, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time on its valid mining claims. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur. Grazing allotments would continue to be managed in accordance with the current allotment management plans and no changes to AUMs would occur.

3.6.3.2. Proposed Action

Under the Proposed Action, approximately 867 acres of the Nyssa allotment would be fenced off from livestock. Pastures affected by the closure include 709.5 acres of the Grassy Mountain pasture, 144.5 acres of the Ryefield Seeding pasture, 1.8 acres of the Owyhee Ridge Trough enclosure, and 30.1 acres of the Grassy Seeding pasture in the Nyssa Allotment amounting to 1.8% of the allotment. Within the fenced area two troughs, one well, one reservoir, and one spring currently available as water sources for livestock would no longer be available for use and would permanently be removed due to the construction of mining facilities. The closest reliable BLM managed water source available to livestock would be more than two miles from the current sources when these are removed from use causing livestock to travel farther for reliable water.

Approximately 285 permitted AUMs would be directly affected annually by the loss of existing livestock water at the mine and processing site, which is 2.5% of AUMs available in the affected pastures. This would equate to approximately 24% of the available AUMs in the Ryefield Seeding pasture and 18% in the Grassy Mountain pasture within the Nyssa allotment.

Short-terms effects occur beginning with the construction period (two years) through operations (eight years) and include decommissioning of the mine and facilities (four years following the cessation of mining operations) for a total of fourteen years. Long-term effects occur beginning at the conclusion of closure construction and are analyzed for 26 years until final closure. There is potential for long-term adverse effects, 30+ years, on AUMs related to water developments in close proximity to the access route in both the Nyssa and Dry Creek allotments, which would affect up to six grazing permittees depending on the annual rest/rotation schedule. Six additional livestock water sources adjacent to the preferred access route would experience seasonal effects from increased traffic, creating additional dust. Due to increased traffic and dust conditions, livestock are expected to avoid these water sources, resulting in greater demand on remaining water sources in the pastures and overuse of forage in the surrounding areas. Additionally, dust due to increased traffic on the access route would potentially affecting livestock health, leading to issues such as eye irritation and respiratory problems. Moreover, dust accumulation near roadways would diminish plant palatability and water quality for livestock, resulting in adverse, short-term effects, two years during construction and long-term effects, up to 30 years, during operation and reclamation activities. The Proposed Action includes project design features to minimize the effects of fugitive dust emissions by the placement of gravel and water application onto the road. During the hotter summer months, watering of the road to minimize dust is likely to attract livestock to a cooler dust free environment.

The development of the ancillary mining facilities and haul roads within the fenced area would result in approximately 367 acres of ground disturbance on BLM managed lands. Acreage outside of the fenced area would total 121 acres on BLM-administered lands and would be impacted by road improvements, wellfield construction, and powerline construction in both the Nyssa and Dry Creek Allotments. Along the road, there are multiple water wells and a cattle guard. Acreages of impact for each of the pastures that are within the PO boundary , are presented in Table 20, and amount to two percent of the Dry Creek Allotment, 2.6 percent of the Nyssa Allotment, and, in total, 121 acres of proposed disturbance on BLM-administered lands, resulting in a total of 0.2 percent of the acreage in the two allotments having ground disturbing activities. These areas of the Proposed Action are not fenced, and the acreage of disturbance across the two allotments is 0.2 percent of available acreage for grazing, therefore there would be no short or long-term effects due to the loss of available forage.

Four existing cattleguards along the access route are vital in containing livestock and managing grazing resources. These cattleguards would be replaced to accommodate road widening and meet the weight requirements for mine vehicles and equipment. Because the access road improvements would remain after the closure of the mine, the upgraded cattle guards would also remain. All work associated with the removal and installation of cattle guards would occur within the approved road prism and would not require revegetation. There would be no short or long-term effects to livestock grazing due to the replacement of cattleguards to accommodate mining vehicles.

3.6.3.3. Irretrievable and Irreversible Impacts

If the water developments within the mine processing area were not replaced or relocated, there would be an irretrievable and irreversible effect to livestock grazing due to no longer having them available for use by livestock within the Grassy Mountain and Rye Field Seeding pastures of the Nyssa Allotment resulting in permanent loss of AUMs for permittees.

3.6.3.4. Reasonably Foreseeable Environmental Effects

The total project boundary acres of the Grassy Mountain Mine equal approximate 1,655 acres, including both private and BLM administered lands. Within all past, present and reasonably foreseeable actions (PPRFFA) in Table 7, there a total of 29.43 % of overlapping effects from all actions that impact range management and livestock grazing specifically. Approximately 285 permitted AUMs would be directly affected annually by the loss of existing livestock water at the mine and processing site. This would equate to approximately 24% of the available AUMs in the Ryefield Seeding pasture and 18% in the Grassy Mountain pasture within the Nyssa allotment. Project design features (Section 5.3, Appendix C) such as relocating and replacing affected water resources would minimize and reduce these impacts.

3.7. Socioeconomics

Socioeconomics: How would the alternatives affect socioeconomic conditions in Malheur County?

This socioeconomic analysis characterizes the existing social and economic conditions in communities in Malheur County and evaluates how the proposed Project would directly and/or indirectly affect the county's population, housing, employment, demands for public safety, education, and medical services, and other key socioeconomic parameters. The information used to prepare this socioeconomic analysis synthesizes the information that DOGAMI used to evaluate Calico's Consolidated Permit Application (Stantec, 2024.) The DOGAMI socioeconomic evaluation is a compilation of data from the U.S. Census Bureau, the State of Oregon, Malheur County, the cities of Ontario, Nyssa, and Vale (the three largest cities in Malheur County) and other sources. Accept as otherwise noted, the information presented below is based on the DOGAMI's analysis and Stantec 2024.

3.7.1. Affected Environment

The area of socioeconomic analysis includes Malheur County as a whole, the incorporated cities of Ontario, Nyssa, Vale, Adrian, and Jordan Valley, and other unincorporated communities in the county including Juntura, Ironside, Jamieson, Westfall, Harper, Arock, Annex, and Brogan (Appendix A, Figure 8). This socioeconomics area of analysis is defined as the geographical area in which the potential direct and indirect socioeconomic effects of the proposed Project would be realized. The purpose of documenting the socioeconomic setting of the area of analysis is to provide an understanding of the baseline social and economic forces that have shaped the area and to provide a frame of reference against which to estimate the social and economic effects of the proposed Project.

Malheur County is Oregon's second-largest county by area but is mostly rural and undeveloped. The county covers 9,888 square miles and is sparsely settled, with only 3.2 people per square mile. (U.S. Census, 2024). The county is in the southeastern corner of Oregon, bordering Idaho to the east and Nevada to the south, and is crossed by both the Snake River and the Malheur River. Ninety-four percent of the county is undeveloped rangeland, most of which is federally owned and administered by the Vale District Office of the BLM. Developed areas along the

Snake and Malheur rivers support agricultural production areas and agriculture-focused communities. These rivers also provide recreational opportunities.

3.7.1.1. Population and Demographics

Due to the rural nature of the area, less than one percent of the state's total population resides in Malheur County. As of July 2024, the estimated population is 32,315 (U.S. census) with the city of Ontario being the main population center. The population growth rate of Malheur County is expected to increase between 0.7 and 0.8 percent during the duration of the Project, amounting to roughly 255 projected new county residents per year (Stantec 2024).

According to the U.S. Census Bureau (2023a), the average household in Malheur County is comprised of 2.82 people consisting of two adults and 0.82 children per household. Compared to the Oregon state average, Malheur County has more residents under 18, a similar percentage of people over 65, and a smaller proportion of females. Median household incomes and home values are significantly lower than the state average. Educational attainment in Malheur County is also below the state average, with 81 percent having a high school diploma, compared to the state average of 92 percent, and 15 percent holding a bachelor's degree or higher compared to the 35 percent of Oregon residence who have Bachelor's or higher degrees.

While most residents speak English at home, 26 percent speak a foreign language—mostly Spanish. Table 21 shows the U.S. Census Bureau's demographic statistics for ethnicity and race in Malheur County compared to Oregon.

Table 21. Race, Ethnicity and Minority Communities

Demographic	Malheur County (%)	Oregon (%)
Total population (2022)	31,879	4,240,137
White alone	91.90	85.90
Black or African American alone	1.70	2.30
American Indian and Native Alaskan alone	2.00	1.90
Asian alone	1.40	5.10
Native Hawaiian and other Pacific Islander alone	0.20	0.50
Two or more races	2.80	4.30
Hispanic or Latino	35.50	14.40
White alone, not Hispanic or Latino	59.20	73.50
Foreign born	9.8	9.8

Sources: U.S. Census Bureau 2023a, 2023b, 2023c

3.7.1.2. Housing

Malheur County has approximately 11,649 housing units, with an 89 percent occupancy rate. In 2023, there were 46 homes for sale in Ontario, Nyssa, and Vale and 130 homes for rent in these same cities. (Headwater Economics, 2023). According to Zillow, in June 2025, there were 195 homes for sale in the county.

Most housing was built between 1960 and 1979, reflecting a decline in new construction since. Single-family homes make up 63 percent of housing, multi-family units'18 percent, and mobile homes 16 percent. Affordable housing is managed by the Housing Authority, which has 183 units.

Approximately 40 percent of households moved to their current home between 2010-2017, and 25 percent since 2018. Median home value in Malheur County is $187,500, which is much lower than median home value throughout the state of $423,100. Median rent in Malheur County is $761, which is lower than the $1,373 statewide median rent. Most Malheur County pay between $500 and $999 monthly, compared to $1,000–$1,499 statewide. Malheur County households spend less of their income on housing than the state average:

- 46 percent spend less than 20 percent of their income on housing (vs. 41 percent statewide)
- 20 percent spend 20–29 percent (vs. 23 percent statewide)
- 27 percent spend 30 percent or more (vs. 33 percent statewide).

3.7.1.3. Employment

In 2022, the U.S. Census Bureau estimated that the total labor force (people aged 16 years and older and able to work) in Malheur County was approximately 12,415 people. Unemployment has been steadily declining for the last 10 years in Malheur County, with a minor increase in 2020. In 2022, Malheur County's unemployment rate was 6.2 percent, slightly higher than the state’s unemployment rate of 5.5 percent.

The Oregon Employment Department (OED) industry employment projections for 2022 to 2032 forecast growth in construction, educational and health services, and local government. The trends show reductions in information services and federal government jobs (OED 2023).
In 2021, there were roughly 17,600 jobs in Malheur County compared to 18,100 in 2000, and 17,200 in 2010. Although there were some mining jobs in the past (18 in the 1970s, 64 in the 1980s, and 75 in the 1990s), since then there has not been any employment in the mining sector in Malheur County. In 2021 the following Malheur County employment sectors employed more than 500 people: services related, non-services related, government, retail trade, farm, healthcare and social assistance, manufacturing (including forest products), accommodation and food services, services, wholesale trade, and real estate rental and leasing

Malheur County’s largest employer is Ore-Ida, which is a potato-based frozen foods distributor located in Ontario that employs about 1,000 workers. The county’s second-largest employer is the Oregon Snake River Correctional Institution, which is the largest facility in the Oregon Department of Corrections and employs 900 people (McConnell et al. 2015).

3.7.1.4. Income and Poverty

Malheur County is an economically depressed part of Oregon. In 2021, it had the highest poverty rate (20.0 percent) in Oregon. By comparison, the 2021 poverty rate in Oregon was 12.1 percent and the national poverty rate was 11.5 percent (Stantec 2024). The most common racial or ethnic group living below the poverty line in Malheur County is white (Data USA 2023). The U.S. Census Bureau’s Quick Facts website shows that in 2023, the county poverty rate declined slightly to 19.7 percent.

The 2021 median household income in Malheur County was $47,906 compared to $70,084 in the state of Oregon and $69,021 nationwide. (Stantec 2024). Agriculture, forestry, fishing, and hunting; retail trade; and manufacturing are the most common occupations for Malheur County residents (Data USA 2023). In 2022, the highest median earnings by industry in the analysis area were in professional, scientific, and technical services and public administration. Approximately 24 percent of residents earn $1,250 or less monthly, 41 percent earn $1,251–$3,333 per month, and 36 percent earn more than $3,333 monthly.

3.7.1.5. Social Activities and Culture

The Malheur County Fair and Rodeo, originating as the Ontario Corn Festival in 1909, is a significant event in the Pacific Northwest with about 20,000 annual attendees. It celebrates the area's agricultural and cultural heritage. Outside of the fair, community events mainly occur in Ontario, including festivals like the America's Global Village Festival and the Japanese American Obon Festival.

Recreation in Malheur County includes off-highway vehicle use, camping, hiking, hunting, wildlife viewing, and rockhounding. Parks and reservoirs—like Bully Creek Park, Beulah Reservoir, and Malheur Reservoir—offer camping, boating, and fishing. Lake Owyhee State Park, near the Project area, provides camping and boating with two campgrounds along the 53-mile-long Owyhee Reservoir.

The closest recreational site to the proposed Project is Twin Springs Campground, three miles from the site and accessible via BLM-managed Twin Springs Road, which is also used by hunters during hunting season.

3.7.1.6. Public Safety

3.7.1.6.1. Law Enforcement

The Malheur County Sheriff's Office (MCSO) is the primary provider of law enforcement services to residents of Malheur County. The MCSO includes the following divisions: 9-1-1 Dispatch; Civil; Criminal; Emergency Management; Jail; Parole and Probation; and Search & Rescue. The Criminal Division comprises the Patrol, Marine, Sheriff's Emergency Response Team, and Investigations units. The Sheriff Patrol unit is divided into the Southern District (two deputies), the North District (four deputies), and the Vale District (three deputies). The Patrol contracts with the City of Vale to provide law enforcement services in the Vale District. The Marine unit patrols approximately 57 square miles of waterways in Malheur County.
The Ontario Police Department and the Nyssa Police Department also provide law enforcement services to residents in those jurisdictions. The Oregon State Police (OSP) enforces traffic laws on state roadways, investigates and solves crime, conducts post-mortem examinations and forensic analyses, and provides background checks and law enforcement data. The OSP also regulates gaming, the handling of hazardous materials, educates the public on fire safety, and enforces fish, wildlife, and natural resource laws.

3.7.1.6.2. *Fire Protection*

There are eight fire departments located in the most populated areas in Malheur County (Malheur County 2023b). The BLM Oregon and Washington Fire Program is responsible for fire suppression, treatment of hazardous fuels, fire prevention, fire investigation, and fire rehabilitation on BLM-managed public lands in Malheur County (BLM 2023).

3.7.1.6.3. *Emergency Medical Services*

The Malheur County Sheriff Emergency Management Division provides emergency dispatch services in the county. Malheur County is served by the St. Alphonsus Medical Center, a 49-bed, acute care, not-for-profit hospital in Ontario.

3.7.1.6.4. *Community Facilities and Services*

3.7.1.6.4.1. *Healthcare*

The St. Alphonsus Medical Center in Ontario, which is the main provider of healthcare services, is a 49-bed, acute care, not-for-profit hospital, serving Ontario and the surrounding communities in eastern Oregon and southwestern Idaho. Other healthcare providers in the county include Valley Family Health Care, Planned Parenthood – Ontario Health Center, Treasure Valley Women's Clinic, Physician's Primary Care Center, and Malheur Memorial Health Clinic.

3.7.1.6.4.2. *Education*

The Malheur County Education Service District (ESD) provides supporting infrastructure to local school districts within its boundaries. The ESD includes seven school districts in the study area, with 309 teachers and 5,325 students (Oregon Department of Education 2023). The school districts in Malheur County include Nyssa, Adrian, Ontario, Harper, Vale, Jordan Valley, and Four Rivers Community School. Ontario school district is the largest district in Malheur County, followed by Nyssa, and Vale. There are two elementary schools in Vale, one middle school and one high school. (Vale School District, 2025). Ontario has two elementary schools, two middle schools, and one high school. Nyssa has an elementary school, a middle school, a high school and a virtual K-8 school (Nyssa School District, 2025). Adrian Elementary School is approximately 16 miles from the Permit Area and is the closest school to the Project. The Treasure Valley Community College is the only post-secondary education option in Malheur County and provides a public 2-year education.

3.7.1.6.4.3. *County Finances*

For the Fiscal Year that ended on June 30, 2022 (FY 2022), Malheur County had total revenues of $31,973,976 and total expenditures of $27,993,497. Malheur County's primary source of revenue is intergovernmental transfers ($17,239,979). Those intergovernmental funds consist of the general fund ($4,980,311), road fund (3,869,271), American Rescue Plan ($2,969,029), mental health ($3,568,168), and other funds ($1,853,200). Additional sources of revenue include property taxes, followed by grants and charges for services. Malheur County's areas of expenditures include general government, social services, public safety, community services, roads, and other expenses. (Malheur County 2023a).

3.7.2. Environmental Effects

This section discusses project-related effects on socioeconomic characteristics of the area, focusing on the direct, indirect, and induced jobs created during construction and operations, tax revenues generated during project construction and operation. This analysis also examines how the 198 anticipated new jobs and the resulting increase in population would affect the demand for housing and public services including schools, emergency services, medical services, and law enforcement. Unless otherwise noted, this analysis is based on Stantec, 2024

3.7.2.1. Analysis Method

This analysis considers the potential direct, indirect, and induced socioeconomic effects from implementing the Proposed Action and examines the effects on general socioeconomic conditions in the analysis area and on specific socioeconomic parameters potentially affected by the Project. The analysis presents the results of economic impact modeling using the IMPLAN software that was performed for Malheur County (IMPLAN, 2023) and available information for Malheur County including population, unemployment, income statistics, school districts, housing, law enforcement, and medical services. The methodologies used and the assumptions made are described in the sections below.

3.7.2.2. No-Action Alternative

Under the No-Action Alternative, the BLM would not approve the PO to build and operate any of the mine support facilities on BLM administered lands or issue the ROWs for the access road and power line. Consequently, no direct, indirect or induced jobs would be created, and the State and local governments would not receive any of the tax revenue benefits anticipated from the project. The loss of jobs and tax revenue associated with the No Action Alternative would be a negative environmental effect of not implementing the Proposed Action. Forty-five mining professionals would not relocate to Malheur County if BLM were to select the No Action Alternative, so there would be no increased demand for housing or public services or an increase in school enrollment. Because the Proposed Action is not anticipated to create adverse RFEE to these socioeconomic parameters (see Section 3.13.2.3), maintaining the socioeconomic status quo under the No Action Alternative would be a negative effect due to the lost opportunity to benefit from the economic output resulting from the 198 jobs and the tax revenues generated by the Proposed Action.

