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

Gibellini Vanadium Mine Project

Draft Environmental Impact Statement

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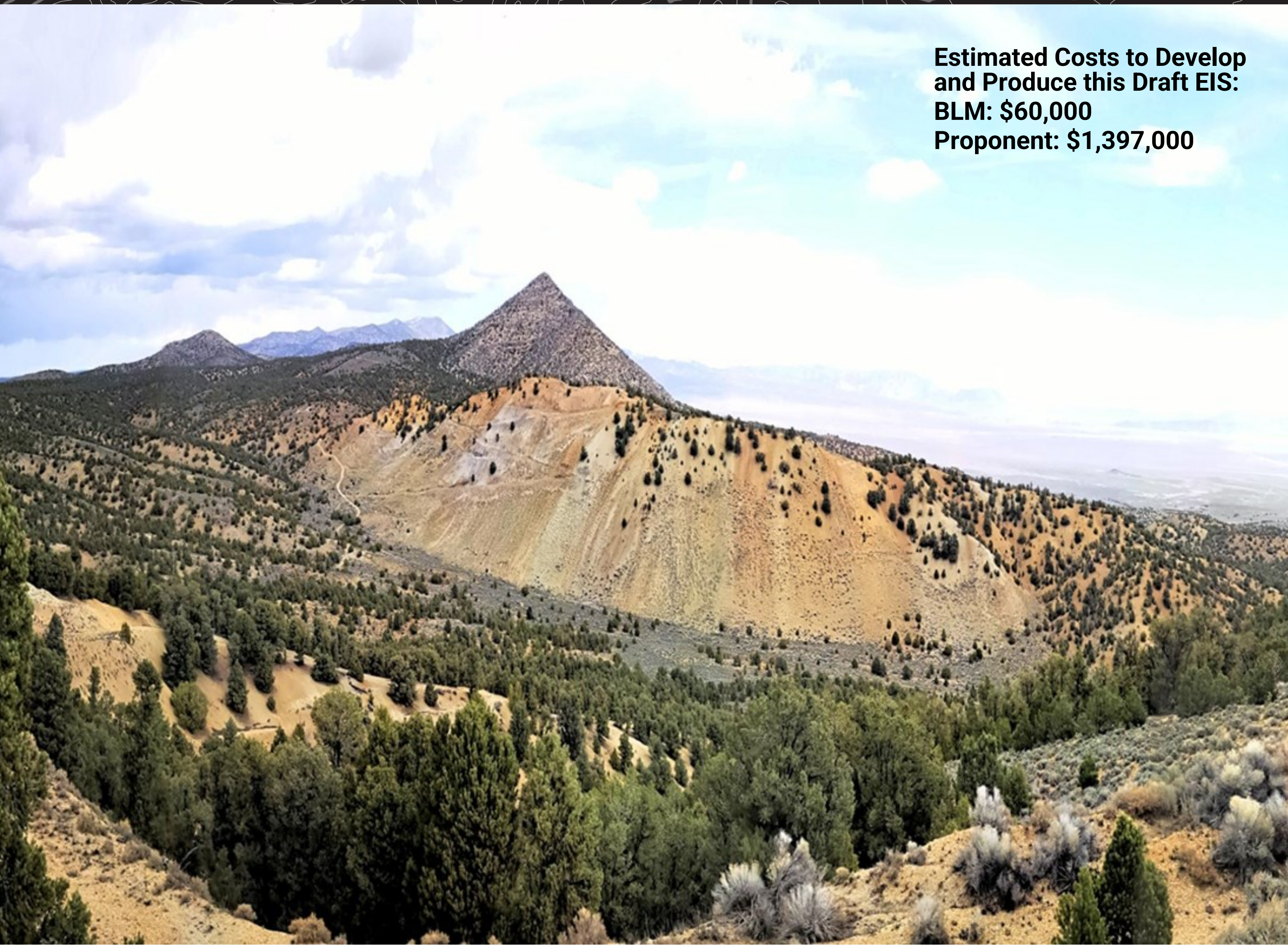

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Bureau of Land Management
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, NV 89820

Draft Environmental Impact Statement for the Gibellini Vanadium Mine Project

(X) Draft	**( ) Final**
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Cooperating Agencies:	U.S. Environmental Protection Agency U.S. Fish and Wildlife Service Nevada Department of Wildlife Nevada Department of Natural Resource Conservation (Sagebrush Ecosystem Technical Team) Eureka County
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ABSTRACT

This Draft Environmental Impact Statement (EIS) analyzes the potential direct, indirect, and cumulative impacts associated with the proposed Gibellini Vanadium Mine Project Plan of Operations. The proposed Project consists of construction and operation of an open pit mine, rock disposal area, crushing facilities and stockpile, heap leach pad, process facility, process and make-up water ponds, borrow areas, mine and access roads, water and power supply lines, ancillary facilities, and continued exploration activities on public lands within the Project area in Eureka County, Nevada. The estimated mine life would consist of 1.5 years of construction, 7 years of operation, 4 years of active reclamation and closure, and up to 30 years of post-closure monitoring. More information is available at: https://go.usa.gov/xf2GR.

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EXECUTIVE SUMMARY

The United States (U.S.) Department of the Interior (DOI), Bureau of Land Management (BLM) prepared this Environmental Impact Statement (EIS) in response to a Plan of Operations submitted by Nevada Vanadium Company (NVV) for the Gibellini Vanadium Mine Project (Project). The Project consists of construction and operation of an open pit mine and process facility, and continued exploration activities on public lands within the Project area in Eureka County, Nevada.

The U.S. Fish and Wildlife Service, the Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, and Eureka County are official cooperating agencies for preparation and review of this EIS. The U.S. Environmental Protection Agency and the Nevada Division of Environmental Protection have agency-wide Memoranda of Understanding with the BLM for coordination on National Environmental Policy Act of 1969 projects, and both actively coordinated with the BLM on this EIS.

PROPOSED ACTION

Under the Proposed Action, NVV would construct and operate an open pit mine in the southern extent of the Fish Creek Range. Facilities associated with the Proposed Action include development of an open pit mine, rock disposal area, crushing facilities and stockpile, heap leach pad, process facility, process and make-up water ponds, borrow areas, mine and access roads, water and power supply lines, and ancillary facilities. The estimated Project life consists of 1.5 years of construction, 7 years of operation, 4 years of active reclamation and closure, and up to 30 years of post-closure monitoring. In addition, NVV would complete exploration activities as part of the Proposed Action. The Project area consists of a total of 6,456 acres of BLM-administered land, on which approximately 806 acres of surface disturbance would occur due to Project-related activities. No state or private lands are included in the Project Area. Surface disturbances under the Proposed Action, with the exception of the 85-acre open pit, would be reclaimed by the Applicant with the intent to reclaim areas within the Project area to a beneficial post-mining land use, prevent unnecessary degradation of the environment, and reclaim disturbed areas to ensure visual and functional compatibility with surrounding areas. The 85-acre open pit would not be reclaimed. Final reclamation of the Project area would occur at the end the Project although every effort would be made to identify concurrent reclamation opportunities during the life of the operation.

SOUTH ACCESS ROAD ALTERNATIVE

The South Access Road Alternative would include the same mine components as described for the Proposed Action, except the access road would be constructed in a different location. This alternative access road would be approximately 7 miles long and extend from County Road M-103 (Duckwater Road) to the Project area. The access road would be constructed parallel to the power line corridor. Overall, this alternative would result in approximately 38 additional acres of surface disturbance relative to the Proposed Action. Total surface disturbance would consist of 844 acres of BLM-administered land. Post-reclamation topography would be similar to that of the Proposed Action, except the access road would be in a different location and would not be reclaimed.

RENEWABLE ENERGY ALTERNATIVE

The Renewable Energy Alternative would consist of the same overall activities as described for the Proposed Action except this alternative would include supporting the mine operations with a combination of renewable energy and a utility interconnection with future large-scale battery storage. This alternative would include the installation of enough Solar Electric Photovoltaic capacity so the site would become a net generation facility with battery storage to perform peak smoothing and daily load management as well as provide a sustainable long-term power source servicing the remote electrical needs of southern Eureka County and northern Nye County.

This alternative would result in approximately 33 additional acres of permanent surface disturbance compared to the Proposed Action because the solar facility would not be reclaimed at the end of the Project. Total surface disturbance for the Renewable Energy Alternative would consist of 839 acres of public land.

NO ACTION ALTERNATIVE

Under the No Action Alternative, the Plan of Operations would not be authorized by the BLM, and the activities described in the Proposed Action would not occur. Mineral resources would remain undeveloped, and the construction and operation of the proposed mining and associated facilities would not occur.