3.7.2.3. Proposed Action

3.7.2.3.1. Employment and Economic Activity

Under the Proposed Action, approximately 100 to 120 new workers would be directly employed, which would reduce the county's unemployment rate for the duration of the construction and operating phases of the Project. The Project workforce would include mine operators, process plant operators, administrative personnel, security staff, parking attendants, and health, safety, and environmental compliance personnel. Malheur County residents would be hired for as many mining and milling jobs as possible, with limited hiring from outside the area to supply the necessary mining, mineral processing, and other technical expertise to augment the experience of the local workforce. Because there are no mining jobs currently in Malheur County, Calico anticipates that it would need to hire an estimated 45 skilled mining professionals from outside Malheur County who would relocate to the county.

Based on the current estimated Malheur County labor force of 12,415 people and an unemployment rate of 6.2 percent, it is assumed that approximately 770 people would be available in the local workforce to satisfy a portion of the Project's workforce demand. With Calico's plan to preferentially hire and train county residents whenever possible, no adverse effects due to a shortage of workers are anticipated.

Stantec, 2024 describes the results of Malheur County' economic impact modeling using the IMPLAN software to determine the projected direct, indirect, and induced employment and economic impacts. The IMPLAN model used an input of 112 new Project workers. Since there is no local mining industry, the IMPLAN model used data averages for U.S. gold mining industry workers as a proxy to model the direct, indirect, and induced effects from changes in spending in Malheur County associated with the Project (IMPLAN 2023). In addition to the 112 direct jobs associated with the project, the IMPLAN model shows the Project would create 52 indirect and 34 induced jobs, for a total of 198 new jobs (Table 22). Examples of indirect employment include jobs at hotels and restaurants. Induced employment would be jobs in retail, services, and the local government. It is anticipated that both the indirect and induced jobs would be hired from the local workforce. Roughly 45 jobs (40 percent of the direct jobs) would be filled with mining professionals currently living outside of Malheur County.

The proposed Project is aligned with several elements of the "Malheur County: Poverty to Prosperity" grassroots initiative, which outlines a five-point economic development strategy for Malheur County consisting of the following elements: 1) building a career technical education school; 2) expanding industrial land; 3) using natural resources; 4) retaining local business; and 5) expanding the agriculture trade sector.

Calico would hire local contractors and purchase local goods and services where practicable, and to provide mine-worker job training to local hires to provide them with the knowledge and skills needed to work at the Project. Calico would enter into partnerships with local community colleges and vocational schools, including Treasure Valley Community College in Ontario, Eastern Oregon University in LaGrande, and the College of Western Idaho in Boise to establish the necessary worker training programs. (Calico 2022, Stantec 2024).

As shown in Table 22, the Proposed Action would have a significant positive effect on employment and the local economy. Comparing Malheur County's revenues and expenditures for FY 2022 of $31,973,976 and total $27,993,497 respectively creates a context for assessing the relative importance of the economic benefits the Project would create. The Project's total economic activity and employment benefit of $142,641,829 is roughly 4.5 times the revenue Malheur County collected in FY 2022.

The positive employment effects would consist of a combination of labor income, value added, and output impact. The labor income impact is the direct employee payroll consisting of the wages paid to project employees. The value-added impact is the increase in the county's gross domestic product from the production of extra goods and services. The output impact is the economic value of mining the minerals.

Table 22. Project Impacts to Employment and Economic Activity

Impact	Employment	Labor Income	Value Added	Output	Total
Direct	112	$12,906,486	$34,109,965	$70,204,305	$117,220,756
Indirect	52	$2,485,244	$4,424,720	$10,036,997	$16,946,961
Induced	34	$1,393,030	$2,523,800	$4,557,262	$8,474,112
Totals	198	$16,784,760	$41,058,485	$84,798,584	$142,641,829

Source: Stantec 2024

3.7.2.3.2. Public Revenue

Stantec (2024) presents the results of IMPLAN software modeling of the public revenues that the Project would generate. Table 23shows the direct, indirect, and induced estimated revenues attributable to the Project. Direct revenues would consist of property taxes on the mine (which is located on private land), government charges for services, and taxes on the mineral output. Indirect revenues would consist of the income and sales taxes that the project workforce would pay. Induced impacts would be created by the economic multiplier effects including increased retail activities from the 45 new households who would relocate to Malheur County and the resulting benefits to local services companies. The Grassy Mountain Project Feasibility Study (Ausenco, 2022) determined the Project would pay $30.9 million in state and federal taxes. The projected tax revenues would be a positive RREE that would benefit local and state governments.

Table 23. Taxes Generated by the Proposed Project

Impact	Sub-County General	Sub-County Special Districts	County	State	Federal	Total
Direct	$576,440	$1,249,794	$446,973	$2,361,640	$2,403,106	$7,037,953
Indirect	$147,586	$319,986	$114,439	$544,281	$341,544	$1,467,836
Induced	$29,947	$64,928	$23,221	$145,636	$258,341	$522,073
Total	$753,973	$1,634,708	$584,633	$3,051,557	$3,002,991	$9,027,862

3.7.2.3.3. Population and Demographics

To determine the projected population growth due to the 45 new jobs that are anticipated to be imported from outside of Malheur County, it was assumed that each of the 45 relocated employees would establish households consisting of 2.82 people (matching the average for Malheur County households) resulting in a net increase in population of 127 people. The addition of 127 people into the county would represent roughly a 0.4 percent increase in the counties' population based on the 2022 population of 31,879 people. It is assumed that most of the incoming project workforce would live in Ontario, Nyssa, and Vale – the three largest cities in Malheur County. This increase in population, which would be dispersed in the three cities and potentially elsewhere throughout the county, would have a negligible effect on population levels in the county and in the affected cities.

3.7.2.3.4. Housing

Assuming an 89 percent occupancy rate for the 11,649 housing units in Malheur County, approximately 1,280 houses could be available for workforce housing. Some of the available houses would be homes for sale (195 per Zillow, 2025); some would be available as rental properties (130 per Headwater Economics, 2023). The incoming households would likely occupy some of the rental and for-sale homes. Based on the number of housing units, rental properties and homes for sale, the Project is not anticipated to create a significant or adverse RFEE on housing availability or housing demand in the local market.

3.7.2.3.5. Public Services

The 45 new workers who are projected to relocate to Malheur County would create demands for public services, such as healthcare and emergency medical support. If users pay a fee for services, the increased demand would be beneficial unless the magnitude of the increased demand places a strain on the service providers. When services are provided without use fees, the increase in demand would be adverse.

Malheur County's population would increase by 0.4 percent due to the 45 workers who are anticipated to relocate to the county. This very low percentage change in Malheur County's population due to the incoming workforce is expected to create a minor increased demand for public services during the 10-year life of the mine.

3.7.2.3.6. Education

It is assumed that the 45 new households that would relocate to Malheur County would each have 0.82 children (the average number of children per household in Malheur County), representing an increase of 37 students who would need schooling. These 37 new students would increase the existing 5,325 student population in Malheur County by 0.7 percent.

Assuming that all of the incoming school-age children would attend public schools in the county (rather than being home-schooled), they would most likely attend the elementary, middle, and high schools in Ontario, Nyssa, and Vale. Because the incoming students would be dispersed between the three communities' schools, and the students would attend classes distributed throughout the K-12 school system, the Malheur County Education Service District, which includes the K-12 schools in Ontario, Nyssa, and Vale, is anticipated to be able to absorb the small increase in student enrollment with little potential for a disproportionate impact to individual class sizes. Consequently, the RFEE to education are anticipated to be minor and last for approximately ten years during the construction and operation phases of the Project.

3.7.2.3.7. Irretrievable and Irreversible Impacts

The Project's effects on the socioeconomic conditions in Malheur County would occur during project construction and operation and are anticipated to last for about ten years. None of the anticipated impacts would affect federal resources. Therefore, no irretrievable or irreversible commitments of federal resources are anticipated from the Proposed Action.

3.7.2.3.8. Reasonably Foreseeable Environmental Effects Scenario Analysis

There are no reasonably foreseeable future environmental effects based on Section 3.2, Table 7.

3.8. Soil

How does the project affect soil disturbances and erosion?

3.8.1. Affected Environment

The area of analysis for soils consists of the entire Permit Area (i.e., the Mine and Process Area and the Access Road Area). The Proposed Action area consists of several drainages bounded on the east and west by bedrock ridges. The underlying bedrock is made up of a range of volcanic basalt and tuffs to sedimentary conglomerates, sandstones, and siltstones. Soil found on the ridges typically are found to measure less than 30 inches in depth and contains a significant amount of rock fragments throughout the profile. These soils were formed from the underlying bedrock, which generally consists of conglomerate sandstone and basalt. Soils located in the valleys consist predominantly of alluvium, loess (wind-blown silt), and eolian (wind-blown sand) Series (Abrams 2018).

A total of 17 soil map units were identified from the various soil surveys conducted for the Proposed Action (Abrams 2018). The map unit descriptions are presented in Table 24 and shown in Appendix A, Figure 9. Each map unit description provides basic information, including predominant soil(s), reclamation suitability, limitations, recommended salvage depth, wind erodibility group (WEG), and K-factor. The susceptibility of soil to erosion by water is represented by the soil K-factor, and erodibility by wind is represented by the WEG. The wind and water erosion potential for each soil type is presented in Table 24. Wind erosion potential ranges from WEG three (higher wind erosion potential) to eight (lower wind erosion potential), and water erosion potential ranges from a K-factor of 0.07 (low water erosion potential) to 0.61 (high water erosion potential).

The soils in the Mine and Process Area of the Proposed Action are susceptible to wind erosion due to the high content of silt and very fine sand. However, high rock fragment content within the soil significantly reduces the K-factor of each unit (Abrams 2018). In all locations where mining and processing occur, suitable topsoil would be removed and stockpiled for reclamation. Laboratory analysis results indicated that the topsoil collected near the Mine and Process Area contains a higher clay content and is shallower in the soil profile, thus falling in the "marginally suitable" category, indicating that the topsoil for the Proposed Action is suitable for reclamation. The main reclamation limitation is surficial and subsurface coarse fragments encountered on ridge sides, summits, and steep slopes (Abrams 2018). Drewsey and Owsel soils, occurring on valley floors, exhibited marginal limitations for reclamation due to pH level and/or soil erodibility, and Nyssa soil exhibited unsuitable subsurface soil horizons that are cemented and show increased sodium and carbonate levels (Abrams 2018).

Table 24. Soil Map Unit Descriptions for the Soils Study Area

Map Unit	Name and Description	Reclamation Suitability	Limitations	Recommended Salvage Depth (feet)	WEG Value (1 to 8)	K-Factor (0.00 to 0.70)
1	Farmell-Rock outcrop complex, 8 to 30 percent slopes	Unsuitable	Surficial rock	0	8	0.10
2	Farmell-Chardoton very cobbly soil, 15 to 30 percent slopes	Marginal	Surficial rock	0.5	8	0.10 to 0.13
3	Farmell-Chardoton very cobbly soil, 4 to 15 percent slopes	Unsuitable	Surficial rock	0 to 0.5	8	0.10 to 0.13
4	Farmell-Chardoton extremely stony soil, 4 to 15 percent slopes	Unsuitable	Surficial rock	0	8	0.10 to 0.13
5	Farmell-Chardoton soil, 8 to 15 percent slopes	Marginal	Surficial rock	0 to 0.5	8	0.10 to 0.13
6	Ruckles very stony loam, 8 to 30 percent slopes	Marginal	Surficial rock, Depth to bedrock	0.5	8	0.10
7	Shano silt loam, 2 to 6 percent slopes	Good	None listed	2.0 to 2.5	5	0.37
8	Soil A extremely gravelly sandy loam, 15 to 30 percent slopes	Unsuitable	Surficial rock	0	8	0.07
9	Virtue loam, 2 to 8 percent slopes	Good	Depth to hardpan	2.0	5	0.16
10	Xeric Torriorthents, 8 to 30 percent slopes	Unsuitable	Depth to bedrock, slope	0	Unknown	Unknown
11	Soil B very gravelly sandy loam, 8 to 30 percent slopes	Unsuitable	Rock fragments	0	8	0.07
12	Nyssa silt loam, 2 to 6 percent slopes	Marginal	Soil erodibility	0.5	5	0.61
13	Drewsey very fine sandy loam, 2 to 6 percent slopes	Marginal	pH	2.5	3	0.34
14	Ruclick cobbly loam, 4 to 15 percent slopes	Marginal	Surficial rock	0.5	8	0.37
15	Drewsey-Quincy-Solarview complex, 8 to 30 percent slopes	Marginal	pH, Texture	0.5 to 2.5	3	0.34
16	Owsel silt loam, 2 to 6 percent slopes	Marginal	Soil erodibility	0.5 to 2.0	5	0.46

Map Unit	Name and Description	Reclamation Suitability	Limitations	Recommended Salvage Depth (feet)	WEG Value (1 to 8)	K-Factor (0.00 to 0.70)
17	Powder silt loam, 0 to 3 percent slopes	Good	None listed	2.5	5	0.52

Notes: WEG = Wind Erodibility Group; values range from 1 to 8, with lower values indicating greater susceptibility to wind erosion. K-factor = Soil Erodibility Factor; values range from 0.00 to 0.70 with higher factors indicating greater susceptibility to water erosion.
Source: Abrams 2018

3.8.2. Environmental Consequences

3.8.2.1. Analysis Method

The analysis in this section addresses the acreage of effects on soils, general erodibility of soils, potential feasibility of soil salvage, use as a reclamation growth medium for revegetation, and potential for soil contamination. The analysis method evaluates the impacts on soil, specifically focusing on several key areas: soil acreage effects, general soil erodibility, the feasibility of soil salvage, its potential as a reclamation growth medium, and the risk of contamination. This analysis utilizes existing project-specific data and integrates the best available science from resources like the Bureau of Land Management (BLM) and publicly available data from the State of Oregon.

Spatial indicators, particularly acreage, help assess the extent of these effects. Temporary impacts are quantified by examining how they relate to the operational schedule. Short-term effects are studied over a 2.5-year period, covering pre-operation construction through to decommissioning, which lasts a total of 14.5 years. In contrast, long-term effects are analyzed for 26 years, beginning the year after decommissioning is completed. The analysis area encompasses the Mine and Process Area, along with the Project Access Area, totaling approximately 1,654.91 acres. The degree of impact on soil resources is assessed by comparing the affected portion of the analysis area to the overall land available for recreation.

3.8.2.2. No-Action Alternative

Under the No Action Alternative, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time on its valid mining claims. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur. Existing land use and types of activities in the general area would continue at existing levels. Twin Springs Road, which leads to the Twin Springs Campground, would not be subject to upgrades, widening, or culvert installation, and current road conditions and use would continue.

3.8.2.3. Proposed Action

Under the Proposed Action, short and long-term effects include surface disturbance of approximately 488 acres of soil (469 acres of public land and 19 acres of private land), which would increase erodibility of soils due to vegetation removal, salvage of the growth media, blading, and general earthworks during construction, operations, and closure of mine components.

During operations, effects would be minimized through measures to reduce wind and water erosion on growth media stockpiles until reuse. Growth media in stockpiles for one or more planting seasons would be seeded with an interim BLM approved seed mix to stabilize the material to reduce erosion and minimize establishment of undesirable weeds (Calico 2023).

Applicant-committed measures to reduce and minimize wind and water erosion of growth media stockpiles include contouring surfaces with slopes with a horizontal to vertical ratio no steeper than 2.5H:1V and vegetating with a seed mix. Seed mixes are identified in the Reclamation Plan as Basins, Low Hills, Uplands, and Riparian or Custom (Calico 2023). Stormwater diversion berms would be constructed around the growth media stockpiles, as needed, to prevent erosion from overland run-off, while sediment run-off would be contained through the use of silt fences, geotextile fabric, or staked weed-free straw bales. Sediment retention basins would also be installed to reduce soil movement on site and minimize off-site effects. Soil collected in these structures would be periodically removed and placed in growth medium stockpiles for future use during reclamation. Project Design features will follow the standards laid out in OAR 632-030-0027. Soil erosion, as a result of the Proposed Action, is expected to be short-term.

The effect of removing native soil causes the mixing of soil horizons that would result in the degradation or loss of soil function. BLM requires the soil horizons to be separated and replaced in order, where feasible (BLM 2023). The disturbance of this soil and long-term storage in stockpiles would affect soil productivity by altering its permeability, structure, and microbial activity. Long-term effects would include the dispersion and mobilization of soils via wind and water erosion. Calico proposes to manage surface soils and alluvium as a growth media resource to be replaced during reclamation, add soil amendments during reclamation for soil placed on reclaimed surfaces to enhance vegetation establishment, and conduct post-closure monitoring (Calico 2022b, 2023). With these measures in place, effects to soil erodibility and function would be minimized over the long-term.

During closure and reclamation, disturbed areas would be regraded and recontoured to provide long-term stability, mimic adjacent landforms, facilitate revegetation, control drainage, and minimize soil erosion. Where practicable, the natural pre-mining drainage patterns would be re-established. Where the post-closure landform does not allow for reestablishing pre-mining drainage patterns, drainage would be engineered to complement natural drainage (Calico 2023). Effects due to reclamation are long-term rather than permanent, as soil function and productivity are anticipated to return after reclamation is completed and established (Calico 2022b).

Spills or leaks of chemicals during transportation, storage, and use would have adverse effects to soils by contamination. The facility would have a Spill Prevention, Control, and Countermeasures Plan (SPCC) in place, which requires inspections of oil storage tanks, piping, and secondary containment areas regularly (Calico 2021a). In addition, the *Grassy Toxic and Hazardous Substances Transportation and Storage Plan* (Calico 2021b) identifies specific hazardous and toxic substances proposed for the project and reporting procedures in the event of an incident during transportation of hazardous or toxic substances. In the event that site soils become contaminated with petroleum products due to accidental spills or other activity, the soils would be handled as described in the *Grassy Mountain Mine Project Petroleum-Contaminated Soils Management Plan* (Calico 2022a) and the *Emergency Response Plan* (Calico 2021a). Calico would collect and transport petroleum-contaminated soils to a licensed off-site disposal facility.

3.8.2.4. Irretrievable and Irreversible Impacts

Mine construction and operations that occur on previously undisturbed soil would create an irretrievable impact to the existing soil structure and functions. There is also potential for water erosion, all of which would last until soil is stabilized, reclaimed, and begins the natural process to form a new structure. Topsoil would be salvaged, reclaimed, and reapplied to limit loss of topsoil through water erosion. With successful reclamation, these irretrievable impacts would not be permanent or irreversible. There is potential for irreversible impacts to net soil loss from wind erosion because once soil is lost from the site, it would not be returned to the site. However, this loss would be minimized throughout the construction and operations phases of the Project. In regard to disturbance caused by underground infrastructure and utilities, soil properties would be reclaimed faster than for disturbance caused by aboveground facilities, as once the infrastructure is constructed and buried, restoration would be conducted to reestablish natural contours, replace salvaged native topsoil, and revegetate the disturbed area.

3.8.2.5. Reasonably Foreseeable Environmental Effects Scenario Analysis

There are no reasonably foreseeable future environmental effects based on Section 3.2, Table 7.

3.9. Transportation and Access Roads

How does the project affect transportation and access routes within Malheur County and BLM managed roads?

3.9.1. Affected Environment

The area of analysis for transportation and access is the Mine and Process Plant Area, Project Access Area boundary, and the main transportation routes and access roads on which materials and mine personnel would be transported (Appendix A, Figure 2.). This includes Malheur County roads, Bureau of Land Management (BLM) roads, state highway and an Oregon state route.

Access to the proposed Project would be on existing roads that begin at the intersection of U.S. Highway 20 (US 20) and Russell Road. Project access would be gained by going south on Russell Road for 2.75 miles, south on Cow Hollow Road for 4.05 miles, and south on Twin Springs Road for 13.46 miles until reaching the Project area (Appendix A, Figure 3.). An emergency access route would be located on a portion of Oregon Route 201 (OR 201) and county-owned Mitchell Butte Road and Owyhee Avenue (Appendix A, Figure 3.). Mitchell Butte Road is an unpaved county-owned and maintained road, seven miles of which is located on BLM-administered land. Owyhee Avenue is also a county-owned and maintained road and is part of the main access to Owyhee Reservoir.

Oregon Department of Transportation (ODOT) traffic count data from 2015 show that average annual daily traffic (AADT) counts for US 20 and U.S. Highway 26 (US 26) through Vale range between 2,501 and 5,000 vehicles (EM Strategies 2018; Calico 2022-Appendix B18b). The volume decreases east and west of Vale, ranging between 1,001 to 2,500 vehicles. An ODOT traffic counter located west of the point where the main access route intersects US 20 showed an AADT of approximately 1,900 in 2015 (ODOT 2017).

In coordination with the Malheur County surveyor, traffic counts were taken at two locations in the analysis area in fall 2014 and again in spring 2015 to record existing two-way road and trail usage on Russell Road and Twin Springs Road (EM Strategies 2018; Calico 2022-Appendix B18b). The traffic counters do not reliably record lighter vehicles, like all-terrain vehicles and dirt bikes, so the data reflects only full-sized vehicles. Table 25 summarizes the data collected.

Table 25. Traffic Count Data on the Proposed Access Route

Counter No.	Location	X coordinate	Y coordinate	Date Gathering Start Date	Data Gathering End Date	Total Recorded Vehicles
1	Russell Road (Fall 2014)	475475	4862111	9/21/14	10/22/14	2,591
	Russell Road (Spring 2015)			4/7/15	4/16/15	413
2	Twin Springs Road (Fall 2014)	471910	4840599	9/21/14	10/22/14	564
	Twin Springs Road (Spring 2015)			4/7/15	4/16/15	27

Source: HDR 2015

Russell Road experiences seasonal changes with farm work and farm-to-market traffic, especially during the fall harvest, since it is a primary access route to irrigated farmland. Twin Springs Road also showed higher use in the fall; however, more usage occurs in the summer when recreationists travel down Twin Springs Road to Twin Springs Campground or Owyhee Lake State Park, as well as for hunters during hunting seasons. Winter use by farm and recreational traffic is low both on Russell Road and Twin Springs Road.

3.9.2. Environmental Consequences

3.9.2.1. Analysis Methods

The indicator used to analyze the effects of the Proposed Action is the percentage increase of vehicle trips per day that would occur on the existing road. The analysis includes operational trips that would occur on the existing public road. Non-motorized travel is not considered. Short-term effects would occur through Phase 1 & 2 (construction and mine operations). Long-term effects would occur through in Phase 3 & 4 (reclamation and post-closure monitoring) (Table 8).

3.9.2.2. No-Action Alternative

Under the No Action Alternative, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time on its valid mining claims. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur. Roads would not be upgraded or improved. Vehicle usage of the area would remain at currently levels. Therefore, no effects to transportation would occur under the No-Action Alternative.

3.9.2.3. Proposed Action

The first two years of the Proposed Action would include the construction of facilities. The pre-production phase would include the bulk of the earthwork, site facility construction, pre-production mining, road improvements, and existing powerline upgrading and new powerline installation along the mine access road. Construction traffic would include heavy equipment and semi-trucks, pickup trucks, crew buses, and other light vehicles. During this time, there would traffic delays, causing a short-term direct effect to traffic while the access road is widened and realigned and while equipment is delivered to the mine site.

During mine operations, employees would be required to use a shuttle bus when regularly commuting to the mine; a range of eight to 31 vehicles would be traveling roundtrip to the site on a daily basis, including employee personal vehicles, delivery vehicles include semi-trucks delivering materials???, and other authorized vehicles from off-site (Calico 2022). Mine Development Associates (MDA) estimated the total amount of mine traffic (Table 26).

Table 26. Total Mine Traffic Estimate

Trips	Round Trips Per Day							
	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total/Week
Process Personnel	4	5	5	5	5	5	4	33
Mining Personnel	-	10	10	10	10	-	-	40
Administrative Personnel	2	9	9	9	9	7	2	47
Consumables & Other	2	7	3	6	3	6	2	29
Total Route Trips	**8**	**31**	**27**	**30**	**27**	**18**	**8**	**149**
Total One-Way Trips	**16**	**62**	**54**	**60**	**54**	**36**	**16**	**298**

Source: Adapted from Mine Development Associates 2018

Based on the trips estimated in Table 26, average weekday trips are estimated at 53.2, average weekend trips are estimated at 16 per day, and average full week trips are estimated at 42.3 (Mine Development Associates 2018).
Assuming total recorded vehicles in Table 25, is equivalent to round trips, using the one-month fall 2014 traffic count data in Table 25, the Proposed Action would increase vehicles on Russell Road by approximately 6.5 percent and on Twin Springs Road by approximately 30.0 percent over the course of a fall month.[12]

[12] **Russel Road:** Ave. mine weekly trips 42.3 x 4 = 169.2 monthly trips + 2,591 non-mine trips = 2,760.2 monthly trips, Percent increase = 169.2/2591 = 0.065 x 100 = 6.5%

Similarly, assuming total recorded vehicles in Table 25, is equivalent to round trips, using the one-week spring 2015 traffic count data in Table 25, the Proposed Action would increase vehicles on Russel Road by approximately 10 percent and on Twin Springs Road by approximately 157 percent over the course of a spring week.[13]

Calico would conduct seasonal road maintenance, including grading with dust suppression in the summer months and snow removal (i.e., plowing) in the winter months, and year-round road maintenance during construction, operation, and closure (Calico 2022). Continued maintenance of and improvements to the access road would reduce the effects from increased traffic by maintaining the designed condition of the roadbed. The proposed 35 miles-per-hour speed limit would enhance public safety, help protect wildlife and livestock and minimize dust emissions. The Proposed Action would have direct, short-term effects to transportation due to increased traffic during operations. No traffic data are available during reclamation and post-closure monitoring, so long-term effects to transportation due to traffic are unknown. However, Cow Hollow Road and Twin Springs Road improvements would not be reclaimed, which would have direct, long-term beneficial effects to recreation and hunting access.

3.9.2.4. Irretrievable and Irreversible Impacts

Irreversible, beneficial effects to recreation and hunting access would occur, as the Cow Hollow Road and Twin Springs Road, including improvements and upgrades, would be transferred to Malheur County and would not be reclaimed (Calico 2023). It is assumed that Malheur County would not reclaim roads, so those impacts would also be irretrievable. The portion of the mine access road along Twin Springs Road would be reclaimed from a two-way gravel road to a one-way primitive road during closure year four, approximately 14 years after the project begins. Therefore, that portion of the mine access road would not constitute an irreversible or irretrievable impact to transportation.

3.9.2.5. Reasonably Foreseeable Environmental Effects Scenario Analysis

There are no reasonably foreseeable future environmental effects based on Section 3.2, Table 7.

3.10. Visual Resources

How would the project affect visual resources?

Twin Springs Road: Ave. mine weekly trips 42.3 x 4 = 169.2 monthly trips + 564 non-mine trips = 733.2 monthly trips
Percent increase = 169.2/564 = 0.3 x 100 = 30.0%

[13] **Russel Road:** Ave. mine weekly trips 42.3 + 413 non-mine trips = 455.3 weekly trips
Percent increase = 42.3/413 = 0.102 x 100 = 10.2%

Twin Springs Road:
Ave. mine weekly trips 42.3 + 27 non-mine trips = 69.3 weekly trips
Percent increase = 42.3/27 = 1.57 x 100 = 157.0%

3.10.1. Affected Environment

The visual resources of a community or area include the physical features that make up the visible landscape and vistas, including land, water, vegetation, topography, and human-made features such as buildings, roads, utilities, and structures, combined with the viewer response to the area.

Viewer response is a combination of viewer exposure and viewer sensitivity. Viewer exposure is a function of the number of viewers, the number of views seen, the distance of the viewers, and the viewing duration. Viewer sensitivity relates to the extent of the public's concern for a particular viewshed (a viewshed is all of the views that can be seen from a given location). The visual resources analysis area consists of a 1-mile-wide buffer around the southern extent of the access road (0.5 mile on each side of the road) and the visible extent of the project area based on the surrounding hilly topography (Appendix A, Figure 10.). The viewshed is influenced by the gently rolling topography, small rock outcroppings along ridgelines, and access roads.

BLM developed the Visual Resource Management (VRM) system for visual resource inventory, management, and impact assessment. BLM's VRM system provides a framework for managing visual resources on BLM-administered land. Included in this system is a mechanism for identifying visual resource values on BLM-administered land, minimizing the effects of surface Statement was made that proposed rights would transfer to the county - this is pre-decision as assignment of rights is discretionary and subject to application. -disturbing activities on visual resources and maintaining the scenic value of tracts of land for the future. The overall BLM policy direction for the VRM is contained in BLM Manual 8400 – Visual Resource Management (BLM 1984). Approximately 436 acres of the Project is located on BLM land and is assessed following the BLM's VRM system.

The Project crosses private lands that are not subject to the VRM standards that federal or state land-managing agencies would apply. However, visual resources were inventoried and assessed on private lands in a manner consistent manner with the system for assessing BLM lands. Private lands within the proposed Project corridor are subject to land-use regulation of the respective local government jurisdiction (i.e., Malheur County) within the county where the Project is located. The area of analysis is zoned "County Exclusive Range Use," which preserves the land for resource-based economic development and uses (Malheur County 2024). Conditional uses include mineral extraction and processing, road improvements, and transmission towers over 200 feet in height (Malheur County 2022).

Existing visual resources, such as landscape features, buildings, and vegetation were identified for the Grassy Mountain Mine in the area of analysis (EM Strategies 2017) as part of a baseline assessment and description of the current landscape. The development of Project elements was considered to assess changes in the landscape. Changes in visual resources considered:

- **Landscape Character.** Consideration of past changes to the landscape character such as topography and landforms, vegetation, landscape features (water and exposed rock), and cultural modification or development.

- **Scenic Integrity.** Consideration of the extent to which the existing landscape was previously altered, and therefore, the extent to which changes to the landscape would not be as readily apparent compared to changes to an unaltered, more natural appearing landscape.

Potential viewing locations of the Proposed Action were identified in the Visual Resources Baseline Report (EM Strategies 2017). These are locations from which the Project could be seen by the public, such as roadways, public facilities, public recreation areas, or residences.

Changes in the existing visual landscape were assessed about viewer sensitivity and viewing distance by considering the visual appearance of Project facilities that would be developed in the analysis area. Consideration was given to the potential number of viewers, the duration of views, the context of the viewing setting, viewing distances, and viewer expectations. For example, viewers would be more sensitive to landscape changes to foreground and middleground views than those at a distance.
Lighting effects from the proposed Project were also considered.

3.10.1.1. Existing Conditions

The landscape within the area of analysis is characterized by gently rolling hills, with small rock outcroppings along ridgelines. In general, soils throughout the area of analysis are light tan in color. Dark brown rock outcroppings are visible along ridgelines. The area of analysis has experienced some disturbance created by various access roads; however, very few man-made structures exist throughout the landscape. The most common structures include fence lines, stock-watering troughs, and transmission lines, which are visible at various locations throughout the area of analysis (EM Strategies 2017).

Vegetation within the area of analysis is a desert-rangeland type, where sagebrush and grasses are the dominant species (Photo 3-1). The area has been extensively grazed and invasive cheatgrass dominates much of the landscape. The landscape experiences very little change in color throughout the year. In general, hues of green/gray are typically visible in the sagebrush and rabbitbrush, and the grasses vary between light-yellow/green to light-gold/brown throughout the year (EM Strategies 2017; Calico 2022-Appendix B19).

Low light pollution conditions, or dark skies, is one of the most important properties for viewing stars, constellations, and other astronomical features, such as comets. There are no existing stationary light sources in the Project area and there are very few existing stationary light sources in the Project region. The Project area is remote, rural, and isolated from cities and towns. Therefore, the ambient light level in the Project area is very low during the night and the sky is considered to be very dark. The very low ambient light level allows visibility of astronomical features. The night landscape appears as an otherwise dark and unlit, black, or nearly black space with little to no distinguishable landscape features.

Photo 3-1. Representative photo of the landscape.

Source: HDR 2015

3.10.1.1.1. Visual Resource Management Classes

The Southeastern Oregon Resource Management Plan (RMP) Amendment designates the BLM land intersected by the Project as Class III and IV visual resources in BLM's VRM system (BLM 2023).

> ***Class III.*** *The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.*
>
> ***Class IV.*** *The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.* (BLM 1986, page 7)

Both VRM Classes III and IV allow for visual changes in form, line, and color. Class IV allows for high levels of visual change to the landscape and most of the Project is located on Class IV land. Class III allows for moderate levels of visual change.

The VRM system includes effects of artificial lighting on night skies. Existing or potential sources of artificial nighttime light in the area include traffic along the proposed access road, traffic along neighboring dirt roads, and residential lighting from communities north and east of the area of analysis.

3.10.1.1.2. Key Observation Points

A key observation point (KOP) is a specific place on a travel route or within an existing or potential use area where the view of a management activity or project would be most revealing for purposes of the contrast rating. KOPs are selected based on existing land use, frequency of visibility, duration of visibility, and anticipated activities of the observer.
Four KOPs have been selected to capture views that represent the existing landscape where Project activities are proposed. The KOPs include views of BLM-administered land that may be used to support future mining activities, as well as the proposed access road corridor, which could be upgraded to provide improved vehicle access to the Project. Each of the four KOPs is given a number designation. The KOPs are briefly described in Table 27, and shown in Appendix A, Figure 10. along with the VRM classes.

Table 27. Key Observation Points

KOP	Location description	VRM class	View description
1	Terminus of Access Road facing south in Mine and Process Area	IV	Gently rolling hills with rock outcroppings in middleground and background. Sagebrush/ bunchgrass vegetation has fine to medium texture. Linear elements include access road tire tracks.
2	Western portion of Mine and Process Area facing northeast	IV	Gently rolling hills. Sagebrush/bunchgrass vegetation creates a mottled, fine-to-medium texture across the landscape. Linear elements include access road tire tracks.
3	Intersection of Access Road Area and Twin Springs Road facing south toward Mine and Process Area	IV	Relatively flat valley bottom. Gently rolling hills are visible in the middleground and background near the Mine and Process Area. Vegetation is relatively homogeneous. The color and texture of the access road contrasts sharply with the adjacent, undisturbed landscape.
4	Along Twin Springs Road facing south toward Mine and Process Area	IV	Terrain slopes gently south toward the Mine and Process Area. Slightly undulating landforms are visible in the middleground and background. Landscape is mottled with fine textured grass species. The color and texture of Twin Springs Road contrasts sharply with the adjacent, undisturbed landscape.

Source: Visual Resources Baseline Report (EM Strategies 2017)

3.10.1.1.2.1. KOP 1

KOP 1 (Photo 1) is located at near the terminus of the Access Road facing south in the Mine and Process Area. The visible landscape in this area is characterized by gently rolling hills, viewed in the middleground and background. Rock outcroppings are visible along the ridgelines viewed in the middleground, especially at the proposed Mine and Process Area. Soil ranges from tan to brown and rock outcroppings are dark brown in color.

Vegetation at this location consists of a shrub stratum that includes big sagebrush and rabbitbrush. The herbaceous stratum consists of bunchgrasses and cheatgrass, which is dominant across the landscape. The shrub stratum, which is viewed in the foreground and middleground, is gray/green with a fine-to-medium texture. The herbaceous stratum, which is viewed in the foreground and middleground, is light and varies between green and bright green. In general, the landscape is void of species diversity.

Tire tracks created by the access road add a linear element to the foreground of the viewshed. The texture of the tire tracks contrasts with the adjacent vegetation and undisturbed soil. No other man-made features are visible at this location.

Photo 2. Key Observation Point 2

Source: HDR 2015

3.10.1.1.2.2. KOP 2

KOP 2 (Photo 2) is located in the western portion of the Mine and Process Area facing northeast. Similar to KOP 1, the visible landscape from this location is characterized by gently rolling hills, viewed in the middleground and background. Soil colors range from tans to browns with a few dark brown colored rocks scattered throughout the landscape.

Vegetation dominated by sagebrush and bunchgrasses creates a mottled texture throughout the viewshed. The shrub stratum is comprised of big sagebrush and rabbitbrush, while the herbaceous stratum consists of bunchgrasses and cheatgrass. The shrub stratum, viewed in the foreground and middleground, is gray/green with a fine-to-medium texture. The herbaceous stratum, viewed in the foreground and middleground, is light green in color.

Tire tracks created by the access road add a linear element to landscape as they pass through the viewshed from the foreground before disappearing into the middleground. The texture of the tire tracks contrasts with the adjacent vegetation and undisturbed soil. No other man-made features are visible at KOP 2.

Photo 3 Key Observation Point 3

Source: HDR 2015

3.10.1.1.2.3. KOP 3

KOP 3 (Photo 3) is located at the intersection of the Access Road Area and Twin Springs Road facing south toward the Mine and Process Area. The terrain consists of a relatively flat valley bottom. Gently rolling hills are visible in the middleground and background in the area of the proposed Project. Fine-textured soil throughout the landscape ranges from light tan to brown. Some rock outcroppings are visible in the background and are dark brown in color. Small, light-colored, angular rocks and gravel are present along the access road.

Vegetation viewed in the foreground is relatively homogenous and dominated by grasses, including bluebunch wheatgrass and cheatgrass ranging from green to green/brown in color. Sagebrush in the shrub stratum is sparsely distributed throughout the landscape.