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ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AAQS	Ambient Air Quality Standards
ABA	acid base accounting
ac-ft/yr	acre-feet per year
AMV	ammonium meta vanadate
ANFO	ammonium nitrate–fuel oil
APE	area of potential effects
ARMPA	Approved Resource Management Plan Amendment
AUM	animal unit month
AVC	American Vanadium Corporation
AWRMP	Adaptive Waste Rock Management Plan
Basin 155A	Little Smoky Valley Hydrographic Basin (Northern Part) – Nevada Hydrographic Basin 155A
BLM	Bureau of Land Management
BMP	best management practice
BMRR	Bureau of Mining Regulation and Reclamation
$CaCO_3$	calcium carbonate
CCS	Conservation Credit System
CEQ	Council on Environmental Quality
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CO_2	carbon dioxide
COPC	constituent of potential concern
dB	decibel
dBA	A-weighted decibel
DOI	U.S. Department of the Interior
E-cell	evaporation cell
ECP	Eagle Conservation Plan
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EPM	Environmental Protection Measure
ET	evapotranspiration

FLPMA	Federal Land Policy and Management Act
GHG	greenhouse gas
GHMA	General Habitat Management Area
gpm	gallon per minute
HCT	humidity cell test
HDPE	high-density polyethylene
HLP	Heap Leach Pad
HMA	Herd Management Area
HPTP	Historic Properties Treatment Plan
I-	Interstate
ILS	Intermediate Leach Solution
IMPLAN	Impact Analysis for Planning
IPCC	Intergovernmental Panel on Climate Change
KOP	Key Observation Point
kV	kilovolt
L_{dn}	day-night average sound level
L_{eq}	equivalent sound level
LOS	level of service
MCE	maximum credible earthquake
mg/L	milligrams per liter
MOA	Memorandum of Agreement
MSHA	Mine Safety and Health Administration
MW	megawatt
MWMP	meteoric water mobility procedure
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NBAPC	Nevada Bureau of Air Pollution Control
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NNP	net neutralization potential
NOI	Notice of Intent
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places

NRS	Nevada Revised Statute
NVV	Nevada Vanadium Company
OHMA	Other Habitat Management Area
PAG	Potentially Acid Generating
pCi/g	picocuries per gram
PCS	petroleum-contaminated soil
PHMA	Priority Habitat Management Area
PLS	Pregnant Leach Solution
PMU	Population Management Unit
Project	Gibellini Vanadium Mine Project
PSE	Process Solution Evaporation
PV	photovoltaic
RDA	rock disposal area
RFFA	reasonably foreseeable future action
RMP	Resource Management Plan
ROW	right-of-way
SARA	Superfund Amendments and Reauthorization Act
SCP	Spill Contingency Plan
SDU	sodium diuranate
SER	Supplemental Environmental Report
SETT	Sagebrush Ecosystem Technical Team
SR	State Route
SRB	sulfate-reducing bioreactor
SX	solvent extraction
TDS	total dissolved solids
tpy	U.S. tons per year
U.S.	United States
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
V_2O_5	vanadium pentoxide
VRM	Visual Resource Management
WIU	Wilderness Inventory Unit
WSA	Wilderness Study Area

CHAPTER 1. INTRODUCTION

1.1 INTRODUCTION AND BACKGROUND

The United States (U.S.) Department of the Interior (DOI), Bureau of Land Management (BLM) prepared this Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA), 40 Code of Federal Regulations (CFR) Parts 1500–1508, and 85 *Federal Register* 1684 to address potential effects of the Nevada Vanadium Company's (NVV) Gibellini Vanadium Mine Project (Project).

The Project is a proposed vanadium mine located along the eastern slope of the Fish Creek Mountains in Eureka County, Nevada (**Figure 1.1**). The Project area has been prospected for vanadium and manganese since the 1940s when Union Carbide explored the area for vanadium to support U.S. steel production. Since then, vanadium has been recognized as a Critical Mineral due to its strategic importance in steel manufacturing, aerospace applications, and grid scale energy storage. As there is currently no primary domestic production of vanadium, the U.S. is dependent on foreign sources of vanadium, which creates a strategic vulnerability for both its economy and military to adverse government action or other events that can disrupt the supply of this key mineral. The Project would produce nearly 5,000 tons of vanadium annually, which represents approximately 50 percent of the current U.S. demand, making this Project a significant domestic contributor to satisfy this demand.

The BLM is the lead agency for preparing the EIS in compliance with NEPA, the 1978 Council on Environmental Quality (CEQ) NEPA implementing regulations (40 CFR 1500–1508, as amended); the BLM's NEPA Handbook (H-1790-1); Guidelines for Assessing and Documenting Cumulative Impacts (BLM 1994); CEQ's Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ 2005); and other applicable guidance. The BLM is using the pre-2020 CEQ regulations because the Notice of Intent was published in the *Federal Register* on July 14, 2020, prior to those regulations being implemented. Eureka County, the Nevada Department of Conservation and Natural Resources, the Nevada Department of Wildlife, and the U.S. Environmental Protection Agency are serving as cooperating agencies for preparation and review of the EIS. In addition, the BLM will work cooperatively with the U.S. Fish and Wildlife Service and Nevada Division of Environmental Protection (NDEP) Bureau of Mining Regulation and Reclamation (BMRR).

On June 28, 2019, NVV submitted a Plan of Operations and Nevada Reclamation Permit Application for the Project to the BLM Mount Lewis Field Office and the NDEP-BMRR. NVV revised the Plan of Operations in October 2019 and February 2020 (NVV 2020). The BLM issued a Plan of Operations Completeness Determination on March 16, 2020. NVV submitted the Plan of Operations in accordance with BLM Surface Management Regulations 43 CFR 3809, as amended, and Nevada reclamation regulations at Nevada Administrative Code (NAC) 519A. NVV revised the Plan of Operations to address comments provided by the BLM, NDEP, Nevada

Department of Wildlife, Eureka County, and Nevada Sagebrush Ecosystem Technical Team; the revisions incorporated updates to the mineral processing and closure strategies.

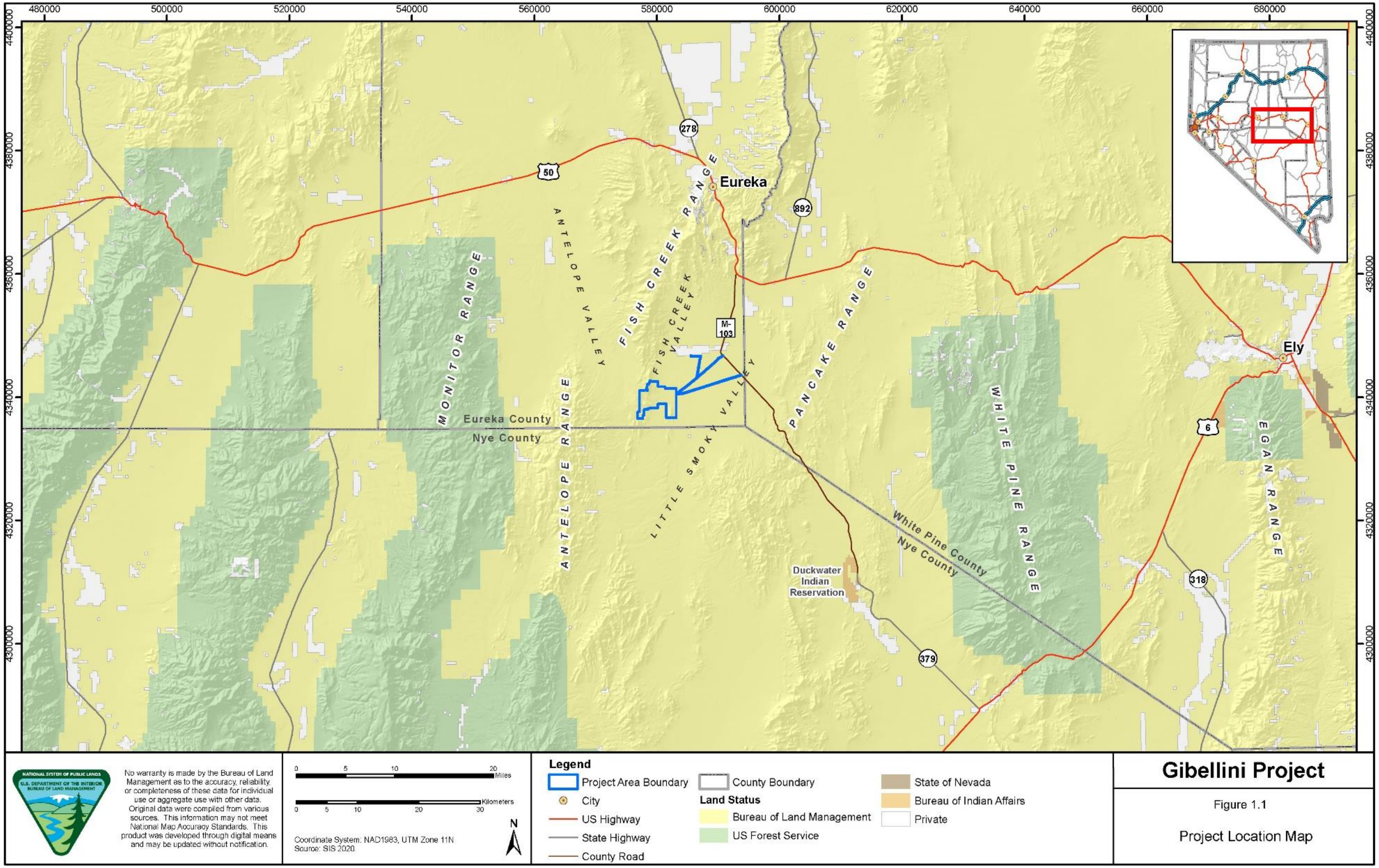
The Project area is in the southern extent of the Fish Creek Range, entirely on Federal land administered by the BLM, pursuant to unpatented mining claims held by Eureka County, Nevada. The Project area includes 6,456 acres of BLM-administered land approximately 27 miles southeast of Eureka, Nevada (**Figure 1.1**). The Project area is accessed by traveling from Eureka, Nevada approximately 10 miles south on U.S. Route 50, turning south on County Road M-103 (Duckwater Road) for approximately 8 miles, and then turning southwest on Fish Creek Ranch Road for approximately 7 miles. The Project area is within the Mount Diablo Baseline and Meridian in Eureka County, Nevada, as described in **Table 1.1.**