Photo 4 Key Observation Point 4

Source: HDR 2015

3.10.1.1.2.4. KOP 4

KOP 4 (Photo 4) is located along Twin Springs Road in the northeastern portion of the area of analysis facing south toward the Mine and Process Area. The terrain viewed in the foreground and middleground slopes gently toward the south. Gently rolling hills are visible in the background along the horizon line. Soils range from tan to light brown. Some rock outcroppings are visible in the middleground and background and are dark brown in color. Small angular rocks are present along the edge of the existing road.

Vegetation viewed in the foreground is dominated by grasses, including bluebunch wheatgrass and cheatgrass, which create a mottled, fine texture across the landscape. Sagebrush in the shrub stratum is sparsely distributed throughout the landscape. Varying hues of green are visible throughout the landscape.

The colors and textures created by Twin Springs Road contrast sharply with the adjacent undisturbed landscape, especially in the foreground. Views of the roadway diminish as it passes through the middleground to the background. Tire tracks in the foreground and middleground introduce a linear element to the natural landscape. No other man-made features are visible from this KOP.

3.10.2. Environmental Consequences

Effects to visual resources occur when a proposed project introduces or alters landforms, vegetation, or structures within the characteristic landscape in a manner that would be visually discordant. The level of effect varies, and the proposed changes are or are not consistent with VRM class objectives.

3.10.2.1. Analysis Method

Visual effects were determined by evaluating the visual elements of the Project relative to the four KOPs to determine visual contrast between the existing conditions and the Proposed Action conditions. The existing landscape character under current conditions and the proposed landscape character under post-mining and reclaimed conditions aid in determining if the Proposed Action would meet VRM Class III and IV management objectives.

3.10.2.2. No-Action Alternative

Under the No Action Alternative, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time on its valid mining claims. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur. Visual resources under the No Action Alternative would remain similar to those described for existing conditions.

3.10.2.3. Proposed Action

The Proposed Action would result in visible changes as summarized in Table 28. Given the remote location, the Proposed Action would not be visible to viewers from the access road, surrounding rangeland, or the surrounding areas since the mine would be underground and not all facilities would be visible at the surface. After active mining ceases, the mine facilities and portal would be closed, plugged, and revegetated post-closure, which would return the area to pre-mining visual conditions, resulting in minor, short-term visual effects compatible with the VRM Class III and IV management objectives.

Table 28. Visible Changes of the Proposed Action

Feature*	Visual Changes
Access Road Improvements	The Proposed Action route is approximately 17 miles of existing roads. Visual changes would occur on the existing roads, where necessary, to accommodate more traffic and heavy equipment. Route improvements include widening the road, improving the subbase of the road, adding culverts and ditches for drainage, adding signage, and rerouting some sections of road to have improved vertical or horizontal alignments for heavy equipment.
Power Line Installation	A 34.5-kilovolt (kV) transmission line would run 25.2 miles to power the mine's operation. Approximately 6 miles of the power line is existing and would be rebuilt.
Underground Mine	The underground mine would have visible, aboveground ancillary facilities including lift stations, truck loading bays, power bay, an ore stockpile, and sump to collect mine water.
Ore Processing	Ore processing would require the construction of processing plants.
Temporary Waste Rock Storage Facility	Temporary waste rock storage facility would be constructed to store rock waste before it is disposed.
Tailings Storage Facility (TSF) and Tailings Disposal	A TSF would be constructed immediately west of the Mine Portal and Process Plant. The TSF would fill the native valley and require staged embankment constructions on the north and west sides.
Development of the basalt quarry	48-acre quarry footprint, 60-foot wide horizontal benches, 40-foot vertical high benches and have a maximum excavated depth of 125 feet on public land. This site would be partially reclaimed, but overall, it would remain on the landscape which creates an irretrievable and irreversible effect.
Reclamation Borrow Areas	A 55.9-acre footprint on public land. It would be completely reclaimed by year 14, therefore a long-term effect (stage 2 to 4) but it would not remain as a permanent feature on the landscape.
Growth media stockpiles	Temporary stockpile sites would encompass 7.7 acres on public land, which would have a long-term (stage 2 to 4) effect to the landform.
Perimeter Fencing	Approximately 22,176 feet of fencing for security and safety would be installed around the Mine and Process Plant Area boundary (perimeter fence).

** For more details on these features Mine Plan of Operations (Calico 2022).*

3.10.2.3.1. Visual Effects During Construction

Effects to visual resources would be more apparent during construction. The construction of the Proposed Action would introduce form, line, color, texture, scale, and movement changes that contrast with the existing landscape character and would modify views from the identified KOPs. The modifications to the landscape are within the VRM Class III and IV management objectives. These short-term visual effects would result from the construction of mining operation facilities as well as construction of improved access roads, power line, and fencing, and associated vegetation clearing. The following sections describe visual resource effects associated with the different features.

During construction, the removal of vegetation and earthwork would introduce areas of exposed soil, which would contrast with the existing setting until vegetation is later reclaimed. The construction of access roads in the level to rolling terrain in the area of analysis would require minimal modification of the existing terrain, resulting in negligible long-term visual effects. The improved access roads would be gravel, as the existing roads are today, matching the landscape context. Effects common to all KOPs during construction of the access road improvements would include views of additional vehicular traffic and areas of exposed soil after the removal of vegetation and during earthwork activities. Viewers located within the foreground distance zone, or in locations where views would be occupied by a large portion of the Proposed Action under construction, would result in increased visual contrast on these views.

The construction of the power line would include vegetation clearing along the access road and construction of a series of tall, vertical power poles. During construction, the motion associated with construction equipment, power pole placement, as well as vegetation clearing and landform modification would be noticeable and create visual contrast within the viewshed. Construction activities for power line would result in short-term, local effects on visual resources.

The construction of the ancillary, aboveground facilities for the underground mine operation would include vegetation clearing of almost 490 acres and construction of a series of tall, vertical buildings and other structures. These features would range in height from 13 to 84 feet above ground (Calico 2022). The construction of these features would be largely obscured for most viewers due to its location within a remote valley.

- The Tailings Storage Facility (TSF) is proposed to be constructed in the broad valley immediately west of the Mine Portal and Process Plant. The TSF would fill the native valley and require staged embankment constructions on the north and west sides and would require ground clearing of almost 100 acres.

- Construction of the TWRSF would require ground clearing of almost 6 acres. The maximum height of the TWRSF would be 35 feet.

- Approximately 22,176 feet of fencing for security and safety would be installed around the Mine and Process Plant Area boundary. The construction of the perimeter fence would include vegetation clearing and construction of a series of short, vertical fence poles, which would create a visual contrast when viewed from foreground and middleground vantages.

During construction, the motion associated with construction equipment, as well as vegetation clearing and landform modification would be noticeable and create visual contrast within the viewshed. Construction activities for ancillary facilities would result in short-term, local effects on visual resources.

During construction, there would be short-term effects from construction activities occupying a large portion of the landscape when considering all of the Proposed Action components (i.e., access road improvements; power line installation; construction of underground mine facilities, ore processing structures, temporary waste rock storage facility, tailing storage facility, and perimeter fencing). This would include views of additional vehicular traffic as well as areas of exposed soil after the removal of vegetation and during earthwork activities. The removal of vegetation would be noticeable in the landscape and contrast with the existing character; however, over time, after vegetation is reclaimed in temporary disturbance areas, it would begin to repeat vegetation patterns common in the area.

Viewpoints and KOPs located within the foreground distance zone would be affected by the construction of the Proposed Action, particularly KOPs 1 and 2, which are within the area of mine operations. Construction effects are anticipated to be short-term and localized due to the topography and remoteness of the site.

3.10.2.3.2. Visual Effects During Operations and Reclamation

The Proposed Action would result in both short-term modifications to the existing landscape's form, line, color, and texture, and would modify views from the identified KOP locations. Although the Proposed Action introduces visual change, the change would be most dramatic at KOPs 1 and 2 within the area of mine operations, which would be reclaimed after the mining is complete. Near KOPs 3 and 4, the visual effects of operations would be similar to existing conditions.

During operations, the improved access road would be a gravel road and appear similar to existing conditions to most viewers. Viewers may be sensitive to the movement or dust associated with additional vehicular traffic when the mine is in operation. After the mine is closed and the land reclaimed, there would be less vehicular traffic.
After construction, the power line and poles would introduce new vertical structures and horizontal lines that would contrast with the existing form and lines of the landscape. These features would be visible to travelers along Twin Springs Road as they travel through the area. Power lines exist in the surrounding landscape; therefore, viewers may not be sensitive to additional power lines.

Some facilities within the area of mine operations would be visible to travelers along Twin Springs Road for short periods of time as they travel through the area. These facilities are designed to remain in place during operation only, except for the TSF. Post-reclamation, buildings and fencing would be removed and disturbed areas regraded and vegetated, which would result in changes to topography but would not strongly contrast with vegetation in the landscape in general, resulting in short-term visual effects.
The TSF would remain at the site permanently, which would alter the landscape and result in a permanent visual change. However, the TSF would be covered and vegetated as part of the

reclamation plan, which would reduce its visual effects and it would ultimately appear as a hill on the landscape.

Since the mine is proposed to operate 24 hours per day, 4 days per week and the process plant would operate two shifts per day, 365 days per year, it is assumed that the Proposed Action would install lights to accommodate night workers. However, lighting would be underground or within enclosed buildings during the time of use, reducing the effects of night-time lighting and glare. Since it is assumed, there are few to no light sources in the area currently, installation of lights for Proposed Action operations would constitute a change from current conditions in the immediate area. There are no nearby structures, people, or fixed operations that would be affected by night-lighting. Viewed from a distance, the area may appear as a glow in the distance, resulting in short-term visual effects. Post-reclamation, all lights would be removed along with other aboveground structures. The Proposed Action would follow best management practices (BMPs) developed by the BLM for lighting at night (Sullivan et al. 2023), which includes minimizing the use of skyward lighting (unless needed to maintain safe conditions), installing motion detectors or timers and hoods/shields to avoid and minimize skyward lighting on exterior lights (to the extent practical), and directing all lighting only onto the active work areas (Sullivan et al. 2023). These measures would reduce the glow effect during operations.

As the majority of the Process Area and the entirety of the Access Road Area are located within a Class IV landscape, allowing major modification of the existing character of the landscape, there would be no conflicts with the BLM Class IV land classification. The eastern part of the Process Area is located within a Class III landscape, allowing a moderate level of change to the landscape character. The perimeter fencing, presence of construction vehicles and equipment, and potential dust emissions would constitute moderate changes. Development of the TSF and installation of the process plant and other buildings could be considered a major landscape change while in operation. However, after reclamation is complete, the TSF would appear as a vegetated hill on the landscape, and the buildings would be removed, resulting in short-term visual effects.

3.10.2.4. Irretrievable and Irreversible Impacts

There would be irretrievable effects on the landscape character and scenic quality throughout the life of the Project with the development of the Project on previously undisturbed lands. These irretrievable impacts would be lessened by the revegetation and soil stabilization activities associated with mine closure and reclamation. However, the visual landscape in and surrounding the Project area would continue to show evidence of the existing and future landform and vegetation modifications. This would continue indefinitely during the life of the mine and post-closure. These impacts would be irretrievable because these areas would not be taken back to pre-disturbance contours and the transmission line would not be reclaimed.

3.10.2.5. Reasonably Foreseeable Environmental Effects

The Boardman to Hemingway 500kV transmission line project would cross the northern portion of the Project access road and transmission line, reasonably foreseeable future affects to visual resources would result from the long-term presence of the power infrastructure and the degree of contrast within the existing characteristic landscape.

3.11. Water Resources and Geochemistry

Water Resources and Geochemistry: How does the project affect water quality, quantity including the potential for acid generation and metals leaching, and surface, sub-surface, and groundwater?

3.11.1. Affected Environment

Water supply for the Project consists of groundwater produced at the Production Well Field, groundwater captured in the underground mine as part of the dewatering process, contact stormwater from the Collection Pond and reclaimed water from the TSF Reclaim Pond which captures water from the TSF and the TWRSF.

The analysis area for water resources (surface water and groundwater) is defined by the numerical groundwater flow model boundary (Appendix A, Figure 11.). It spans approximately 10 miles north-south and 8 miles east-west, encompassing the Mine and Process Area, Negro Rock Canyon, and part of Oxbow Basin, northwest of the Owyhee Reservoir (Appendix A, Figure 12.). The analysis area for geochemistry is defined by the PO boundary.

The Project lies within the Sourdough Basin/Negro Rock Canyon Watershed, draining northward. Grassy Mountain, southeast of the Project, forms a hydrologic divide between this watershed and the Oxbow Basin, which drains to the Owyhee River to the east, the region's primary drainage feature (Appendix A, Figure 12.).

3.11.1.1. Surface Water Resources

No perennial surface water features exist near the proposed mine and process areas. The analysis area contains ephemeral waterbodies, including wetlands, springs, creeks, a pond, an artificial waterway, and tributary drainages. As defined by the EPA, an ephemeral stream flows only after precipitation (EPA 2024). Following the 2023 Supreme Court Sackett decision, ephemeral waterbodies are not considered jurisdictional Waters of the United States under Section 404 of the Clean Water Act (USACE 2023). In Oregon, "Waters of the State" are defined under ORS 468B.005(10) to include all surface and underground waters, such as lakes, rivers, streams, springs, and ephemeral water bodies, whether natural or artificial, that are wholly or partially within or bordering the state, subjecting them to state jurisdiction for water quality regulation. Wetlands are discussed in Section 3.14 Vegetation. Executive Order 11988 directs federal agencies to avoid actions in floodplains; however, the Federal Emergency Management Agency's (FEMA) map of floodplain hazard areas does not identify any floodplains within the water resources study area (FEMA 2017).

Negro Rock Canyon Creek is an intermittent stream in the Negro Rock Canyon drainage, which flows north with intermittent flows of 0.01 to 0.04 cubic feet per second (cfs) when flowing (Appendix A, Figure 12.) (SPF 2018). Twin Springs Creek, an ephemeral stream, flows south from Negro Rock Canyon/Owyhee River watershed divide to Dry Creek, an ephemeral tributary to the Owyhee Reservoir (Appendix A, Figure 12.). No flow has been observed in Twin Springs Creek during monitoring (SPF 2018).

The analysis area includes 29 springs and seeps, primarily discharging from groundwater systems, with flows ranging from 35 to 45 gallons per minute (gpm) (Appendix A, Figure 12.) (SPF 2018).

No designated wild, scenic, or recreational rivers exist within the water resources analysis area. The nearest river is the Owyhee River, approximately 6 miles southeast of the Project, beyond the Grassy Mountain hydrologic divide. The Owyhee River flows south to north, joining the Snake River near the Oregon-Idaho border (Appendix A, Figure 12.). The Owyhee Reservoir, created in 1932 by the Owyhee River Dam, is operated by the U.S. Bureau of Reclamation, supplying approximately 500,000 acre-feet for irrigation (USBR 2023). While the Owyhee River below the reservoir has perennial flow, tributary streams are typically ephemeral or intermittent (SPF 2018).

3.11.1.2. Groundwater Resources

Groundwater occurs in permeable sediments and fractured rock, primarily within the Grassy Mountain Formation (which is comprised of arkosic sandstone, conglomerate, and tuffaceous siltstone), underlain by the Kern Basin Tuff (SPF 2021b).

Grassy Mountain acts as a groundwater divide, with regional flow northwest to Negro Rock Canyon and southeast to the Owyhee Reservoir. In the Mine and Process Area, groundwater flows northwest, consistent with surface topography, from higher to lower elevations, with no seasonal variations. Groundwater elevations range from ~3,150 feet above mean sea level (amsl) at the proposed mine to ~3,100 feet amsl at two monitoring wells to the northwest (SPF 2021b). Annual recharge from precipitation is estimated at 0.25 to 1 inch (Adrian Brown Consultants, Inc. 1992).

Hydraulic conductivity in the bedrock is low, particularly in the ore body due to silicification, with values of 10^{-8} to 10^{-9} centimeters per second (cm/s) (SPF 2021b). This restricts groundwater inflow to the underground mine, with a predicted average annual inflow of 60 gpm (Lorax 2022). Aquifer tests near the mine confirm low hydraulic conductivity (SPF 2021b). This groundwater inflow will be captured and utilized for processing along with other sources including the Production Wellfield and reclaimed water from the TSF via the Tailing Reclaim Pond and contact stormwater from the Collection Pond.

The primary water supply is provided by the proposed Production Well Field located within the water-bearing units around wells PW-4 and Prod-1 (Appendix A, Figure 2.), with high hydraulic conductivity within the ranges of expected values for sandstone and conglomerate aquifers. Aquifer tests at PW-4 and Prod-1 confirm high hydraulic conductivity ranging from 10^{-3} to 10^{-5} cm/s (SPF 2021b).

Discharge occurs to springs and surface channels at lower elevations. Regional groundwater flow is to the north toward the Malheur River (SPF 2021c). Within the Grassy Mountain vicinity, numerous individual springs have been monitored for flow, with the majority of springs having flow rates of less than 1 gpm and some are ephemeral (SPF 2021c). The total maximum combined discharge from the monitored springs located on the north side of the Grassy Mountain hydrologic divide is on the order of approximately 35 to 45 gpm based on flow measurements collected between 2013 and 2018 (SPF 2018). The average flows for the springs and artesian wells were used as calibration targets in the Lorax (2022) groundwater model.

3.11.1.3. Water Rights

Calico holds water rights issued from the Oregon Water Resources Department (OWRD) (ID 201970) for 2 cfs, which is sufficient for the planned water demand for mining, ore processing, dust control, and other usage (Calico 2019). Nine other surface water rights in Negro Rock Canyon allow the diversion of water for agricultural or wildlife use (DOGAMI, 2024). BLM holds two surface water rights (Water Right IDs 115224 and 126953) for reservoirs that collect surface water and are used for livestock and wildlife.

3.11.1.4. Water Quality

Oregon Department of Environmental Quality (ODEQ) sets primary (health-based) and secondary (aesthetic) water quality standards (OAR 340-041). These standards are also referred to as maximum contaminant levels. The ODEQ also has groundwater antidegradation regulations (OAR 340-040-0020) governing discharges to groundwater. Surface water samples from 10 creeks, springs, and seeps with sufficient flow show neutral to alkaline pH [8.0 to 9.0 standard units (s.u.)], and total dissolved solids (TDS) between 200 and 400 milligrams per liter (mg/L) (SPF 2021a). Individual analyte concentrations are below state standard values with the exception of arsenic, which typically exceeds the 0.01 mg/L standard in most surface waters with concentrations ranging between 0.03 and 0.09 mg/L. In addition to arsenic, aluminum, manganese, and TDS levels above the standards were infrequently and inconsistently detected. Baseline selenium concentrations exceed the aquatic life standard (0.0042 mg/L) in the Deposit Stock Tank (0.0045 to 0.006 mg/L) and Twin Springs South (0.0044 to 0.0049 mg/L) but are below the drinking water standard.

Groundwater samples from 15 wells in the water resource analysis area show neutral pH. Six wells have TDS concentrations greater than the standard (500 mg/L), ranging between 500 and 1,850 mg/L, with the highest observed TDS concentrations in the vicinity of the proposed mine area. Five of the wells exhibited a sodium-potassium sulfate water type, consistent with their proximity to sulfide mineralization in the ore deposit. Wells farther from the deposit exhibited calcium bicarbonate or sodium-potassium bicarbonate water types with lower sulfate concentrations (SPF 2021a). The groundwater meets drinking water standards except for antimony and arsenic. Three wells had antimony concentrations greater than the 0.006 mg/L standard, with antimony concentrations ranging from 0.022 to 0.298 mg/L. Arsenic concentrations in groundwater throughout the area were greater than the 0.01 mg/L standard, ranging from 0.01 to 0.16 mg/L, with the highest concentrations nearest the ore deposit. Mercury concentrations are generally below detection limits groundwater, with only periodic detections in groundwater wells at concentrations between 1 and 4 nanograms per liter (SPF 2021a). Aluminum, iron, manganese, and sulfate concentrations were detected above standards in approximately half of the wells.

3.11.1.5. Geochemical Characterization Tests

To evaluate acid rock drainage and metals leaching potential, a geochemical baseline characterization program was completed. This program analyzed 104 samples from the proposed underground mine location, 20 samples of proposed borrow material, and seven samples from road cuts. These samples include both waste and ore from the underground operations destined for the TWRSF and the ROM ore stockpiles (with some ore processed into tailings), waste rocks and basalt aggregate used for underground backfill and to construct the CRF, materials from the borrow areas, and samples from road cuts along the access road.

The comprehensive geochemical characterization testing program included: 1) acid-base accounting (ABA) - to determine the balance between acid-generating and neutralizing materials; 2) net acid generation (NAG) - to assess the potential for acid generation; 3) humidity cell tests (HCT) - to evaluate the long-term weathering behavior of the waste rock; 4) meteoric water mobility procedure (MWMP) tests - to measure the release of metals and other contaminants under natural precipitation conditions; 5) synthetic precipitation leaching procedure (SPLP) - to assess the leachability of metals from tailings; 6) total metal analysis - to quantify the concentration of environmentally significant elements; 7) mineralogical analysis X-ray diffraction (XRD) - to identify key minerals influencing geochemical behavior; and 8) cemented rock fill (CRF) evaluation - to assess the stability and leaching potential of backfill materials (SRK 2022a and SRK 2022b). The following subsections describe the key findings from the geochemical characterization tests performed on the underground mine samples, borrow materials, and road cut samples, and discuss their implications for water quality.

3.11.1.5.1. Underground Mine Samples

Geochemical characterization tests were performed on samples of the ore and waste rock materials that would be excavated from the proposed underground mine. The percentages of the tested samples were comprised of siltstone (54 percent), sandstone (26 percent), sinter (11 percent), mud/clay (5 percent), breccia (< 1 percent), and mudstone (< 1 percent). These samples were representative of the ore to be temporarily stored in the ROM ore stockpile and the waste rock to be placed in the TWRSF.

Of the 104 underground mine samples, neutralization potential (NP) is low, averaging 2.2 kilogram (kg) $CaCO_3$ eq/ton with a standard deviation of 9.0 kg $CaCO_3$ eq/ton (SRK 2022a). The variability was due to two samples with significantly higher NP values (> 10 kg $CaCO_3$ eq/ton). The total sulfide content ranged from < 0.01 percent to 1.9 percent, while the acid-generating potential (AP) varied between < 0.03 and 58 kg $CaCO_3$ eq/ton. The characterization results for the ore grade material are similar to the waste rock materials.

Based on BLM's waste characterization criteria (SRK 2022a), most samples (97 out of 104) fall into the uncertain category, with net neutralization potential (NNP) values between -20 and 20 kg $CaCO_3$ eq/ton or a NP/AP ratio between 1 and 3. Only two samples meet the non-acid-generating classification (NNP > 20 kg $CaCO_3$ eq/ton and NP/AP ratio > 3), while five samples were categorized as acid-generating, exhibiting NNP values less than -20 kg $CaCO_3$ eq/ton, or a NP/AP ratio less than 1. These results indicate that the majority of underground waste rock and ore samples are classified as having an uncertain acid generating potential, while a fraction can be classified as either clearly acid-generating or non-acid-generating.

The NAG test corroborates the ABA findings, demonstrating that sulfide content directly affects NAG pH. Six percent of the materials contain more than 0.5 percent sulfide and are expected to have a high acid generating potential (NAG > 20 kg H_2SO_4 eq/ton). Forty-four percent of the materials contain 0.05-0.5 percent sulfide and exhibit low to moderate acid generating potential (1-20 kg H_2SO_4 eq/ton). Almost half of the tested rocks show acid-generating potential that could pose a risk of acid rock drainage if not properly managed (SRK 2022a).

The multi-element analysis of 104 samples shows that most elements are at or near their average crustal abundance. However, the average concentrations of arsenic, antimony, gold, mercury, and selenium are elevated to more than 12 times the crustal abundance across all project material types (SRK 2022a). Additionally, the average concentrations of molybdenum, silver, and sulfur exceed three times the crustal abundance in all material types, while the average concentrations of lead and tungsten in interbedded mud/clay were also significantly (> 3 times) elevated.
A total of 13 waste rock and six ore samples were tested using the MWMP. The effluent pH ranged from 2.0 to 9.4 standard units (s.u.), with 11 out of 19 samples below the Oregon Groundwater Quality Guidelines (OGWQG) reference range of 6.5-8.5 s.u (SRK 2022a). Additionally, three samples had pH values below the rinse solution pH (5.0 s.u.), indicating higher acid-generating potential. Several constituents exceeded reference values, including arsenic (4 samples), sulfate and TDS (4), cadmium (2), chromium (2), copper (2), iron (5), manganese (5), selenium (5), silver (1), and zinc (2). Arsenic exceeded reference values in four samples, particularly in those with acidic or highly alkaline effluent pH.

XRD analysis of 12 waste and ore samples identified quartz as the dominant mineral in all samples, with minor amounts (< 15 percent) of orthoclase present in the sinter, sandstone, and siltstone, and illite in the sandstone, siltstone, and mudstone (SRK 2022a). Carbonate minerals were absent, except for 1 percent calcite in a single sinter sample. Two percent pyrite was detected in one siltstone and one mudstone sample.

Nine HCTs were run on waste rock samples for 87 weeks to assess the long-term geochemical behavior of these materials. Seven of the nine samples (the sandstone, mudstone, siltstone, sinter, and mud/clay samples) generated acidic leachate. One of the sinter samples exhibited mildly acidic conditions (pH approximately 5 s.u.); the other sinter sample remained pH neutral throughout the test (SRK 2022a). Acid-generating samples released arsenic, sulfate, TDS, iron, manganese, and copper at concentrations exceeding OGWQG, with cadmium, chromium, lead, selenium, silver, and zinc elevated during the initial flushing phase. In contrast, the non-acidic sinter sample maintained a circum-neutral leachate pH (6.8-8.0 s.u.) and showed minimal metals release. The HCT results indicate that except for the sinter, the waste rocks are acid generating and leach metals.

During underground mining, CRF would be used as backfill, with basalt (approximately 85 percent) as the primary aggregate and waste rock (approximately 15 percent) as a minor component. The cement and fly ash binders used to enhance physical and chemical stability would provide buffering capacity and reduce oxygen and water contact with sulfide minerals, thereby minimizing acid generation and metals mobility.

Testing on 14 CRF cylinders confirmed low levels of metals and sulfate release, with most constituents below OGWQG limits (SRK 2022b). Barium, chromium, mercury, and sulfate exceeded OGWQG in the liquid/solid (L:S) ratio of the 2:1 test but were much lower in diffusion tests, suggesting only a limited potential to affect groundwater. While some metals leached above OGWQG in disaggregated samples, groundwater flowing through monolithic CRF blocks is expected to have significantly lower concentrations. Overall, the CRF presents low risk to adversely affect groundwater quality due to acid generation or metals leaching.

3.11.1.5.2. Borrow Material Samples

Geochemical characterization tests were performed on 20 samples of borrow materials that would be used to construct roadbeds, structural fill, and the CRF. The 20 borrow materials samples, which consisted of andesitic basalt, vesicular basalt, basalt, clay, sand and clay, and sediments, had negligible total sulfur and sulfide sulfur (< 0.01 percent), indicating no acid-generating potential (SRK 2022a). The neutralization potential was consistently positive (3.2-240 kg $CaCO_3$ eq/ton). Based on the BLM criteria, 13 samples were classified as non-acid-generating and seven samples were classified as uncertain. The NAG test results confirmed that none of the borrow materials pose a risk for acid generation, with NAG pH greater than 4.5 s.u. and total NAG values of 0.2 kg H_2SO_4 eq/ton.

Multi-element analysis showed that most elements in the borrow materials samples were at or near average crustal abundance, except for selenium, which exceeded three times the crustal abundance in all material types except sand and clay (SRK 2022a).

X-ray diffraction analysis on eight borrow materials samples identified plagioclase, smectite, and pyroxene as the dominant minerals, with calcite detected in vesicular basalt and clay, but no pyrite, corroborating the ABA results that showed that sulfide was below the method detection limit.

The MWMP leach tests on nine borrow materials samples confirmed low, short-term elemental mobility, with alkaline leachates (pH 7.7-8.3 s.u.) and minimal metal and sulfate release, remaining within OGWQG limits (SRK 2022a). Two HCTs of the basalt showed stable pH (7-8.5 s.u.) and low sulfate release (< 10 milligrams per kilogram [mg/kg]/week) over 27 weeks, with no exceedances except for one basalt sample, which had elevated arsenic during the first eight weeks before stabilizing below the guideline level.

Overall, borrow materials exhibit low acid-generating potential and low risk for metal leaching. The presence of calcite provides additional buffering capacity, further reducing the likelihood of acid rock drainage. Although selenium concentrations exceed three times crustal abundance in some samples, its low leachability suggests limited environmental mobility.

3.11.1.5.3. Access Road Cut Samples

The access road cut samples represent materials excavated during road construction, and their characterization is important in assessing whether roadway infrastructure would contribute to water quality effects through runoff or leaching. Access road cut materials consist primarily of basalt, volcanic tuff, and sedimentary deposits.

All seven road cut samples had a total sulfur content less than 0.01 percent, indicating minimal sulfide presence and acid-generating potential. The moderate NP (15-31 kg $CaCO_3$ eq/ton), elevated NP/AP ratio (50-100), with positive NNP values, confirm that these materials have a natural buffering capacity (SRK 2022a). While some samples were classified as uncertain based on the ABA results, NAG testing confirmed that none of the materials are acid-generating, with an average NAG pH greater than 4.5 (6.2 to 7.9) and a total NAG value of 0.2 kg H_2SO_4 eq/ton. Based on multi-element analysis, most elements in the road cut samples were within average crustal abundance levels, except for selenium, arsenic, and cadmium in some samples. XRD analysis found primarily plagioclase, pyroxene, and smectite, with no sulfide minerals detected. The absence of carbonate minerals suggests that the neutralization potential is derived from silicate weathering rather than carbonate buffering.

All MWMP leachates were near-neutral to alkaline pH (6.8-7.6 s.u.) with low-metal and sulfate concentrations (SRK 2022a). Comparison with OGWQG confirmed that all parameters were within acceptable limits.

The geochemical characterization of access road cut samples indicates that these materials have a low potential for acid generation and minimal risk for metals leaching. The absence of sulfide minerals and low leachable metal concentrations suggests that these materials pose minimal risk to groundwater and surface water quality when used for roadway construction.

3.11.2. Environmental Effects

The impact on water resources depends on existing groundwater and surface water quantity and quality, as well as the potential for mined rock to leach metals or other constituents that impact water quality. To assess these impacts, surface water surveys, water quality sampling, and groundwater pump tests were conducted, and a water balance was developed using groundwater elevation, aquifer properties, and climate and precipitation data (EM Strategies 2017; SPF 2018, 2021a, 2021b). Groundwater sampling established baseline water quality, while geochemical tests of ore, waste rocks, access roads and quarry materials, and the CRF evaluated acid generation and leaching risks (SRK 2022). Impacts to water quantity were analyzed using a FEFLOW 7.4 numerical groundwater model incorporating geologic, climatic, hydrologic, pedologic, and topographic data. The model simulated 10 years of mining operations and groundwater pumping from dewatering and supply wells at 200 gpm (Lorax 2022). Impacts to water quality were analyzed using the geochemical characterization test results. Impacts to floodplains were evaluated using FEMA flood hazard maps and projected changes due to mine operations (FEMA 2017).

Short term effects referenced in this analysis represent the Stage 1 and 2 timeframes. Long-term effects referenced in this analysis represent the Stage 3 and 4 timeframes.

3.11.2.1. No-Action Alternative

Under the No Action Alternative, an underground mine would not be constructed, operated, or closed. Authorized exploration activities limited to notice-level exploration drilling activities could be conducted. Future notice-level activities could not create more than five acres of surface disturbance, and reclamation and financial assurance would be required. These activities would have to prevent unnecessary or undue degradation in accordance with FLPMA and BLM's surface management regulations at 43 CFR 3809.420.

There would be no Reasonably Foreseeable Environmental Effects (RFEE) on either surface water or groundwater resources under the No Action Alternative. Because there would be no groundwater withdrawal for mine dewatering, processing, dust control, or potable uses, there would be no RFEE to groundwater levels or quantities, including to springs and seeps. Similarly, because there would be no contact of meteoric waters with mined materials or runoff from the mine area, there would be no RFEE to surface waters. Under the No Action Alternative, there would be no mined materials with the potential to generate acid and leach constituents. Consequently, there would be no RFEE involving adverse impacts to surface water or groundwater quality.

3.11.2.2. Proposed Action

The Proposed Action activities that were evaluated to determine potential RFEE to water resources, adverse environmental effects to water resources that cannot be avoided, the relationship between short-term uses and long-term-productivity of water resources, and irreversible or irretrievable commitments of Federal water resources are described in detail in Sections 2.2.3 through 2.2.9.

3.11.2.2.1. Impacts to Water Quantity

Lorax (2022) developed a numerical groundwater model using FEFLOW 7.4 to characterize changes to groundwater flow during mining and after closure, and to predict drawdown at springs in the mine vicinity resulting from mine dewatering and groundwater production from the production wells. The model predicts that the groundwater drawdown caused by the mine operations would be primarily associated with the proposed production wells, which would be developed in permeable sandstones and conglomerates. Drawdown in the mine area is predicted to be constrained by barrier faults that create significant hydraulic compartmentalization. Consequently, the drawdown at the mine would be limited to the immediate vicinity of the underground mine. A much greater drawdown footprint is predicted in the vicinity of the proposed Production Well Field.

Temporary drawdown of groundwater during the construction and operations periods due to the combined effects of mine dewatering and well field production are predicted to be up to 42 feet in the immediate vicinity of the production wells and between 0.5 and 7 feet in other areas. The model shows that groundwater drawdown in the uppermost groundwater levels is predicted to extend approximately two miles from the Production Well Field. In contrast, the drawdown from the underground mine is, for the most part, restricted to deeper groundwater levels. Shallow groundwater near the mine is not predicted to be influenced by dewatering of the mine due to the presence of low-permeability clay and siltstone in the upper levels of the mine area.

The model predicts groundwater inflows to the underground mine would range from 15 gpm to 115 gpm during mine construction in Year 1. The average annual mine inflow is predicted to be 60 gpm during operations. The model simulated production well pumping at a constant 72 gpm for the 10-year period of mine construction and operation. As the underground workings expand during mine operation, the water flowing into the mine workings and pumped to the surface to support mining and milling would supply a greater portion of the project's water needs and would reduce the required pumping rates from the production wells. The progressive increased use of water from the underground mine is anticipated to significantly reduce the simulated drawdown impacts in the vicinity of the production wells in the later years of mining.

After 10 years of pumping the proposed production wells, the model predicts the groundwater elevation near the production wells would be 3,122 feet amsl. Four springs located northeast of the mine (e.g., Red Tank #3, Low Spring, Sagebrush Spring, and the Spring North of Lowe Reservoir) are located within the predicted zone of influence of the proposed production wells and would experience a drawdown ranging between 2 and 11 feet. Depending on the depth of the groundwater and the nature of the hydraulic connections sourcing these areas, the predicted drawdown would affect flow rates in some of these springs and/or change the discharge location. Because of the low permeability of the bedrock around the mine, the drawdown at the mine is of relatively limited extent. Downgradient of the mine area, minor residual drawdowns of less than 4 feet are predicted. The model does not predict any drawdown at the location of Deposit Stock Tank.

The groundwater model predicts that springs nearest the Production Well Field would experience the greatest effects, with the groundwater level at Lowe Spring dropping to a maximum of 11 feet at the end of mining. Red Tank Spring, which only flows occasionally under baseline conditions, is predicted to experience a drawdown that progressively increases during mining to just under 10 feet by the end of mining. All other springs are predicted to have a drawdown of less than 2 feet, with negligible drawdown (< 0.05 feet) occurring at most springs within the water resources analysis area. The numerical modeling predicts that the water table in the wellfield area would recover steadily after the end of mining. The residual drawdown 20 years after the end of mining and water production in the wellfield area is predicted to be less than 2 feet.

Due to the low recharge and low permeability in the mine area, groundwater levels would recover slowly after pumping ceases and is predicted to remain lower than pre-mining elevations in the vicinity of the mine after 50 years of recovery. The model predicts that a new groundwater equilibrium level would be established after approximately 100 years of recovery.

The two surface water rights for livestock and wildlife that BLM holds would be within the predicted area of groundwater drawdown. Because these water rights are for reservoirs that collect and retain surface water runoff, they would not be affected by the groundwater drawdown due to mine dewatering and production well pumping. There are no domestic use wells or other water rights mapped within the predicted area of groundwater drawdown.

There are no perennial streams or river segments within the predicted drawdown area from mine and production dewatering. The closest perennial stream and river segments are approximately four miles from the maximum areal extent of the predicted drawdown boundary. Therefore, effects to perennial streams from the groundwater drawdown are not expected.

The Deposit Stock Tank within the water resources area of analysis (Appendix A, Figure 12.) would be removed to accommodate development of Project facilities, resulting in direct effects to this water source. (See the discussion of this stock tank in Range, Section 3.6).