Table 1.1. Project Area Legal Description

Township	Range	Sections
15 North	52 East	1–3, 10–12, 15
15 North	53 East	6, 7
16 North	52 East	25, 26, 34–36
16 North	53 East	15, 20, 22, 25–27, 29–35

The estimated Project life consists of 1.5 years of construction, 7 years of operation, 4 years of active reclamation and closure, and up to 30 years of post-closure monitoring. The Project area includes 6,456 acres of BLM-administered land, on which approximately 806 acres of surface disturbance would occur due to Project-related activities.

Figure 1.1. Project Location Map



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1.2 HISTORY OF THE PROJECT AREA

The Project is within the Fish Creek Mining District, in the Fish Creek Range in the southeastern portion of Eureka County. The first claims in the district were located in the late 1800s by James Butler and Angelo Belli (Roberts et al. 1967). By the late 1800s and into the early 1900s, workings consisted of at least one adit and raise, a number of shafts, inclines, and winzes. Earliest production records from the U.S. Bureau of Mines' Minerals Yearbooks are from 1938 and 1955 showing gold, silver, and lead production values.

The claims associated with the Gibellini Mine were first located in 1942 by L. P. Gibellini of Eureka. The workings consisted of a 37-foot-deep shaft, a 176-foot-long adit, several shallow pits, and some trenches. The average grade of ore in the workings was about 9.5 percent manganese, 2.8 percent zinc, and 1.22 percent nickel (Roberts et al. 1967).

Exploration activities have included mapping, trenching, and geochemical sampling from the 1940s to the present and include the following.

1.2.1 Pre-1981 Activities

- The Nevada Bureau of Mines drilled four drill holes at the Gibellini manganese-nickel mine in 1946. It also collected channel samples from the underground workings and assayed them for manganese, zinc, and nickel. Underground development was also conducted at the Gibellini Manganese-Nickel Mine.
- The Hogle Brothers continued developing the mine during the 1950s.
- Vanadium deposits in black shale south of the Gibellini Mine were explored by Union Carbide in 1958 to 1959. Union Carbide reportedly drilled up to 60 shallow rotary holes in 1956 at the Rich Hill (Bisoni) deposit.
- Devonian Age vanadium deposits in black shale were explored by the Siskon Company in 1960 to 1961. An open cut was made by bulldozers and churn drill holes were put down (Roberts et al. 1967).
- In 1964 and 1965, Terteling drilled 33 rotary drill holes totaling 5,695 feet.
- In 1969, Atlas drilled 77 rotary drill holes totaling 15,685 feet.
- A total of 52 drill holes totaling 10,556 feet were completed by Noranda at the Vanadium Hill (Gibellini) deposit from 1972 to 1973 to provide assay data for a vanadium resource estimate and to provide material for metallurgical testing. Noranda drilled a series of holes at the Rich Hill deposit but the location and data for these holes are unknown. From 1972 through 1975, Noranda had the Colorado School of Mines Research Institute, Noranda Research Centre, and Hazen Research conduct metallurgical test work on surface and drill hole composite samples (Condon 1975). Recovery ranged from 65 percent to 98 percent with an average recovery of 74 percent vanadium oxide products.

1.2.2 Post-1981 and pre-1990 Activities

- A total of 11 drill holes totaling 2,538 feet were completed in 1989 by Inter-Globe throughout the Vanadium Hill deposit to confirm grades reported by Noranda, Atlas, and Terteling and to provide material for metallurgical testing. In August 1989, Inter-Globe mapped and sampled nine bulldozed trenches and seven backhoed pits throughout the Vanadium Hill deposit. The purpose of the program was to evaluate the near-surface oxide mineralization. A total of 173, 5-foot-horizontal and vertical channel samples were collected and assayed for vanadium.

1.2.3 Post-1990 Activities

- American Vanadium Corporation (AVC) acquired the claims in the Project area in March 2006. During 2006, AVC expanded the land position, mapped the surface geology, collected surface and underground geochemical samples, and conducted preliminary metallurgical test work under Notice NVN-08142. In 2007 and 2008, AVC conducted reverse-circulation and core drilling at Gibellini Hill, Rich Hill, and the historic Gibellini manganese-nickel mine; metallurgical test work; and a preliminary economic analysis on the Gibellini Hill deposit. All the notice-level disturbance from AVC has been reclaimed and released except for 2 acres that have been added to the total Project surface disturbance.
- Prophecy Development Corporation acquired the claims in the Project area in 2017 and has consolidated the land position, collected surface geochemical samples, and developed a mining and production plan that is presented in the Plan of Operations.

1.2.4 Metallurgical Activities

- Extensive metallurgical research was carried out by the Colorado School of Mines Research Institute, Noranda Research Centre, and Hazen Research from 1972 to 1975 on various aspects of metallurgical test work on Gibellini mineralization (Condon 1975). AVC undertook test work from 2008–2011 at McClelland Laboratories.
- The Gibellini metallurgical test work spans material obtained by Noranda, to composite samples of core that was accumulated from earlier exploration core drilling, to confirmatory core-drilling programs to trench samples leached at coarse sizes, to finally pilot programs where trench samples were taken across the deposit to make a composite of transition and oxide material that has a deposit-type breakdown of material (approximately 50 percent oxide/50 percent transition) from numerous trenches.
- The sample testing varied from bottle roll tests, to small-diameter columns (approximately six to eight times the diameter to mineralized material size ratio), to large-diameter pilot columns. These columns used either single-pass solution leaching or continuous solution recycling with batch-wise or semi-continuous solvent extraction recovery of vanadium.

- Metallurgical test work and associated analytical procedures were performed by recognized testing facilities, and the tests performed were appropriate to the mineralization type and processing requirements.

No processing factors were identified from the completed metallurgical test work that would have a significant effect on extraction.

1.3 BLM PURPOSE AND NEED

The purpose of the Federal action is to respond to NVV's proposal to extract vanadium on 6,456 acres of BLM-administered land in Eureka County, Nevada, where NVV holds unpatented mining claims. The need for the Federal action is established by the BLM's responsibilities under FLPMA and the BLM Surface Management Regulations at 43 CFR 3809 to respond to an applicant's request for approval of a Plan of Operations and to take any action necessary to prevent unnecessary or undue degradation of public lands as a result of actions taken to prospect, explore, assess, develop, and process locatable mineral resources on public lands.

1.4 DECISION TO BE MADE

The BLM's Battle Mountain District Manager would decide whether to approve the Project as described within the Plan of Operations as submitted (Proposed Action), approve a modified version of the plan (action alternatives), or reject the plan (No Action Alternative). This decision would be made through consideration of the results of an EIS analysis conducted under NEPA and other applicable Federal, State, or local requirements.

1.5 APPLICANT'S OBJECTIVE

The Applicant's objective is to construct and operate an open pit mining operation to mine approximately 24 million tons of ore material and 2 million tons of waste rock over the 7-year life of the Project, and recover 66,000 tons of vanadium and 168 tons of uranium on approximately 806 acres of surface disturbance within a 6,456-acre Project area on BLM-administered land.