The Proposed Action includes the Spring and Seep Monitoring and Mitigation Plan (SLR 2025) to measure groundwater elevation at two monitoring wells and spring monitoring to assess if groundwater levels near select springs are being affected by groundwater production and dewatering operations. The proposed monitoring wells would be screened in the Grassy Mountain Formation, which is the same aquifer from which the mine production wells would draw water. Adaptive monitoring responses would be triggered if any of the following conditions are observed:

- Spring or seep water is not present during a four-month season where it was present during the baseline assessment studies.
- The spring or seep flow is reduced to one half or less of the measured seasonal baseline flow: or
- The overall size of the spring or seep ground surface wetted area (determined through a formal delineation during the baseline survey and monitoring events) is one-quarter or less of the measured seasonal baseline area.

Immediate response measures to any of the conditions listed above would consist of consultation with stakeholders (BLM, ODEQ, DOGAMI) followed by the installation of a well or use of a nearby well with a pump to replace the spring flow. If these measures are anticipated to take more than 90 calendar days from the triggering event, then water would be transported from an alternative potable water source to provide water at the affected spring or seep until the response measures have been implemented.

Reduction in alluvial groundwater levels in the vicinity of the production wells due to well pumping has the potential to result in ground subsidence. Subsidence has the potential to affect the volume of water stored in an alluvial aquifer and its hydraulic permeability characteristics if the subsidence resulted in a substantial reduction in alluvial pore space available for groundwater. The volume and duration of groundwater pumping results in drawdown of less than 40 feet in unconsolidated alluvium in the immediate vicinity of the mine. Based on this drawdown, subsidence effects associated with groundwater levels would be limited by partial consolidation of desaturated alluvial materials in that dewatered interval. Alluvial consolidation associated with less than 40 feet of groundwater drawdown typically yields subsidence at the ground surface of less than approximately three inches (BLM 2019).

Since the water resources analysis area does not contain any floodplains, there would be no effects to floodplains from the Proposed Action.

3.11.2.2.2. Impacts to Water Quality

Geochemical characterization of waste rock and ore materials indicates that they would generate acid and leach metals, including arsenic, selenium, and other constituents associated with acidic drainage under long-term weathering conditions (SRK 2022). Therefore, waste rock would be temporarily stored in the TWRSF, which will have both primary and secondary lining systems to provide dual containment of leachate with an underflow collection system and leak detection that is designed to prevent any leachate seepage from reaching groundwater. Ultimately, all waste rock will be returned to the underground mine workings as RF and CRF, and the empty footprint of the TWRSF will be reclaimed by removing the liners, underdrain, and leak detection system, regrading, placing 12 inches of growth media, and revegetating.

Regarding groundwater quality in the underground mine, the proposed backfill will include a 7 percent cement mixture combined with borrow material, primarily basalt sourced nearby. This cement content significantly exceeds the levels needed to neutralize the average and highest sulfide concentrations present in the deposit rock. As a result, both RF and CRF are expected to effectively limit exposure of reactive sulfides to oxygen and water, helping to reduce the risk of acid mine drainage and promote long-term geochemical stability within the backfilled stopes. While this approach provides strong geochemical control, there remains a possibility that arsenic and selenium could leach from exposed mine workings into surrounding groundwater. Arsenic concentrations in groundwater may rise locally due to leaching, although natural background levels already exceed drinking water standards and are projected to remain above those standards post-mining. Selenium levels may also increase during operations but are expected to return to baseline conditions after backfilling is complete. The mine site is situated within a zone of low permeability, which is expected to restrict the movement of arsenic and selenium away from the deposit area. The 7 percent cement mix not only neutralizes potential acidity from RF and CRF but also creates a low-permeability barrier that limits groundwater interaction. Overall, impacts to groundwater quality from underground mining activities are anticipated to be confined to the immediate vicinity of the deposit due to the low permeability of the ore deposit and have the potential to be long-term.

Geochemical characterization of the tailings indicates that these materials would generate acid and leach metals, including arsenic and selenium (SRK 2022). During operations, lime and oxidizing agents would be added to the tailings for pH control and to facilitate recycling the process solution and detoxification of cyanide in a process dependent on maintaining a high pH. A tailings management plan has been developed to collect samples of tailings on a routine basis for geochemical testing in order to adjust the amounts of lime to be added during operations (Calico 2022). The addition of lime would mitigate the potential for acid generation by the tailings, but there is potential for arsenic and selenium concentrations in leachate to be above standards. The addition of sodium metabisulfate (oxidizing agent) and copper sulfate (a catalyst) would convert cyanide into a less toxic form (cyanate), which can further degrade into ammonia and carbon dioxide in the TSF supernatant pool through natural processes like sunlight exposure and microbial activity. The tailings would be placed in a lined, zero-discharge facility, which is designed to prevent the release of tailings leachate into the environment.

The TSF is designed to store the 500-year, 24-hour storm with stormwater diversion channels and primary and secondary leakage collection and detection systems. If any seepage or release from the TSF were to occur, it would need to pass through at least 120 feet of naturally present, dense, low-permeability clay before reaching the groundwater. This thick clay layer and the depth to groundwater provide an added barrier to contamination, with infiltration estimated to take over 1,000 years under natural hydraulic conditions (Stantec 2024).

At closure, process waters would be evaporated to remove free water from the TSF and a geosynthetic liner would be placed over the tailings, capped by 12 inches of an alluvial cover, 12 inches of growth media, and revegetated via hydroseeding. Long-term drain down from the tailings would be routed to the TSF Reclaim Pond, which would be converted into an Evaporation Cell (E-cell) by covering the geomembrane-lined pond with 12 inches of growth media and vegetation. The E-cell would be maintained until the TSF is fully drained and there is no tailings underflow to be captured, which is estimated to take 20 years. Potential exposure of wildlife to the tailings and process solution is addressed in Section 3.17.

Calico's Groundwater Monitoring Proposal proposes to monitor groundwater levels and quality related to specific facilities including the underground mine, TSF, TWRSF, TSF Reclaim Pond, and the Process Plant Collection Pond. Additionally, water monitoring for the TSF and TWRSF liner systems is included in the Proposed Action. Groundwater monitoring wells would include upgradient (background) and downgradient wells to detect if groundwater is being affected by these facilities. In the event that impacts to groundwater quality are identified, such as a significant increase in one or more water-quality parameters above the established concentration limit, the monitoring well would be immediately resampled following receipt and analysis of the water-quality results (SPF 2022). If the resampling results also exceed the concentration limit, the following actions would be taken (SPF, 2022):

- ODEQ would be notified of the results within ten days of receipt of the laboratory analytical results; and
- A Preliminary Assessment Plan (PAP) would be prepared within 30 days of receipt of the laboratory analytical results (unless an alternative schedule is approved by ODEQ). The PAP would evaluate the source and extent of the identified contaminant and predict potential migration of the contaminant. The PAP would also assess what action, if any, is needed to prevent additional groundwater contamination, and would be coordinated and approved by ODEQ.

Impacts to groundwater and surface water quality could result from the operation of the TSF and TWRSF during the active mine life. Impacts to groundwater and surface water quality are not expected due to the implementation of the following Project Design Features, which are specifically intended to reduce potential risks. 1) the TSF and the TWRSF are designed as zero-discharge facilities to contain the mine waste via liners and drainage collection systems; 2) both facilities are lined and have leak detection and collection systems; 3) the project design includes stormwater management features to prevent inundation of both facilities; 4) both facilities would

be regularly monitored; and 5) both the TSF and the TWRSF would be reclaimed. The duration of potential RFEEs associated with the TWRSF would be limited to the active mining operation because all of the waste rock would be placed as CRF backfill in the underground mine resulting in the facility being removed following the cessation of mining activities. The reclaimed TSF would remain as a permanent feature on the landscape that would be reclaimed to blend in with the surrounding topography to look like a low, gentle hill. Therefore, impacts to groundwater and surface water quality and quantity from the TSF and TWRSF are expected to be minimal.
The likelihood of a large-volume release of fuels, reagents, and process water to the environment at the mine site is significantly reduced because the proposed infrastructure is specifically designed to store and manage these materials, and mine facilities would have secondary containment (Ausenco 2022; Golder Associates 2021). Bulk material storage facilities would have secondary containment. Tanks would be above ground, with lined containment facilities capable of holding a minimum of 110 percent of the largest tank volume within the containment. Process areas would be equipped with spill containment and collection sumps or ponds to retain any leaks or spills of process water or slurries. Process spills would be recycled back into the process circuit. Traffic incidents and spills on the access road could result in releases of fuels from the vehicles, which would be contained and recovered, with the contaminated soils being managed pursuant to the Petroleum-Contaminated Soils Management Plan. Large-material releases from bulk truckloads have a low probability of occurring but could potentially occur due to puncture of a bulk tanker. Calico employees and contractors would receive training on spill prevention and inspections of material storage and handling areas, which would decrease the likelihood of a release to the environment. In the event of a spill or release, Calico would follow the mine Stormwater Pollution Prevention Plan. Furthermore, if a release where to occur in the vicinity of the Process Plant, surface water would be captured within the Collection Pond, which is lined.

The potential for spills and leaks to occur is primarily during mine construction, operation, and Stage 1 of the planned reclamation program, i.e., during roughly the first 15 years of the project. In the event of a leak or spill, the source of the release would be stopped and released materials would be removed for appropriate disposal per the Emergency Response Plan (Calico 2021). Spills from transporters or mine equipment would be immediately responded to and cleaned up in order to limit the area affected by the release. Since there are no perennially flowing surface waters near the mine site and access road and there is no shallow groundwater, any releases would typically be to surface soils rather than flowing water or shallow groundwater, facilitating the containment and removal of spilled material. Spills and releases would directly affect the area of the spill and result in variable volumes of contaminated soil. These spill response and cleanup measures, and handling of the contaminated materials would reduce the impact of releases and spills.

Stormwater runoff may mobilize sediment from construction areas and roads. Project best management practices (BMPs) would be implemented to reduce effects from sediment mobilization during construction, including the use of erosion controls and installation of temporary drainage ditches during construction to control stormwater. In addition, compliance with Oregon’s General Stormwater Permit and the Stormwater Pollution Prevention Plan would reduce such effects. The Stormwater Pollution Control Plan describes BMPs and monitoring to control stormwater pollution in compliance with the ODEQ 1200-Z National Pollutant Discharge

Elimination System Stormwater General Permit (the 1200-Z Permit, Appendix A), effective July 1, 2021. The Stormwater Pollution Control Plan is required to be updated in accordance with ODEQ procedures, as described in the 1200-Z Permit, whenever there is a change in design, construction, raw materials, operation, or maintenance of the mining facilities that may affect stormwater quality. During operations, discharge points would be inspected monthly and sampled quarterly if water is present, in addition to storm event sampling, as described in the Stormwater Pollution Control Plan. Corrective action triggers and responses are described in the Stormwater Pollution Control Plan.

Upon completion of active reclamation, a 26-year post-closure monitoring and maintenance period would begin. Post-closure monitoring and maintenance would include the following:

- The flow rate of the tailings underflow from the TSF to the reclaim pond/e-cell would be routinely monitored.
- Groundwater quality samples would be routinely collected, tested, and reported to ODEQ to demonstrate reclamation compliance in the monitoring wells. This activity would be conducted until closure has been approved and the bond released, estimated to be a period of 30 years after mining is completed. Groundwater monitoring would be conducted in three stages:
    - Stage 1 includes quarterly monitoring for a period of five years after mining is completed.
    - Stage 2 includes semi-annual monitoring for a period of ten years after Stage 1 monitoring is completed.
    - Stage 3 includes annual monitoring for a period of fifteen years after Stage 2 monitoring is completed.
- Stormwater samples from permitted outfalls would be collected, tested, and reported in accordance with the Stormwater Pollution Control Plan during the reclamation monitoring period (fifteen years) to demonstrate reclamation compliance where necessary.
- Stormwater diversion channels and the e-cell evaporation facility would be inspected quarterly during the reclamation monitoring period (fifteen years) for sediment accumulation, which would reduce the design capacity of the structures.

The operational period stormwater controls for the proposed facilities would remain in place into the post-closure period. These controls would divert most stormwater away from the Project facilities, including the closed TWRSF and TSF. Following reclamation of the TWRSF (removal of the facility) and TSF (gentle hill) would include an internal drainage swale to route precipitation that falls directly on these reclaimed facilities into a native drainage, where water would evaporate due to the arid conditions of the area (Calico 2023a). Long-term stormwater management via stormwater controls and the drainage swale would require post-closure monitoring and maintenance during the closure construction and post-closure monitoring periods to ensure their physical integrity and performance in managing stormwater.

The water quality protection measures outlined in the plan, including diversion channels to route clean runoff away from disturbed areas, sedimentation ponds for erosion and sediment control, zero-discharge designs with lined containment facilities, cemented backfill for ARD prevention, cyanide detoxification processes, comprehensive groundwater monitoring, and routine inspections with adaptive monitoring and spill response procedures, align with established industry standards and best management practices for mining operations (SWPCP 2021; Reclamation Plan 2022). At Grassy Mountain, these measures are projected to be highly effective due to the site's arid climate (low precipitation promotes rapid evaporation, minimal runoff, and reduces water ingress), low sulfide content (average < 1 percent), absence of perennial surface waters nearby, and low-permeability soils and host rock that limit contaminant transport, resulting in negligible long-term impacts such as no predicted exceedances of water quality standards beyond the project boundary and full containment of any spills within localized areas (e.g., <100 meters from source) as validated by baseline hydrogeologic assessments and post-closure monitoring plans (SWPCP 2021; Reclamation Plan 2022). The above-described impacts to water resources cannot be avoided should the Project be implemented. However, the Project Design Features described in the PO and Section 2.8 that are part of the Proposed Action would reduce and minimize them.

3.11.2.2.3. Short-Term Uses and Long-Term Productivity

The Proposed Action would involve short-term uses of water resources that would mainly occur for approximately 10 years during active mine construction and operation. In addition to the short-term water consumptive uses, the Proposed Action’s drawdown effects are predicted to last approximately 20 years near the Production Well Field and up to 100 years in the immediate vicinity of the underground mine.

None of the short-term water resource uses are expected to affect the long-term productivity of water resources in the project area, although some residual impacts could persist for up to 20 years near the water supply wells and for 100 years near the mine due to the time it takes for groundwater elevations to reach equilibrium. The 20 years during which groundwater levels are recovering near the water supply wells could impact flow rates at the four springs that would be impacted by drawdown due to water well pumping and mine dewatering during construction and operations. The groundwater model predicts this impact to last for approximately 20 years. The 100-yearlong modeled recovery of the elevation of the groundwater table in the vicinity of the mine is not anticipated to affect long-term productivity because there are no springs or seeps in the immediate vicinity of the mine.

3.11.2.2.4. Irretrievable and Irreversible Commitments of Federal Resources

The RFEE to water resources described above would be irretrievable and irreversible. However, there would be no irretrievable or irreversible commitments to Federal water resources. As described above, BLM has two water rights for surface water reservoirs that would not be impacted by the groundwater drawdown due to mine dewatering and pumping of the production wells.

3.11.2.2.5. Reasonably Foreseeable Environmental Effects Scenario Analysis

There are no reasonably foreseeable future environmental effects based on Section 3.2, Table 7.

3.12. Wildlife

How would the project affect wildlife, including Sensitive Species and Threatened and Endangered Species?

The study area for wildlife resources includes the Plan of Operations Boundary (access road and transmission line and the mine and associated ancillary facilities), plus a half-mile buffer and a two-mile buffer depending on the species. The half-mile buffer incorporates surveys for leporids, bats, burrowing owl, landbirds, and general wildlife encounters, while the two-mile buffer includes Greater sage-grouse habitat assessment and lek surveys, surveys for nesting raptors and bald and golden eagles, and observations of special status species. Together these areas make up the terrestrial wildlife analysis area (WAA) (Appendix A, Figure 13.).

The study area for aquatic species differed from the WAA and included water features located within the Aquatic Resources Study Area described in the Aquatic Resources Baseline Report (EMS 2020a). The Aquatic Resource Study Area was defined in EM Strategies (2020a) as follows: "an eastern boundary defined by the Grassy Mountains; a southern boundary of the northern portion of Township 23 South and Range 43 East; a western boundary of the Sourdough Mountains and Hoodoo Creek; and a northern boundary defined by an east-west line two miles north of production well PW-4".

Information regarding wildlife species and habitat within the WAA and Aquatic Resources Study Area was obtained from a review of existing published sources; site-specific surveys; and the Bureau of Land Management (BLM), Oregon Department of Fish and Wildlife (ODFW), and U.S. Fish and Wildlife Service (USFWS) file information. Site-specific surveys were conducted in 2014, 2017, and 2018 to analyze the impacts to wildlife and special-status species and their habitats within the WAA and Aquatic Resources Study Area. An additional raptor nest survey was completed in 2020. Survey data was combined with desktop analyses to characterize existing wildlife resources in the Proposed Action Area (EM Strategies 2020).

3.12.1. Affected Environment

3.12.1.1. Wildlife Resources

Wildlife habitats found within and adjacent to the WAA are typical of the Great Basin region and consist of desert-rangeland type habitat where sagebrush and grasses are the dominant species. the following vegetation communities were observed during field surveys: big sagebrush/bluebunch wheatgrass community, mixed annual weedy grass-forb/native bunch grass community, bluebunch wheatgrass/ cheatgrass/annual-perennial community, crested wheatgrass seeded community, big sagebrush/crested wheatgrass community, yellow rabbitbrush/ bluebunch wheatgrass community, annual weedy grass-forb community, big sagebrush/weedy annual grass-forb community, irrigated pasture/agricultural crop plant community (EM Strategies 2020). In Appendix B, Section 5.2.4 (Vegetation and Wetlands) summarizes the acreages of each vegetation type found in the WAA. A portion of the survey area is classified by ODFW as low-density Greater sage-grouse (sage-grouse) habitat. Mapped mule deer and pronghorn winter ranges also occur within the WAA (Appendix A, Figure 14.).

Water resources in the Aquatic Resources Study Area available for wildlife use include wetlands, springs, creeks, a pond, an artificial waterway, tributary drainages, and one perennial stream (see Section 3.12, Surface, Subsurface, and Groundwater). The Malheur River, a perennial stream, runs roughly east to west approximately half a mile north of the proposed access road at the north end of the WAA.

3.12.1.2. Terrestrial Species

3.12.1.2.1. Big Game Species

ODFW designated winter range for mule deer (*Odocoileus hemionus*) is located within the WAA (0.5-mile buffer) (Appendix A, Figure 14.). Additionally, essential pronghorn (*Antilocapra americana*) winter range and year-round range intersect the northern portion of the WAA. Low densities of mule deer and pronghorn were observed within the northern end of the WAA where they presumably feed in the adjacent alfalfa fields. Additional herds of mule deer and pronghorn were observed during the 2017 survey where they used seeps and springs in the area. While observing locations near springs, elk (*Cervus canadensis*) scat was documented, and one bull elk individual was noted east of Sagebrush Gulch. While conducting aerial surveys for sage-grouse in 2018, groups of mule deer were recorded throughout the WAA while a herd of 30 pronghorn were observed in Cow Hollow (EM Strategies 2020). Migratory Birds & Raptors
Nongame birds encompass a variety of passerine and raptor species, including migratory bird species that are protected under the Migratory Bird Treaty Act (MBTA) (16 United States Code [U.S.C.] §§ 703-712). The MBTA prohibits the taking of migratory birds, their parts, nests, eggs, and nestlings. Executive Order 13186, signed January 10, 2001, directs federal agencies to protect migratory birds by integrating bird conservation principles, measures, and practices into projects.

Large-plot avian surveys were designed to detect large birds within a half mile of the PO boundary between June 2013 and May 2014. Seventeen species were detected, three of which accounted for 80 percent of all bird sightings—horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), and common raven (*Corvus corax*). Golden eagles were detected during all seasons, indicating two golden eagle territories occupied year-round. Other raptors detected outside of the large plots included northern harrier (*Circus hudsonius*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*), short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), and prairie falcon (*Falco mexicanus*) (EM Strategies 2020). Small plot avian surveys were completed to complement the large plot surveys, in which 47 species were detected between June 2013 and May 2014.

Raptor nest surveys were conducted in 2013, 2014, 2017, 2018, and 2020. Both aerial and ground surveys were completed during this timeframe. Golden eagle nest surveys were completed concurrently with the 2020 raptor nest survey. Results from the 2020 aerial survey yielded 49 total nests with 18 confirmed as occupied. Table 29 displays species occupancy of the confirmed nests.

Table 29. Summary of Nests Observed

Nest Type	Total Nests	Occupied Nests	Occupied By	Confirmed Nesting Attempts
Ferruginous hawk	18	5	Ferruginous hawk	5
Golden Eagle	9	1	Golden Eagle	0
Large Raptor	10	5	Red-Tailed Hawk	5
Small Raptor	7	2	Prairie Falcon	1
			Barn owl	1
Common Raven	5	5	Common Raven	5
Totals	**49**	**18**	**NA**	**17**

Source: EM Strategies 2020

3.12.1.3. Aquatic Species

Aquatic habitat within the Aquatic Resource Study Area consists of 14 springs, a piped well with adjacent ponding, a stock tank, and two ponds (EM Strategies 2020a). One perennial river (Malheur River) exists to the north of the proposed action but was not surveyed as part of the 2014 aquatic resources survey. A majority of streams within the Aquatic Resource Study Area are ephemeral in nature and lack suitable year-round habitat for aquatic species. ODFW fish distribution maps indicate that fish presence is unlikely in the Aquatic Resource Study Area. Aquatic surveys were conducted for fish and amphibians in potentially affected waters. Visual assessments of streams occurred in the Aquatic Resources Study Area between May 13 and May 15, 2014, and between October 22 and October 24, 2014, to determine if water was flowing and if electrofishing surveys were feasible. Electrofishing surveys followed the visual assessment between May 13 and May 15, 2014. No fish were captured during electrofishing efforts. Visual assessment conducted in October 2014 determined that suitable habitat was not available at that time of year; therefore, electrofishing was not possible. Fish distribution appeared limited by the lack of streams with connectivity to the WAA and the ephemeral nature of the streams did not provide suitable habitat for fish (EM Strategies 2020). The Malheur River was not surveyed. Amphibian surveys were conducted at all wetland and spring features in the Aquatic Resources Study Area between May 13 and May 15, 2014, and at sites with potential suitable habitat on October 22 and October 24, 2014 (EM Strategies 2020). No special status species were observed. One amphibian species was observed at several sites in May 2014, the Pacific treefrog (*Pseudacris regilla*). Pacific tree frogs are able to use numerous types of still or slow-flowing water for breeding, including wetlands, ponds, lakes, slow-flowing springs, irrigation ditches, road ditches, seasonally flooded pools and puddles, and deep tire ruts. Survival in seasonal waterbodies is not assured since such water may dry up before tadpoles can complete metamorphosis (WDFW 2023). During the non-breeding season, the Pacific tree frog uses various habitats that can be quite distant from water, including wet meadows, riparian areas, woodlands, pastures, and disturbed areas (ODFW 2023a). Potential Woodhouse's toad (*Anaxyrus woodhousii*) and western toad (*Anaxyrus boreas*) habitat is present throughout the Aquatic Resources Study Area, but no adult or larval toads of either species were observed (EMS 2020a). Similar to Pacific tree frog, these toads also utilize wetlands, ponds, lakes, slow-flowing springs, irrigation ditches, road ditches, seasonally flooded pools and puddles for breeding and metamorphosis.

Surveys for macroinvertebrates were scheduled to be conducted concurrently with amphibian surveys on October 22 and October 24, 2014, however protocols required that the surveys be completed in flowing water, which was absent during the October survey dates. Therefore, surveys were not completed. Species of macroinvertebrates, including mussels, peaclams, pebblesnails, and springsnails, generally require permanent and flowing water with a constant flow of food and oxygen to breed (Stantec 2024). With the streams in the Aquatic Resources Study Area being ephemeral and only containing water for short periods of time, habitat in the area is likely unsuitable for aquatic macroinvertebrates.

3.12.1.4. Special Status Species

3.12.1.4.1. Mammals

3.12.1.4.1.1. Bats

Acoustic surveys for bats were completed within the WAA (half-mile buffer) to detect bat species with the potential to occur in the area and to assess potential habitat used for foraging or roosting. No caves or mine features were observed throughout the WAA. Potential roosting habitat in the area consists of sparse rock outcrops and deciduous trees. This area has a limited number of cliff and rock outcrops. Surveys were conducted within the WAA on June 24 and October 25, 2013, and between April 8 and May 30, 2014, in areas with the highest potential of recording bats (e.g., rock outcrops, water). Additional acoustic surveys were conducted May 27 and 28 and June 21 to 23, 2017.

A total of 10 bat species were detected, as shown in Table 30: five having a sensitive protection status recognized by ODFW and two of the five species being recognized as BLM sensitive (2). California myotis was detected throughout most of the survey seasons from May to August. Silver-haired bat was also detected throughout most of the survey seasons from April to May, July, and September through October. Hoary bat, spotted bat, and pallid bat were observed for one month period respectively in September, October and July/August (EM Strategies 2020).

Table 30. Bat Species Recorded within the WAA

Common Name	Scientific Name	Listing Status	Months Observed
California myotis	Myotis californicus	ODFW Sensitive	May–August
Small-footed myotis	Myotis ciliolabrum	None	April–September
Long-eared myotis	Myotis evotis	None	July
Yuma myotis	Myotis yumanensis	None	June–July/ September–October
Hoary bat	Lasiurus cinereus	ODFW Sensitive	September
Silver-haired bat	Lasionycteris noctivagans	ODFW Sensitive	April–May/July/September–October
Canyon bat	Parastrellus hesperus	None	April–May/July–September
Big brown bat	Eptesicus fuscus	None	August
Spotted bat	Euderma maculatum	BLM Sensitive; ODFW Sensitive	October
Pallid bat	Antrozous pallidus	BLM Sensitive; ODFW Sensitive	July–August

Source: EM Strategies 2020

3.12.1.4.1.2. Pygmy Rabbit & White-tailed Jackrabbit

Generally, rabbits are found in alluvial fans, swales in a rolling landscape, large flat valleys, at the foot of mountains, along creek and drainage bottoms, in basins in the mountains, or other landscape features where soil accumulates to greater depths. They are generally on flatter ground, sometimes on moderate slopes, and not on steep ground. Burrows are normally in loamy soils deeper than 20 inches. Soil composition must support a burrow system with numerous entrances, but also soft enough for digging. In Oregon, habitat is comprised of big sagebrush inclusions mixed with low sagebrush, rabbit brush, or shorter stature big sagebrush (BLM 2008). Surveys were conducted for pygmy rabbit and white-tailed jackrabbit in 2013, 2014, and 2017. In 2013/2014, no potential suitable habitat was found for either species. Near suitable habitat was surveyed, which resulted in no sign (e.g., burrows, scat, tracks) of either species being detected. Individuals or sign from either species were not detected during any other survey conducted in the WAA in 2013/2014. There were no sightings of pygmy rabbits or white-tailed jackrabbits during the 2017 surveys; however, suitable habitat was found for both species. Further investigation of suitable habitat was conducted but no sign was observed for either species (EM Strategies 2020).

3.12.1.4.1.3. Bighorn Sheep

The species range for bighorn sheep (*Ovis canadensis*) overlaps with the WAA (McKerrow 2018). The northern edge of the Lower Owyhee Herd Range is located approximately 4.9 miles south of the proposed mine (ODFW 2016). This species was not addressed in the Wildlife Resources Baseline Report (EMS 2020), but individuals dispersing from the herd range could be present in the project vicinity.

3.12.1.4.2. Birds

3.12.1.4.2.1. Eagles

Bald and golden eagles are protected under the MBTA and the Bald and Golden Eagle Protection Act (BGEPA), which are enforced by the USFWS. The BGEPA (16 U.S.C. 668) applies primarily to taking, hunting, and trading activities that involve any bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aquila chrysaetos*) and prohibits the direct or indirect take of an eagle, eagle part or product, nest, or egg. The term “take” as used in the act includes “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.” The bald eagle is also listed as sensitive by the BLM.

Suitable nesting and foraging habitats for golden eagles exists within the WAA, which includes rock outcrops and trees for nesting and sagebrush steppe and grassland habitat for foraging. Aerial surveys completed in 2020 resulted in the observation of nine golden eagle nests, one of which was confirmed to be occupied (EM Strategies 2020). Bald eagle habitat is more limited, with a small amount occurring on private property in the north end of the WAA. One bald eagle nest was found on Russell Road near the Malheur River in 2023 (BLM 2025c).

3.12.1.4.2.2. *Migratory Birds and Raptors*

Within the WAA, potential habitat exists for raptors and migratory birds, including sagebrush steppe habitat with perennial grasslands and exotic annual grassland, exposed rock formations, wetland features, trees, and transmission line towers. Avian species listed as state sensitive, and BLM sensitive with potential to occur in the WAA are compiled in Table 31.

Table 31. Avian Special Status Species with the potential to occur in the WAA

Common Name	Scientific Name	Listing Status
American White Pelican	Pelecanus erythrorhynchos	ODFW Sensitive; BLM Sensitive
Bald Eagle	Haliaeetus leucocephalus	BLM Sensitive
Black-necked Stilt	Himantopus mexicanus	ODFW Sensitive;
Bobolink	Dolichonyx oryzivorus	ODFW Sensitive; BLM Sensitive
Burrowing Owl	Athene cunicularia hypugaea	ODFW Sensitive;
Caspian Tern	Hydroprogne caspia	ODFW Sensitive
Ferruginous Hawk	Buteo regalis	ODFW Sensitive
Franklin's Gull	Leucophaeus pipixcan	BLM Sensitive
Grasshopper sparrow	Ammodramus savannarum	BLM Sensitive
Greater Sandhill Crane	Antigone canadensis tabida	ODFW Sensitive;
Greater Sage-Grouse	Centrocercus urophasianus	ODFW Sensitive; BLM Sensitive
Long-billed Curlew	Numenius americanus	ODFW Sensitive;
Peregrine Falcon (American)	Falco peregrinus anatum	ODFW Sensitive;
Purple Martin	Progne subis	BLM Sensitive
Snowy Egret	Egretta thula	ODFW Sensitive; BLM Sensitive
Swainson's Hawk	Buteo swainsoni	ODFW Sensitive;
Tricolored Blackbird	Agelaius tricolor	BLM Sensitive
Trumpeter Swan	Cygnus buccinator	ODFW Sensitive; BLM Sensitive
Willow Flycatcher	Empidonax traillii	ODFW Sensitive;

Sensitive species observed in the WAA included tricolored blackbird and ferruginous hawk. Ferruginous hawk and tricolored blackbird were observed during the avian surveys described in Section 3.12.1.2 and Table 31. A total of 18 ferruginous hawk nests were located with five being confirmed as active nests.

3.12.1.4.2.3. *Western Burrowing Owl*

The western burrowing owl is listed as a State of Oregon sensitive species. Burrowing owl habitat typically consists of open landscapes with sparse vegetation, short grass, and bare soils (USFWS 2024). Broadcast call surveys were conducted on May 17 and 18, June 21 and 22, July 3 and 4, 2017, within the WAA (half-mile buffer) for burrowing owls. No nests or individuals were observed or heard. Incidental sightings of burrowing owls were recorded throughout all survey events, in which three individuals were observed in 2013 during the large-plot avian surveys and raptor nest ground surveys. One active burrow was located during ground surveys by the presence of an adult owl and an abundance of pellets and excrement of this species at the burrow entrance. No other burrowing owl activity was observed during subsequent surveys (EM Strategies 2020).

3.12.1.4.2.4. Greater Sage-grouse

In 2015, ODFW developed the Oregon Sage-Grouse Action Plan (Action Plan) through the Sage-Grouse Conservation (SageCon) Partnership, an Oregon-based collaborative effort jointly convened by the State of Oregon through the Governor's Natural Resources Office, the BLM, and the Natural Resources Conservation Service (NRCS). The Action Plan is intended to articulate and achieve Oregon's vision for the conservation of the greater sage-grouse (*Centrocercus urophasianus*) and its habitat in Oregon (SageCon 2015). Furthermore, the 2025 SGRMPA ROD was signed in January 2025 to amend the 2015 plan to build on specific greater sage-grouse goals, objectives and management from previous planning efforts (BLM 2025). Prior to October 2, 2015, the greater sage-grouse was a candidate for federal listing under the Endangered Species Act. On October 2, 2015, the USFWS released their 12-month finding on a petition to list the greater sage-grouse as an endangered or threatened species and concluded that listing the greater sage-grouse is not warranted at that time (USFWS 2015).

The WAA is located in the northeast corner of the Northern Basin and Range ecoregion. Greater sage-grouse is a ground-nesting bird species of importance in Oregon and is in decline due to habitat loss from fire, drought, and invasive species (ORBIC 2019).

Low-density habitat has been identified within the WAA while sage-grouse core habitat has been identified further to the west. Greater sage-grouse habitat within the WAA includes big sagebrush shrubland communities with a mixture of forbs in the understory for forage. Big sagebrush with a sufficient understory of forbs provides cover and forage for individuals. There are no known leks occurring within four miles of the Proposed Action. The closest known lek is approximately 4.6 miles to the west. Brood rearing surveys, winter use surveys, and lek surveys were conducted in 2013 and 2014. No birds were encountered, nor were feathers, tracks, or scat found for either brood rearing surveys or winter use surveys. Additionally, no known greater sage-grouse leks are known to exist within 4 miles of the WAA. No sign of this species was found during any surveys prior to the April lekking season; therefore, there were no areas of potential concentration to be checked for leks. Listening for drumming males during the hour before and after sunset (on April 10 and April 28, 2014) yielded no detections of greater sage-grouse or their leks. The same survey methods were used in 2017 and 2018. The surveys for 2017/2018 yielded the same results with no birds, feathers, tracks, or scat found. Ten hours of aerial transect surveys were conducted with no detection of greater sage-grouse leks (EM Strategies 2020).

3.12.2. Environmental Consequences

3.12.2.1. Analysis Method

Review of the ORBIC and the BLM GeoBob databases was conducted to determine habitat overlap with the PO boundary, areas of disturbance and areas fenced off from wildlife. Following the desktop survey, site surveys were conducted multiple years and at various times to verify presence/absence of special status species. Additionally, review of various wildlife policies and regulations (ODFW/USFWS/BLM) was conducted to ensure that adequate buffers were applied to adequately analyze the impacts to wildlife from the Proposed project.

For the purposes of this analysis, short-term effects were considered to occur through pre-production construction (two years) and eight years of mining and processing. Long-term effects were defined as occurring during the four-year-long mine closure period and extending through the reclamation period which would last until monitoring indicated reclamation conditions were met, a total of approximately 30 over the life of the project.

3.12.2.2. No-Action Alternative

Under the No Action Alternative, Calico would still conduct notice level work on BLM lands limited to up to five acres of ground disturbance at a time on its valid mining claims. Calico would be required to reclaim that land once the notice level work was completed. The facilities (the processing plant, mine support facilities, basalt quarry, transmission line, and access road upgrades) that Calico proposes to build on BLM administered lands would not be constructed and mining would not occur. Due to the small acreages involved in the notice-level work (up to five acres followed by rehabilitation), there would be no effects to wildlife or wildlife habitats from the No Action Alternative.

3.12.2.3. Proposed Action

Effects to wildlife from mine-related surface disturbance would include short-term and long-term impacts to habitat including removal, visual disturbance, and noise disturbance. Species or group specific impacts are discussed in the sections below. The vegetation cover types and associated acreage of the analysis area that would be disturbed are discussed in Appendix B, Section 5.2.4 (Vegetation and Wetlands). Disturbance would include installation of a perimeter fence around approximately 738.5 acres of the 1,655 PO boundary acres, which would be unavailable to some wildlife for the life of the mine operations and decommissioning. The impacts due to loss of habitat would vary depending on wildlife species and their ability to access the closed area. Approximately 367 acres of the area located within the perimeter fence would be disturbed for facilities associated with the mining operations. Habitat loss from removal associated with the mine or access restriction to otherwise intact habitat within the fenced area would result in direct habitat losses to small mammals, birds, and reptiles, and the displacement of larger, more mobile species into adjacent habitats. Mine-related surface disturbance also would result in long-term increase in habitat fragmentation at the mine site as it would persist until reclamation has been completed, up to 30 years or until vegetation has re-established. Short-term effects associated with mine operations would include increased noise, additional human presence, and the potential for increased vehicle-related mortalities. The degree of the effects on wildlife species would depend on factors such as the sensitivity of the species, seasonal use patterns, type and timing of project activity, and physical parameters (e.g., topography, cover, forage, and climate). The disturbance associated with the proposed project would be reclaimed following completion of mining activities. As described in the Wildlife Mitigation Plan (MB&G 2023), reclamation efforts must result in an ecosystem that is comparable to nearby undamaged ecosystems and is self-sustaining. The Proposed Action's reclamation plan (Calico 2023a) describes how this outcome would be achieved including reclamation actions to be implemented and post-closure monitoring of reclaimed areas. In addition to facility removal and disturbed area restoration, the reclamation plan describes noxious weed monitoring and control. This is further detailed in the Noxious Weed Plan for the Project (Calico 2023b).