1.6 RELATIONSHIP TO BLM AND NON-BLM POLICIES, PLANS, AND PROGRAMS

1.6.1 National and BLM Policies

This EIS is consistent with NEPA, as amended (42 United States Code [U.S.C.] 4321-4347), and 1978 CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508, as amended; 43 CFR 46). The BLM is using the pre-2020 CEQ regulations because the Notice of Intent was published in the *Federal Register* on July 14, 2020, prior to those regulations being implemented. Federal and State regulatory settings for each resource analyzed in this EIS include:

- NEPA (42 U.S.C. 4321–4347);
- CEQ regulations for implementing the procedural provisions of NEPA (40 CFR 1500–1508);
- FLPMA;
- General Mining Law of 1872;
- Surface Management Regulations (43 CFR 3809);
- BLM Right-of-Way Regulations (43 CFR 2800);
- Section 106 of the National Historic Preservation Act;
- DOI and BLM regulations, manuals, and applicable policy documents; and
- Various State of Nevada regulations including NDEP-BMRR under the authority of NRS 445A.300–445A.730 and NAC 445A.350–445A.447.

1.6.2 Land Use Plan Conformance

The BLM has the responsibility and authority to manage the surface and subsurface resources on public lands within the BLM's jurisdiction. Land use plans that apply to this EIS include:

- Shoshone-Eureka Resource Management Plan (BLM 1986a);
- Eureka County Master Plan (Eureka County 2010) (see Appendix A);
- Nevada and Northeastern California Greater Sage-grouse Approved Resource Management Plan Amendment (BLM 2015a); and
- Conformance with NRS 232.162 and NAC 232.400–232.480.

1.7 PERMITS AND APPROVALS

In addition to approval of the EIS, implementing the Proposed Action would require authorizing actions from other Federal, State, and local agencies with jurisdiction over certain aspects of the Proposed Action. **Table 1.2** lists the required permits or approvals that NVV would obtain from the responsible regulatory agencies. NVV would also be responsible for amending existing permits and applying for and acquiring additional permits, as needed.

Table 1.2. Required Permits and Regulatory Authorizations

Permits and Authorizations	Regulatory Agency
Plan of Operations/Record of Decision	Bureau of Land Management
Explosives Permit	U.S. Department of the Treasury, Bureau of Alcohol, Tobacco, and Firearms
Surface Disturbance Permit and Class II Air Quality Operating Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality
Water Pollution Control Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Mining Regulation and Reclamation
Mining Reclamation Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Mining Regulation and Reclamation
Industrial Artificial Pond Permit	Nevada Department of Wildlife
Class III Waiver Landfill Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Solid Waste
General Discharge Permit (Stormwater)	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control
Hazardous Materials Storage Permit	State of Nevada, Fire Marshall Division
Hazardous Waste Identification Number	United States Environmental Protection Agency
Septic Treatment Permit, Sewage Disposal System Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control
Potable Water System Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Safe Drinking Water
Radioactive Materials License	Nevada Department of Health and Human Services, Nevada State Health Division, Radiological Health Section
Conservation Credit System Certification of Mitigation	Nevada Department of Conservation and Natural Resources, Division of State Lands, Sagebrush Ecosystem Council
Dam Safety Permit	State of Nevada Division of Water Resources
Local Permits	
County Road Use and Maintenance License and Agreement	Eureka County Public Works and Natural Resources Department

1.7.1 Uranium Permitting Requirements

In September 2018, the Prophecy Development Corporation (parent company to NVV) sent a letter to the U.S. Nuclear Regulatory Commission (NRC) informing NRC that uranium would be processed and an intermediate uranium product called “yellowcake” would be produced during vanadium processing operations associated with the Project. The NRC determined that ore would not produce byproduct material (42 U.S.C. 2014(e)) because the ore would not be processed primarily for its source material (42 U.S.C. 2014(z)) content. The Project would produce vanadium as the primary product, and the sale of the extracted source material (yellowcake uranium) would be secondary by a significant margin. As indicated in Table 1.2 and detailed below, NVV would need a Radioactive Materials License for the extracted resource material.

In addition, the NRC determined the uranium removal tank, drumming operation, and intermediate and associated equipment at the process plant would contain source material concentrations of uranium as defined in 42 U.S.C. 2014(z). The portion of the process plant that would contain source material concentrations of uranium would include the uranium removal tank, drumming operation, and intermediate and associated equipment. The uranium concentration would exceed 0.05 percent by weight in the uranium removal tank and subsequent filter press and drumming operation.

Source material would be subject to NRC licensing under 10 CFR Part 40, “Domestic Licensing of Source Material.” The NRC confirmed the uranium circuit that would be used for the Project would recover approximately 25 tons of such licensable source material per year. The NRC also confirmed that during the vanadium extraction process NVV would remove and concentrate uranium at a level above the 0.05 percent exemption threshold in 10 CFR 40.13(a), which would mean that NVV must obtain a specific license to possess this material from the NRC or an Agreement State. The NRC said that the processing plant would not be a uranium mill as defined in 10 CFR 40.4, and 10 CFR 40 Appendix A would not apply. The State of Nevada is an Agreement State and would regulate the type and quantity of material to be generated by the Project. Therefore, the State of Nevada, specifically the Nevada Department of Health and Human Services, Nevada State Health Division, Radiological Health Section, would be the appropriate licensing authority for the Project under the provisions of NAC 459. NVV must obtain a Radioactive Materials License that contains requirements to monitor human health and the environment, minimize contamination of the facility and the environment, minimize the generation of radioactive waste, facilitate decommissioning to limit site and subsurface residual radioactivity, and prepare the property for unrestricted use to protect the public and not harm the environment.

Key conditions of the Radioactive Materials License include:

- Engineering or process controls would be used to control airborne radionuclide concentrations. The majority of operations would be “wet” and unlikely to generate airborne particulates. Water sprays and other dust control measures would be used as necessary including keeping materials wet to the extent possible, using effective local ventilation and air pollution control equipment, and performing good housekeeping practices.
- Radiation surveys and monitoring would be conducted in operational areas of the facility. Air sampling, including radon measurements, would include personal monitoring, area monitors, and monitoring at the site boundary. Respiratory protection would be required as needed.
- Routine surveys for contamination would be conducted in the restricted area and in areas frequented by personnel working in the restricted area. Personnel would be monitored for external radiation dose and for the potential for intakes of radioactive material as

applicable. Personnel, equipment, and vehicles exiting the restricted area would be surveyed for contamination to prevent the spread of contaminants.

1.7.2 Organization of the Supplemental Environmental Reports

A series of Supplemental Environmental Reports (SERs) have been prepared that describe the Proposed Action and alternatives, including the existing environment affected by the Proposed Action and alternatives; potential direct, indirect, and cumulative effects of the Proposed Action and alternatives; and Applicant-committed Environmental Protection Measures (EPMs) that NVV would implement to avoid or reduce effects. Appendix B lists all Applicant-committed EPMs. The SERs for the Project are organized into 18 individual reports as described below.

- SER 1: Proposed Action and Project Alternatives (BLM 2021a)
- SER 2: Air Quality (BLM 2022a)
- SER 3: Cultural Resources (BLM 2022b)
- SER 4: Geology and Minerals (BLM 2021b)
- SER 5: Grazing Management (BLM 2021c)
- SER 6: Hazardous Materials and Solid Waste (BLM 2021d)
- SER 7: Land Use and Realty (BLM 2021e)
- SER 8: Noise (BLM 2022c)
- SER 9: Paleontological Resources (BLM 2022d)
- SER 10: Recreation and Wilderness (BLM 2022e)
- SER 11: Socioeconomics and Environmental Justice (BLM 2021f)
- SER 12: Soil Resources (BLM 2021g)
- SER 13: Transportation and Access (BLM 2021h)
- SER 14: Vegetation (including Wetlands and Riparian Zones) (BLM 2021i)
- SER 15: Visual Resources (BLM 2021j)
- SER 16: Water Resources and Geochemistry (BLM 2022f)
- SER 17: Wild Horses and Burros (BLM 2021k)
- SER 18: Wildlife and Aquatic Resources (BLM 2022g)

1.8 PUBLIC INVOLVEMENT

This Draft EIS was prepared in consultation and coordination with various Federal, State, and local agencies, organizations, and individuals. The Notice of Intent to prepare an EIS was published by the BLM in the *Federal Register* on July 14, 2020, along with a news release announcing the beginning of the scoping process. The BLM published an additional news release on August 17, 2020, announcing the scheduled virtual public meetings. On September 2 and 3, 2020, the BLM hosted two virtual scoping meetings. The virtual meetings allowed for agencies, organizations, members of the public, and other interested parties to learn about the proposed Gibellini Vanadium Mine, ask questions, and submit comments on the Project.

The Draft EIS will be available for a 45-day public comment period from the date the Notice of Availability is published in the *Federal Register*. The BLM will hold two public meetings during the 45-day public comment period. The BLM will provide advance notification to the public regarding these meetings.

1.9 KEY ISSUES

Based on internal and external scoping, the BLM identified a number of key issues for detailed analysis in the EIS. The detailed analysis contained in the SERs and this EIS for each resource focuses on these key issues and allows for evaluation of potential impacts including:

- Air quality impacts resulting from mine development and operation;
- Cultural resource impacts resulting from mine development and surface disturbance;
- Impacts on public health and safety from uranium processing and transportation;
- Livestock grazing impacts, including loss of animal unit months resulting from mine development and operation;
- Impacts on social and economic conditions, including effects on local communities and the capacity of existing infrastructure, resulting from mine development and operation;
- Potential impacts on minority and low-income populations and Native American traditional cultural properties;
- Impacts on local and regional traffic volumes and patterns and public access;
- Visual resource impacts and the effects of light pollution on the night sky in the Fish Creek Valley;
- Impacts on groundwater quality and quantity from mine development and operation;
    - Potential impacts on surface water flow, water supply wells, wetlands, seeps and springs, and other water-dependent ecosystems; and
    - Estimated water use and potential impacts on public and private water rights.
- Potential issues regarding the geochemistry associated with the Heap Leach Facility and waste rock area;
- Concerns about ensuring effective planning, implementation, and monitoring of Heap Leach Facility draindown, mine reclamation, and post-closure activities;
- Impacts on wild horses from mine development and operation; and
- Biological resource impacts from mine development and operation, human activities, and other Project-related effects on ecosystems and ecosystem components:
    - Impacts on special status species and BLM sensitive species, including pygmy rabbit, Greater sage-grouse, golden eagle, ferruginous hawk, burrowing owl, Fish Creek Springs tui chub, and migratory birds;

- Impacts on fish and wildlife species and their habitat resulting from mine development and operation, including mule deer, pronghorn antelope, bighorn sheep, springsnail, migratory birds, and raptors; and
- Impacts on wetlands and riparian areas from mine development and operation.

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CHAPTER 2. DESCRIPTION OF THE PROPOSED ACTION AND PROJECT ALTERNATIVES

This chapter describes and compares the Proposed Action and alternatives considered for the Gibellini Vanadium Mine Project (Project). The Proposed Action is the Project as described in the Plan of Operations submitted to the Bureau of Land Management (BLM) in February 2020 (NVV 2020). Other alternatives considered for detailed analysis include the South Access Road Alternative, Renewable Energy Alternative, and No Action Alternative. The BLM developed all alternatives presented in this chapter, including the No Action Alternative, based on public and agency scoping input, supporting technical information from Nevada Vanadium Company (NVV), and BLM review. This chapter also presents the alternatives that were considered but not carried forward for detailed analysis.

2.1 PROPOSED ACTION

The Project would consist of constructing and operating an open pit mining operation and heap leach process facility to extract and recover vanadium in the Gibellini Mining District of Eureka County, Nevada. The Proposed Action includes a water, power, and communications corridor extending approximately 6.5 miles from the Fish Creek Ranch to the Project area in Sections 15, 22, 27, and 31 through 34 of T16N, R53E. The existing 69-kilovolt (kV) power line for the Pan Mine would supply power to the Project. The Gibellini power line would extend to the Project area from a tie-in point along the Pan Mine power line in Section 20 of T16N, R54E. Surface disturbance would include both mining and exploration activities within the Project area, as well as surface disturbance authorized under previous notices. **Table 2.1** identifies the anticipated surface disturbance by facility as well as a compliance buffer area surrounding the surface disturbance areas associated with construction and maintenance activities.

Table 2.1. Proposed Action: Surface Disturbance by Facility and Associated Compliance Buffers

Activity	Pre-1981 Existing Surface Disturbance (acres)	Existing Notice Level Disturbance	Proposed Action Surface Disturbance (acres)	Buffer Area[1] (acres)
Pit	-	-	84.8	46.8
Heap Leach Pad	-	-	186.5	-
Rock Disposal Area	-	-	29.1	21.3
Process Ponds and Make-up Water Pond	-	-	14.4	-
Process Facility and Lab	-	-	2.6	2.8
Waste Rock Sedimentation Pond	-	-	0.2	--
Mine Facilities	-	-	0.7	-

Activity	Pre-1981 Existing Surface Disturbance (acres)	Existing Notice Level Disturbance	Proposed Action Surface Disturbance (acres)	Buffer Area[1] (acres)
Mine Facilities Retention Pond	-	-	0.4	-
Crushing Facility and Stockpile	-	-	5.1	-
Mine and Haul Roads	-	-	47.2	42.6
Access Roads	-	-	3.5	-
Office, Laydown, and Warehouse	-	-	0.7	7.0
Borrow Areas	-	-	91.8	78.8
Landfill Area	-	-	5.8	2.6
Stormwater Diversion Channels	-	-	69.8	-
Potable Water and Fire Suppression Tanks	-	-	0.1	-
Utility Corridor and Substation[2]	-	-	31.5	-
Growth Media Stockpiles	-	-	110.0	-
Explosives Area	-	-	0.1	1.1
Yards (Ancillary)[3]	-	-	73.1	-
Exploration[4]	104.5	-	46.0	-
Water and Monitoring Wells	-	2.4	2.4	-
Total	**104.5**	**2.4**	**805.8**	**203.0**

Source: NVV 2020.
[1] Buffer areas are compliance areas surrounding facilities that are not intended to be disturbed but are to be evaluated in the Environmental Impact Statement.
[2] The utility corridor comprises the buried power line and water pipeline from the mine facilities to the Fish Creek Ranch.
[3] Yards are surface disturbance associated with the mining facilities that would be revegetated but do not require regrading during reclamation.
[4] Exploration disturbance comprises access roads, drill pads, drill sumps and trenches.

The Proposed Action (**Figure 2.1**) would include the following new mine components: open pit, rock disposal area (RDA), mine office and facilities, crushing facilities and stockpile, Heap Leach Pad (HLP), process facility, various process and make-up water ponds, borrow areas, the mine and access roads, water and power supply lines, and ancillary facilities. **Figure 2.2** illustrates the access to the Project area, power and water pipelines, and the land status.