3.12.2.3.1. Terrestrial Species

3.12.2.3.1.1. Big Game Species

Ungulate species tend to move away from areas of human activity and roads, reducing habitat use near the disturbance areas (Cole et al. 1997; Sawyer et al. 2006). Displacement distances are strongly influenced by the level and timing of human activity, topography, and the presence of vegetation, presumably due to noise attenuation and visual cover (Cole et al. 1997; Lyon 1979). Displacement of ungulates is greatest for heavily traveled access roads (Ward 1976).
Potential effects to mule deer would include reduction of potential forage and the increase in habitat fragmentation due to the development and operation of the mine and ancillary facilities. The northernmost five miles of the main access road to the mine site intersects with mule deer winter range. During the short-term, increased traffic related to the proposed action would increase the potential for wildlife-vehicle collisions. However, in mule deer winter-range habitat, noise-producing, ground-disturbing activities (e.g., road construction or widening) would be avoided from December 1 to March 31, which would reduce effects to this species. With increased traffic on the access road, it is likely that mule deer would avoid the area and move to more suitable habitat. Studies have shown that mule deer and other ungulates avoid roads due to noise produced by traffic (Kleist et al. 2021). To reduce wildlife–vehicle collisions, a combination of project design features have been identified by the Applicant in the wildlife protection plan (MB&G 2023), including imposing a maximum speed limit of 35 mph for mine vehicles on access roads, requiring bussing of employees to reduce traffic, and environmental training.

Effects to pronghorn would be similar to those described for mule deer. Potential effects would include the reduction of winter range and year-round habitat along the main access road. As discussed in Chapter 2, Section 2.2.1, an existing road is currently present in the area; however, improvements are needed to account for heavy equipment and mine-related traffic. The increase in vehicle traffic, both mining and recreation related, and noise from ground-disturbing activities have the potential to cause displacement.

The short-term impacts to ungulates would occur during construction, approximately two years, as there would be an increase in vehicle traffic, including large, heavy equipment. Long-term (3+ years, during operations, decommissioning and reclamation) impacts are unlikely as ungulates would most likely disperse to more suitable habitat in order to avoid the mine site and associated activities. The loss of approximately 739 acres, which would be fenced off from ungulate access, would not trend any species towards listing as threatened and endangered.

3.12.2.3.2. Aquatic Species

Effects to aquatic species are expected to be low as there is limited suitable habitat for fish, amphibians, and aquatic macroinvertebrates due to the ephemeral nature of the streams in the WAA and Aquatic Resource Study Area. Due to the fish barrier downstream at Rye Field Reservoir and the ephemeral nature of the stream channels in the area, fish species are unlikely to occur in the area or be affected. Since the springs and streams in the area of analysis are unsuitable for many aquatic macroinvertebrates, there would be no effects to these species.

No special status amphibian species were observed in the area; however, Pacific tree frog was found in multiple locations. Pacific tree frog is adapted to use a variety of wet habitats, including ephemeral wetlands and springs, riparian areas, and pastures (EM Strategies 2020). The presence of Pacific tree frog indicates it is possible for other amphibians who utilize a variety of habitats to be present, and adverse impacts could occur to these species. These amphibians could be run over by vehicles and equipment, experience mortality of tadpoles from reduced water in ephemeral wetlands and springs that dry up before metamorphosis can be achieved, and possible injury from toxins in the TSF (Stantec 2024). To reduce these risks, Calico would implement the wildlife protection plan (MB&G 2023) which includes measures to monitor supernatant liquids within the TSF as well as manage the TSF to remove any encroaching vegetation which may attract wildlife. In addition, the spring and seep monitoring and mitigation plan (SLR 2023b) describes monitoring requirements for seeps and springs. Mitigation would be triggered if baseline conditions, such as flow rate, deteriorate. Impacts to amphibians may occur; however, the monitoring and mitigation plans referenced above are expected to reduce the risk of impact and provide compensatory mitigation should impacts occur.

Short term impacts, two years during construction, to aquatic species, specifically toads, include the loss of habitat and mortality associated with road improvements and the development of the mine and ancillary facilities. While toads are classified as amphibians and therefore an aquatic species, they spend the majority of their life underground and utilize aquatic habitats for breeding and metamorphous from tadpole to adult. It is anticipated that there would be adult toad mortality with the movement of soils. However, the loss of adult toads would not trend the species towards listing as Threatened or Endangered, therefore there would be no long-term effects, 3+ years or until reclamation has been concluded.

3.12.2.3.3. Migratory Birds

The Project is located within the Pacific Flyway for migratory birds. Migrating birds traveling along the Pacific Flyway would pass over the Proposed Action Area where the TSF pond may appear an attractive surface waterbody to species reliant on ponds, lakes and wetlands. A number of areas within TSFs, particularly supernatant and tailings beaches, resemble natural habitats and attract some bird species despite a lack of food. Regular disturbance of the TSF as described in Chapter 2, Section 2.2.4, would prevent establishment of aquatic plants and invertebrates, so there would not be a notable number of plants and insects to forage upon in this location, which is beneficial for wildlife (Stantec 2024). Additionally, maintaining WAD cyanide levels at one milligram per liter in the TSF and regularly monitoring the levels; and using Bird Ball Deterrents in the reclaim pond and monitoring their effectiveness as described in the Wildlife Protection Plan (Mason, Bruce, and Girard, 2022) would minimize injury to birds in this area. Calico is also following the BLM Technical Note 457 on BMPs for Night Sky and Dark Environments which would minimize lighting impacts on birds (Sullivan et al. 2023). The TSF would be dewatered, covered, and re-vegetated during reclamation, so there would be no long-term risk of cyanide exposure to wildlife after reclamation is complete.

Short term impacts to migratory birds, including waterfowl, wading birds and other passerines would occur during construction, approximately two years, as potential habitat is destroyed. Additionally, nest failure would potentially occur during this time if construction activities occurred adjacent to active nests. However, by avoiding construction activities during breeding and nesting season, impacts would be minimized. Long-term impacts would not occur as migratory birds would move to more suitable habitat in subsequent years during breeding and nesting season.

3.12.2.3.4. Special Status Wildlife Species

During the short-term mining operation period, effects to special-status raptors, including ferruginous hawk, golden eagle, and burrowing owl would result from potential exposure to cyanide and other contaminants at the supernatant pond if the pond is used as a water source and design features intended to prevent toxicity fail. Raptors and their prey could also be exposed to several toxic metals (i.e., arsenic, chromium, copper, lead, manganese, mercury, and nickel) at the TSF (Durkalec et al. 2022). As described for aquatic species, Calico will implement the wildlife protection plan (MB&G 2023) to reduce these risks. Raptors may also be affected by noise disturbance during mating and nesting, light pollution, and vehicle strikes on access roads. The 34.5-kilovolt transmission line would pose as an electrocution hazard for raptors attempting to perch on these structures. However, this transmission line would be built to Idaho Power Company's Zone 3 standards that would minimize raptor electrocutions and collision potential (Nugent 2021).

The four special status bat species (hoary bat, silver-haired bat, spotted bat, and pallid bat) observed in the WAA during the acoustic surveys would potentially be affected. These species may use the TSF or reclaim pond as a water and foraging source, thus being exposed to cyanide. However, Calico would maintain WAD cyanide levels at one milligram per liter and regularly monitor the levels as noted in section 3.17.3.2.2. In addition, using Bird Ball deterrents in the reclaim pond and monitoring their effectiveness as described in the Wildlife Protection Plan (Mason, Bruce, and Girard, 2023) would minimize injury to bats in this area. Bats may also be susceptible to ingestion of metals that may be present in the TSF pond if they ingested the water (i.e., arsenic, chromium, copper, lead, mercury, and nickel) or from bioaccumulation of metals if the insects they feed on have been contaminated (Currie et al. 2000).

Bright lighting used as a wildlife deterrent or for project-related activities would also affect special status bat species. While bats tend to avoid brightly lit areas and have a reduced possibility of drinking within the presence of light (Bates 2019); however, lighting used at night would attract insects potentially bringing bats into the mining operations area where they would encounter toxic substances. Effects of light pollution on bats would include effects to foraging movement, roosting, breeding, and hibernation (Cravens and Boyles 2018). These effects would be long-term, through decommissioning when the facilities have been removed and lighting is no longer required in the area, approximately 14 years. Calico would follow BLM Technical Note 457 which includes BMPs for night skies and dark environments (Sullivan et al. 2023) which would minimize lighting impacts on bats.

No high-quality suitable habitat or sign was found for special status leporids (pygmy rabbit and white-tailed jackrabbit); therefore, no effects to these species are expected.

Bighorn sheep occupy habitat approximately 4.9 miles south of the proposed mine. Dispersing individuals may traverse the areas adjacent to and within the project area. Effects could include disturbance of individuals passing through the area, resulting in their avoidance of the human activities associated with the mine. If big horn sheep are seen in the area, Calico would be required to notify the BLM immediately in order to alleviate any potential adverse effects. ODFW designates portions of the permit area and the WAA as low-density greater sage-grouse habitat with a greater sage-grouse core area designated approximately 8.9 miles west of the Permit Area boundary. Due to the lack of high-quality suitable habitat, effects to the species are expected to be low. While there were no signs of greater sage-grouse within the PO boundary, the Proposed Action would affect greater sage-grouse habitat due to the effects of human presence, construction and operation of the mine, including the addition of infrastructure such as fences, roads, and electrical lines. Predators have utilized transmission lines as perches for avian predators, however, project design features such as predator deterrents on structures would minimize these occurrences. Fences can cause direct mortality due to collisions as well as provide perches for avian predators (Van Lanen et al. 2017). If fences are constructed in priority sage grouse habitat, they would be fitted with reflectors to reduce collision with fences.

Anthropogenic noise has the potential to affect greater sage-grouse in the area. Anthropogenic noise can cause chronic physiological stress, which can affect reproductive success, survival, and disease resistance (Blickley et al. 2012), and greater sage-grouse may avoid areas with noise from vehicular traffic. Anthropogenic noise disturbance can also have several negative impacts on greater sage-grouse behavior, including declines in lek attendance (Blickley et al. 2012) and interference with bird vocalizations important for mating and parent–offspring communication (Blickley and Patricelli 2012). Based on site-specific noise data, Calico's Baseline Noise Report (Creative Acoustics Northwest 2019) determined the wildlife sensitivity threshold to be 28 dBA (A-weighted decibel) for the Project site and surrounding habitat. Noise created by the Proposed Action during both construction and operations, except blasting, is expected to attenuate to a level below the sensitivity threshold of 28 dBA within approximately three miles from the mining facilities (BKL 2023). Noise produced by blasting is instantaneous and episodic and would occur over a 29-day period during construction followed by approximately two blast events per week during operations. During operations, blasting would occur only during daylight hours and would not occur for two hours after sunrise and two hours before sunset. To minimize noise impacts on greater sage-grouse and other wildlife, Calico would avoid blasting for construction from March 1 through June 30. If it is determined that blasting must occur during this period, Calico would coordinate with ODFW in advance to determine appropriate measures to reduce or avoid impacts (Mason, Bruce & Girard 2023).

Constituents in the TSF pond would pose a risk to greater sage-grouse if individuals are able to access and use the water source. However, Calico would conduct the following quarterly monitoring and reporting:

- Results of regular sampling and testing of the contact waters stored in the TSF and reclaim pond to demonstrate they consistently remain non-toxic to wildlife species that might come into contact with them. Monitoring will include at least quarterly repetition of the ecological risk assessment for likely wildlife receptors,

- Record of any wildlife mortality events, and
- Any adaptive measures implemented during the year to address wildlife protection issues (Mason, Bruce & Girard 2023).

3.12.2.4. Irretrievable and Irreversible Impacts

There would be no irretrievable nor irreversible impacts to wildlife. None of the activities associated with the proposed project would trend any species towards listing as Threatened and Endangered. There is no designated critical wildlife habitat located within the PO boundary. Additionally, project design features would be utilized to minimize adverse effects, such as vegetation reclamation to provide habitat once the mine has closed.

3.12.2.5. Reasonably Foreseeable Environmental Effects Scenario Analysis

There are no reasonably foreseeable future environmental effects based on Table 7 (Section 3.2).

4. Consultation and Coordination

4.1. Consultation and Coordination with Agencies and Tribal Governments

This section describes the specific actions the Bureau of Land Management (BLM) has taken to consult and coordinate with Native American tribes, cooperating agencies, and other government agencies. Various federal laws require the BLM to consult with Native American tribes, the State Historic Preservation Office (SHPO), the U.S. Fish and Wildlife Service (USFWS), and the U.S. Environmental Protection Agency (USEPA), and cooperating agencies during the National Environmental Protection Act (NEPA) decision-making process. In addition to formal scoping, the BLM implemented collaborative outreach and a public involvement process that included inviting agencies to be cooperative partners for the EIS NEPA process.

4.2. Government-to-Government Consultation with Native American Tribes

Tribal consultation is ongoing.

Pre-scoping and requests for consultation letters were sent to the following tribes in March 2023 and November 2023:

March 2023

- Burns Paiute Tribe
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of the Warm Springs Reservation
- Shoshone-Paiute Tribes of the Duck Valley Indian Reservation
- Shoshone-Bannock Tribes of the Fort Hall Indian Reservation
- Fort McDermitt Shoshone Paiute

November 2023

- Burns Paiute Tribe
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of the Warm Springs Reservation
- Duckwater Shoshone Tribe of the Duckwater Reservation
- Fort Bidwell Indian Community of the Fort Bidwell Reservation of California
- Fort McDermitt Paiute Shoshone Tribe
- Klamath Tribes
- Lovelock Paiute Tribe of the Lovelock Indian Colony
- Pyramid Lake Paiute Tribe of the Pyramid Lake Reservation
- Reno-Sparks Indian Colony
- Shoshone-Bannock Tribes of the Fort Hall Indian Reservation
- Shoshone-Paiute Tribes of the Duck Valley Indian Reservation
- Summit Lake Paiute Tribe
- Te-Moak Tribe of Western Shoshone Indians of Nevada

- Winnemucca Indian Colony of Nevada

4.3. Cooperating Agencies

This section lists agencies/counties that were invited to be cooperating agencies. In addition, agencies participating as cooperating agencies are outlined below. A cooperative agency is any federal, state, or local government agency or Native American tribe that enters into a formal agreement with the lead federal agency to develop an environmental impact statement. To prepare this EIS, BLM coordinated with the following entities:

- USEPA (Cooperating Agency)
- Oregon Department of Geology and Mineral Industries (DOGAMI) (Cooperating Agency)
- USFWS
- Malheur County.

4.4. Public Involvement

Public involvement in the EIS process included the steps necessary to identify and address public concerns and needs. The public involvement process assists agencies in: (1) broadening the information base for decision making; (2) informing the public about proposed actions and potential short and long-term impacts that could result from a project.
Public participation in the EIS process occurs at several stages.

- Scoping: The public is provided a 30-day scoping period to inform an agency of potential issues and concerns associated with the project being proposed. Information obtained by the agencies during the public scoping is combined with issues identified by the agencies, and this forms the scope of the EIS.

- Draft EIS Comment Period: A 30-day Draft EIS comment period is initiated by publication of a Notice of Availability for the Draft EIS in the *Federal Register*. Public meetings, both in person and/or virtually, are held during this time period.

- Final EIS/ Record of Decision (ROD) Availability Period: A 30-day Final EIS Appeal period is initiated by publication of a Notice of Availability for the Final EIS in the *Federal Register.*

4.4.1. Scoping

The BLM published a Notice of Intent (NOI) to prepare this Draft EIS (DEIS) in the Federal Register on March 18, 2024. The NOI invited the public to submit scoping comments to be sent to the BLM from March 18 through April 17, 2024. The BLM also sent a press release to local newspapers. Public scoping meetings were held on April 3 and 4, 2024, in Vale and Jordan Valley, Oregon, respectively. The NOI and news release notified the public of the BLM's intent to prepare an EIS, provided information about the Proposed Action, described the purpose of the scoping process, identified methods to provide comments, and provided contact information for questions regarding the Project.

As part of this scoping period, the BLM held two public scoping meetings in Vale and Jordan Valley, Oregon, on April 3 and 4, 2024, respectively, along with an online component to the April 3 meeting. The scoping meetings provided an opportunity for the public, community, interest groups, media, and government agencies to obtain more information on the project, learn more about the environmental review processes, ask questions regarding the project, and provide comments on the project. The BLM asked the public to provide written comments via the BLM e-Planning site, public meetings, e-mail, and postal mail. By the close of the scoping period, 21 comment documents had been received. The BLM reviewed the scoping comments and the Draft EIS was prepared.

4.4.2. Draft EIS Comment Period

A 30-day Draft EIS comment period is initiated by publication to the EPA and posted to ePlanning. Public meetings will be held to inform the public of the Project, answer questions, and offer guidance on how to be most helpful with comments. All public comments received during the public comment period on the Draft EIS will be reviewed, and substantive comments will receive responses. Responses to comments will be appended to the Final EIS.

4.5. List of Preparers

Name	Organization	Title
Andrea Bowen	BLM Medford District Office	Geologist
Brandon Sikes	BLM OR/WA State Office	Lands and Realty Specialist
Caroline Chang	BLM Vale Field office	Geologist
Caryn Burri	BLM Vale Field office	Planning and Environmental Coordinator
Dustin Wharton	BLM OR/WA State Office & Vale Field Office	Actin Field Manager
Gretta Krost	BLM OR/WA State Office	Geologist
Jeremey Vargas	BLM Vale Field office	Planning and Environmental Coordinator
Kari Points	BLM Vale Field office	Recreation and Visual Management Specialist
Laura Brockington	BLM Vale Field office	Natural Resource Specialist
Marissa Russell	BLM Vale Field office	Geographic Information Specialist
Matt Hoffman	BLM Vale Field office	Archaeologist
Michael Brown	BLM OR/WA State Office	Natural Resource Specialist
Monica Ketcham	BLM Vale Field office	Wildlife Biologist
Russell Bond	BLM Vale Field office	Range Management Specialist
Susan Fritts,	BLM Vale Field office	Assistant Field Manager
Tye Morgan	BLM OR/WA State Office	Planning and Environmental Coordinator
Allessandra Capretti	HDR	Contractor
Brandon Jones	HDR	Contractor
Cheryl Reed	HDR	Contractor
Elizabeth Allen	HDR	Contractor
Jennifer Ferris	HDR	Contractor

Name	Organization	Title
Kyle Larsen	HDR	Contractor
Lesley Thode	HDR	Contractor
Steven Peluso	HDR	Contractor
Suzanne Cavanagh	HDR	Contractor
Charlie Mumford	SLR	Contractor
Connor Dickes	SLR	Contractor
Jeremy Scott Collyard	SLR	Contractor
Rick Black	SLR	Contractor
R. Scott Miller	SLR	Contractor
Sarah Kronholm	SLR	Contractor
Tina Barber	SLR	Contractor
Tom Patterson	SLR	Contractor
Trent Toler	SLR	Contractor
Wendy Wente	Mason, Bruce & Girard	Contractor
Debra Struhsacker	Struhsacker Consulting	Contractor