Figure 2.1. Proposed Facility Layout

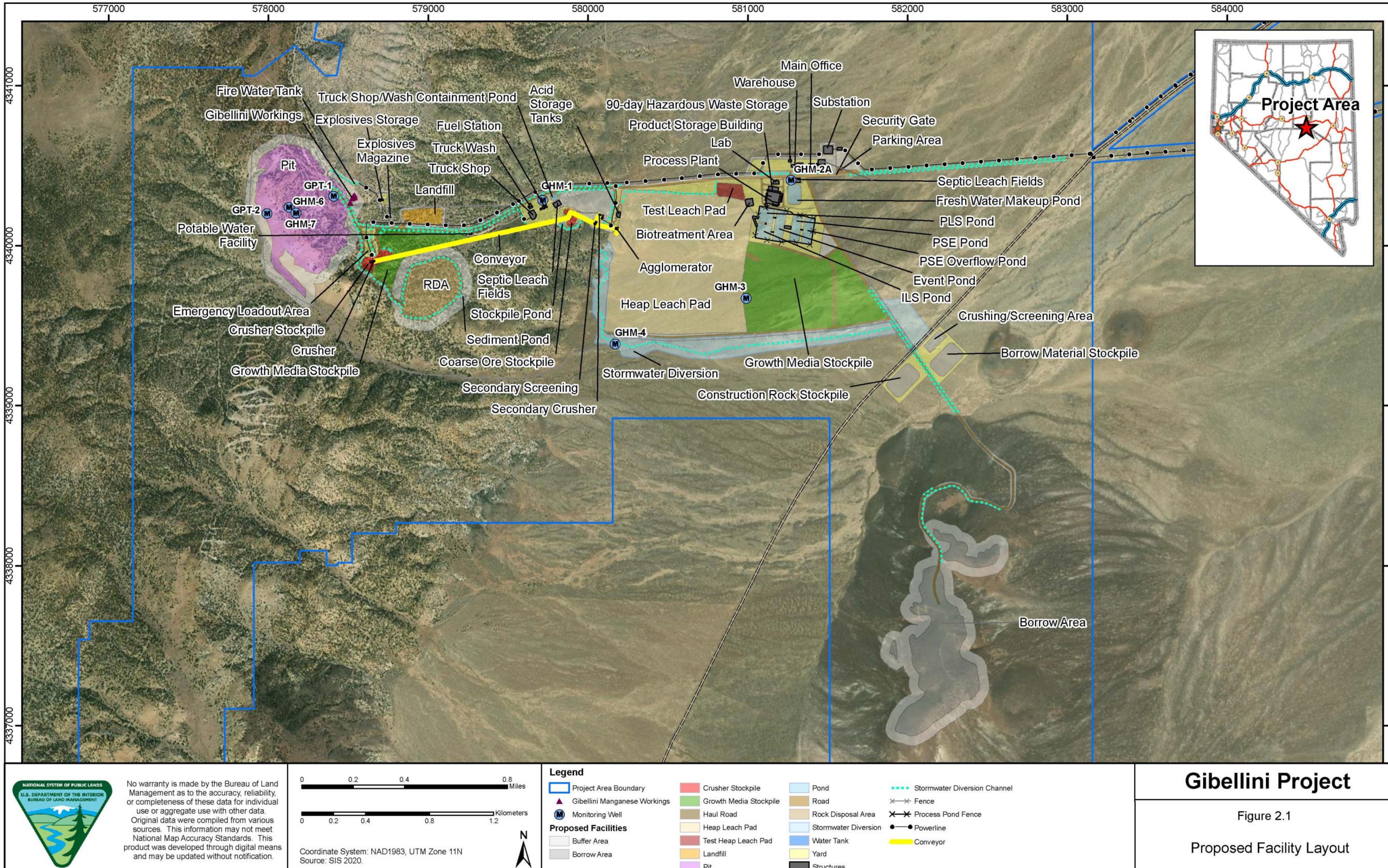
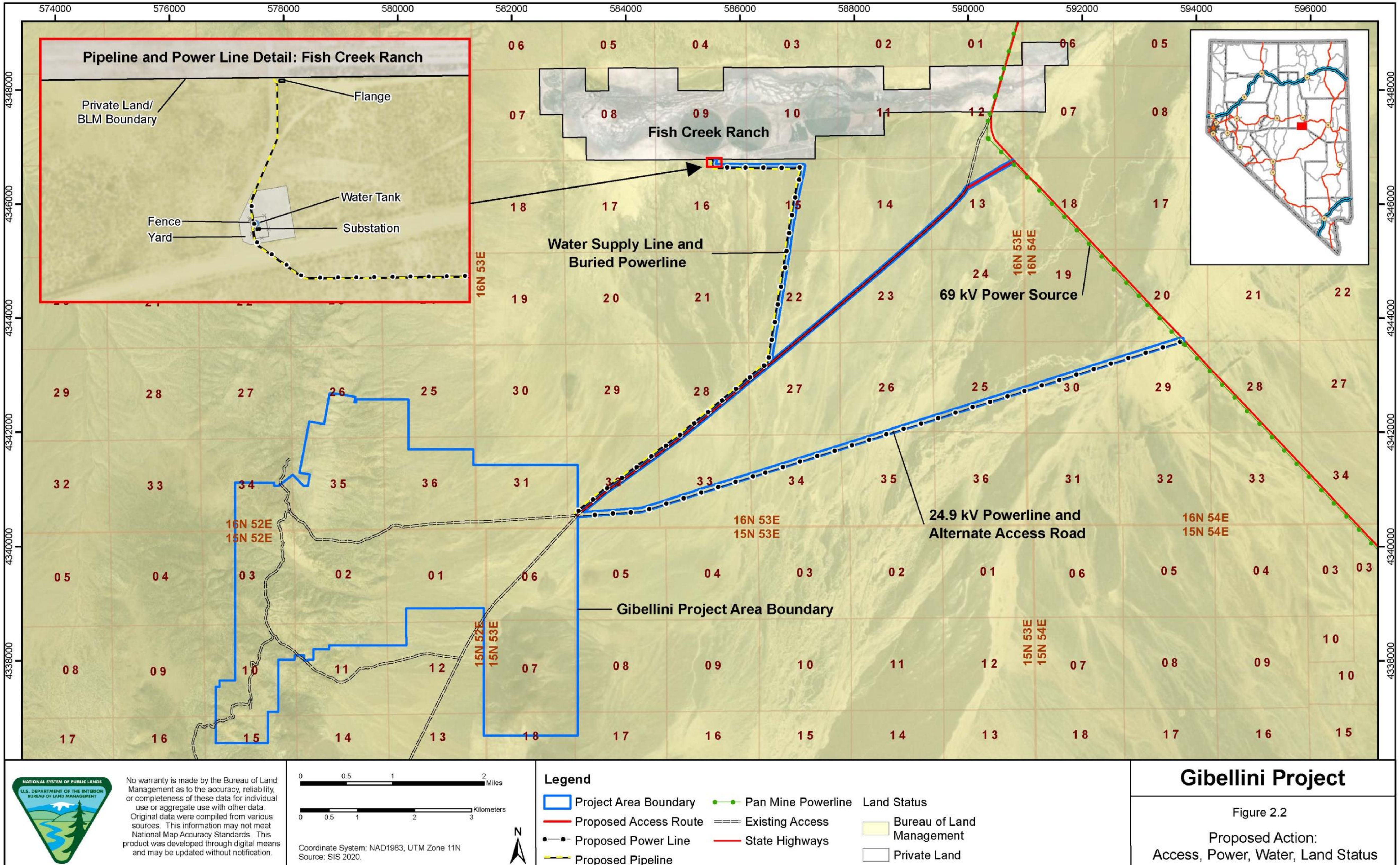


Figure 2.2. Proposed Action: Access, Power, Water, Land Status



Under the Proposed Action, NVV would construct and operate an open pit mining operation to mine approximately 24 million tons of ore material and recover 66,000 tons of vanadium and 168 tons of uranium over the mine life. Approximately 2.0 million tons of waste rock material would be mined during the life of the Project. Mining and crushing would occur up to 24 hours per day, 7 days per week. NVV would employ up to 120 employees for construction of the Project. During mine operations, there would be up to 120 employees with approximately 30 employees on site at any one time, including contractors.

Pending acquisition of the required permits and authorization, construction is anticipated to begin upon Plan of Operations approval and take approximately 1.5 years, with a currently anticipated mine life of approximately 7 years. Reclamation and site closure activities would require approximately 4 years to complete. Post-closure monitoring is estimated to take up to an additional 30 years.

2.1.1 Open Pit Mining

The approximate dimensions of the pit would be 2,410 feet long (north to south) and 1,560 feet wide (east to west) (**Figure 2.3**). The maximum excavation depth would be approximately 280 feet below ground surface. Slope angles within the open pit would be dependent on rock strength, geologic structure, pit wall orientation, and additional operational considerations. NVV would mine 10- to 20-foot-high benches with a double-benched highwall safety catchment within the open pit. **Figure 2.3** illustrates the pit configuration (plan view) with the locations of two pit cross-sections. **Figure 2.4 and Figure 2.5** illustrate cross-sections of the pit in addition to the geologic strata, ore zones, and groundwater levels.

Conventional open pit mining methods would be conducted using drilling and blasting to break up the rock. In-pit blasthole drilling would be completed with up to two Atlas Copco DM 45 series production drills (or equivalent). Blast holes would typically have a 6.75-inch diameter with bench heights of 10 and 20 feet. Blast hole drill spacing would range from 12 to 20 feet based on the material properties for each geologic unit encountered. Sub-drilling would be completed to an estimated depth of 3 feet with stemming columns of approximately 11 feet. Blasting would be scheduled at a consistent time, generally mid-day, and would be no more frequent than once per day. Revisions to these assumed parameters may be required as warranted by the availability of new geotechnical information and site conditions encountered in the field once the mine goes into operation.

Blasting components, including ammonium nitrate and diesel fuel, would be stored on site in bins and tanks, respectively. The primary mine consumables include ammonium nitrate–fuel oil (ANFO), the blasting agent; and diesel fuel. Utilizing a powder factor of 0.25 pound per ton for blasting soft rock, annual ANFO usage would be approximately 400 tons per year. Explosives would be stored and used in accordance with Mine Safety and Health Administration (MSHA); Bureau of Alcohol, Tobacco, Firearms and Explosives; and Department of Homeland Security requirements, as well as any other applicable Federal, State, or local statutes and regulations.

Ore and waste would be moved with loaders into 40- to 50-ton haul trucks with the ore conveyed via over-land conveyors to the HLP from the crusher. The average mine production during the 7-year mine life would be approximately 3.3 million tons of ore and waste per year. The Project would include mining approximately 24 million tons of ore material containing 66,000 tons of vanadium and 168 tons of uranium over the mine life. Approximately 2.0 million tons of waste rock material would be mined during the life of the Project.

2.1.2 Heap Leach Pad

The HLP, which would meet the requirements of Nevada Administrative Code (NAC) 445A.434, would leach crushed and polymer-agglomerated vanadium ore from the pit. The rectangularly shaped HLP would be approximately 2,850 feet by 2,500 feet. The HLP would be developed in two phases. Phase 1 would cover approximately 3.5 million square feet and Phase 2 would cover approximately 3.6 million square feet. Based on 0.5-inch minus crushed material and using a tonnage factor of 23.5 cubic feet per ton (90 pounds per cubic foot), Phases 1 and 2 would accommodate approximately 30 million tons of ore placed to an ultimate height of 150 feet. Each phase would be sized to accommodate approximately 15 million tons of crushed ore. **Figure 2.3** provides a detailed view of the heap leach facility and vertical cross-sections through the HLP. A representative cross-section of the Phase 1 and Phase 2 portions of the HLP is illustrated on **Figure 2.6** and a cross-section of the geologic strata that occurs in the HLP area is illustrated on **Figure 2.7**.

Lifts of leach material would be placed by a radial stacker to an approximate height of 15 feet. Setbacks have been incorporated into the stacking plan at each lift level to achieve a 3-foot horizontal to 1-foot vertical (3H:1V) overall slope. Due to the friable nature of the ore, agglomeration is critical to the percolation characteristics of the leach materials. Low ground pressure dozers and other small process equipment would be used to place ore. The barren solution application rate would be approximately 0.0025 gallon per minute (gpm) per square foot. Solution would be applied over a large enough area to maintain an operational flow rate of approximately 1,500 gpm through the system.

The design concept for the HLP liner includes a composite lining system consisting of the use of geosynthetic clay liner, native clayey soils, imported clayey soils and/or bentonite augment soils overlain by an 80-mil high-density polyethylene (HDPE) geomembrane liner. The HDPE geomembrane liner would be covered with a 3-foot-thick cushioning/drainage layer of liner cover material called an overliner. An integrated piping network (underdrain piping) has been included in the HLP design to enhance solution recovery and limit heads on the liner system. Overliner material would consist of crushed and/or screened suitable borrow material to serve as a drainage layer immediately over the HDPE liner.

Figure 2.3. Pit and Heap Leach Pad Cross-sections (Plan View)

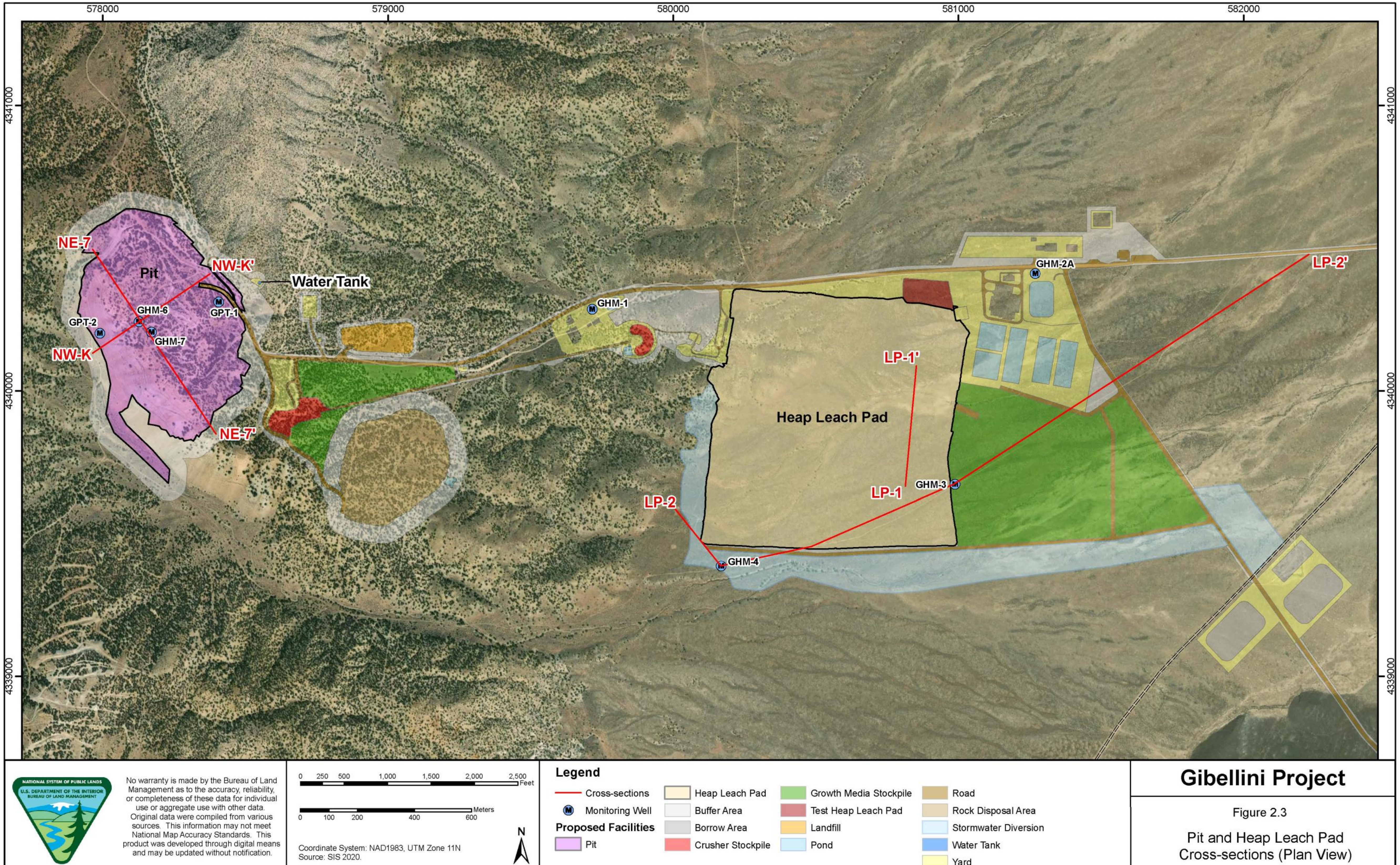


Figure 2.4. Pit Cross-section NE-7 to NE-7'

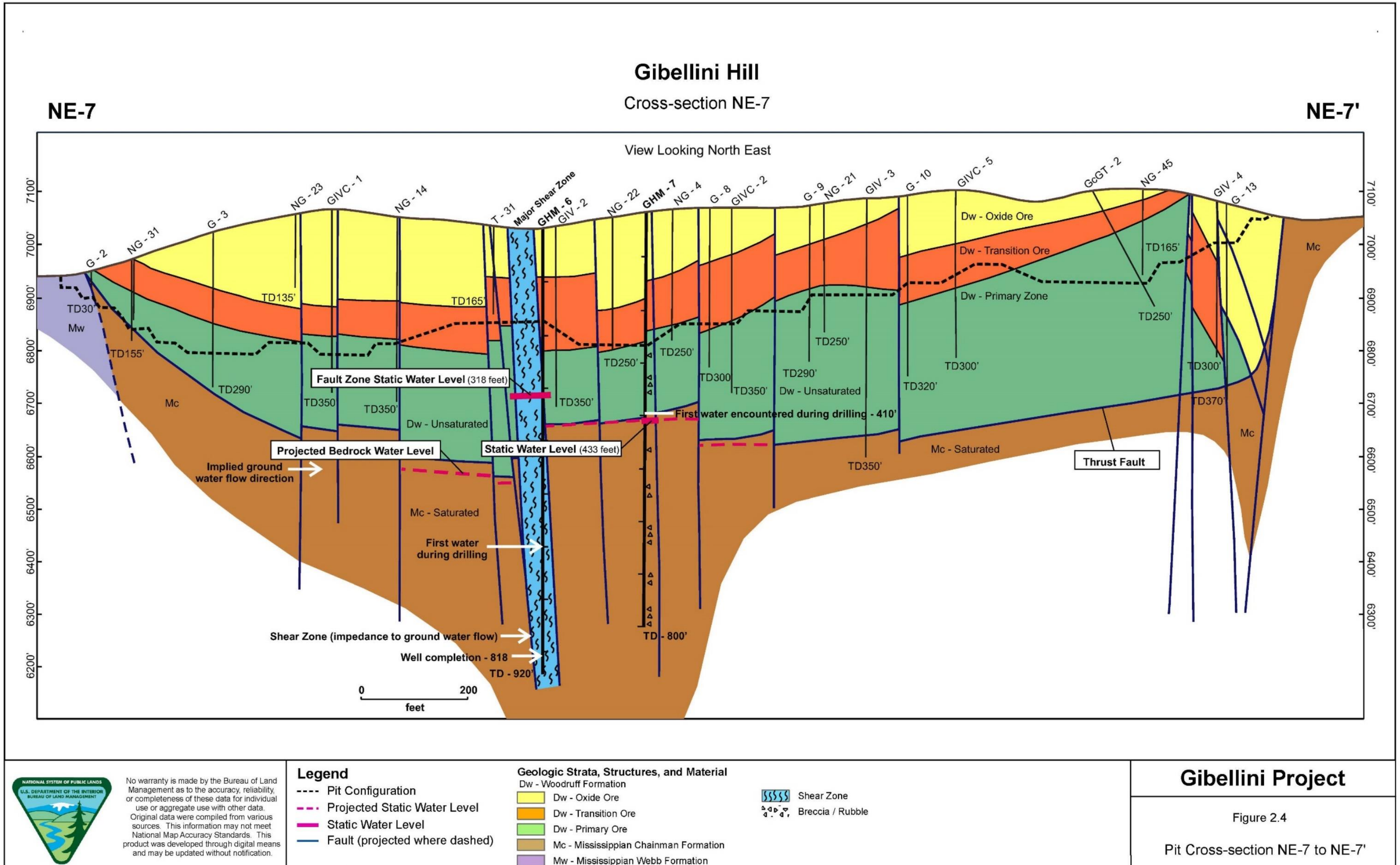


Figure 2.5. Pit Cross-section NW-K to NW-K'

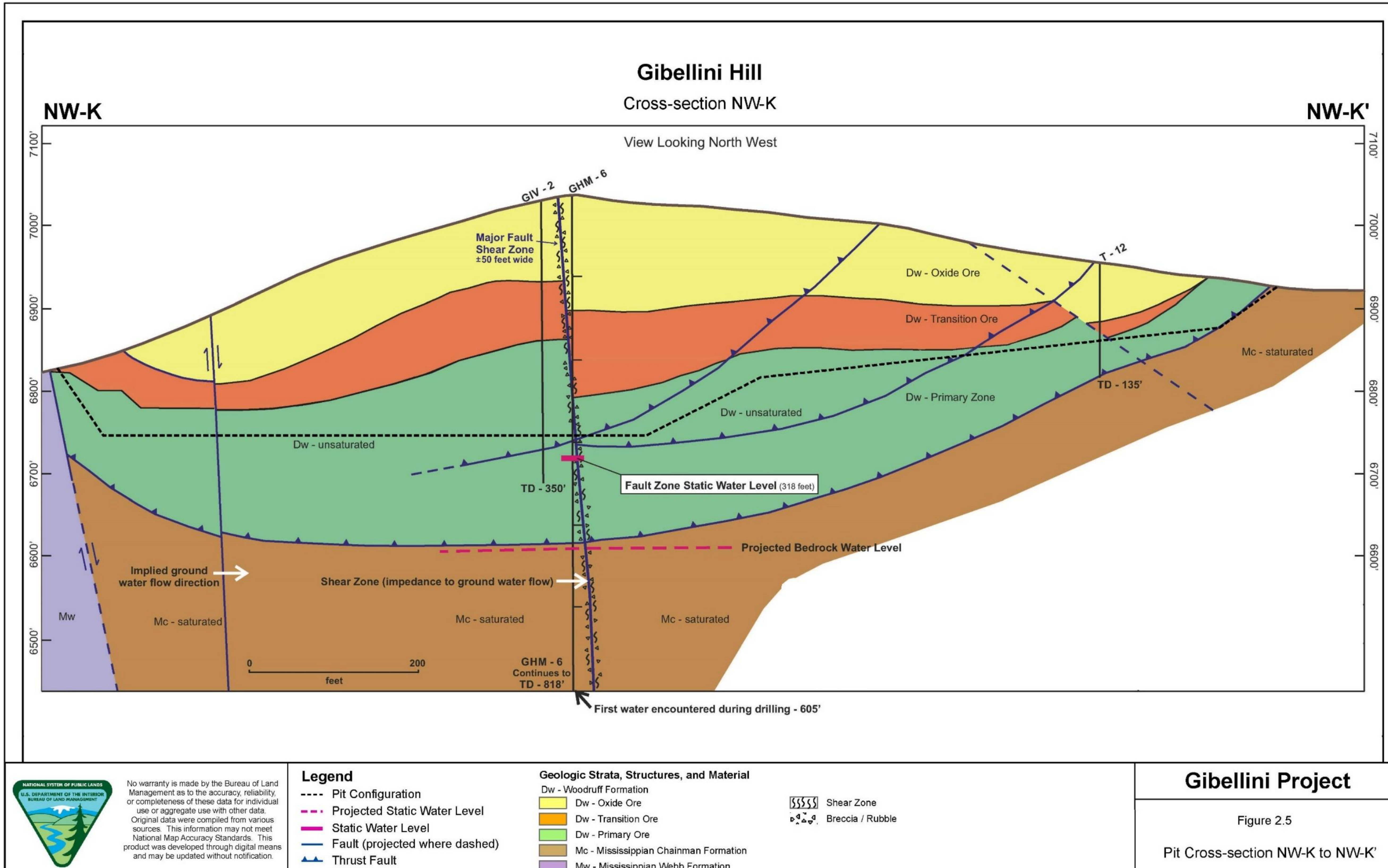


Figure 2.6. Heap Leach Pad Design Cross-section (LP-1 to LP-1')

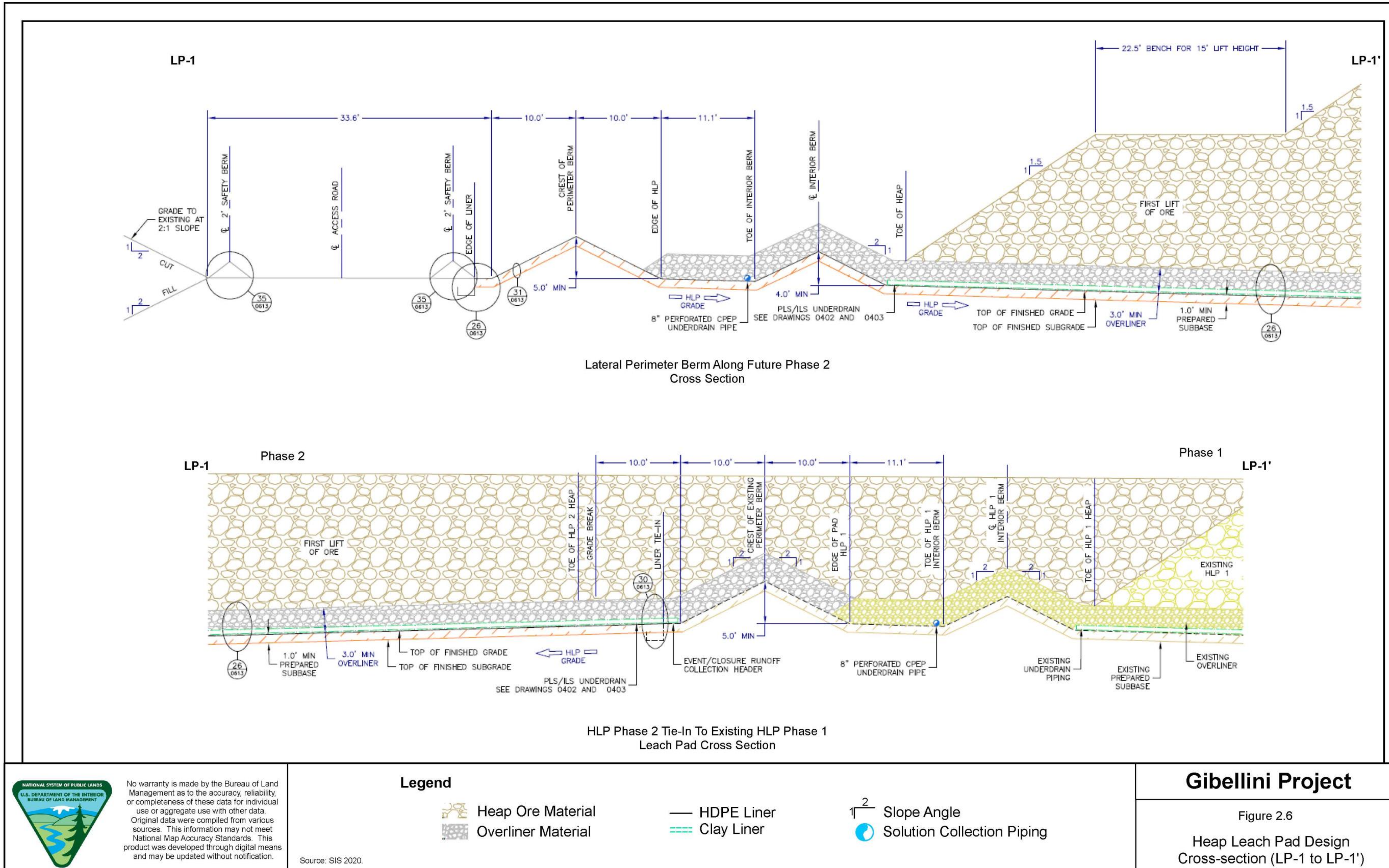
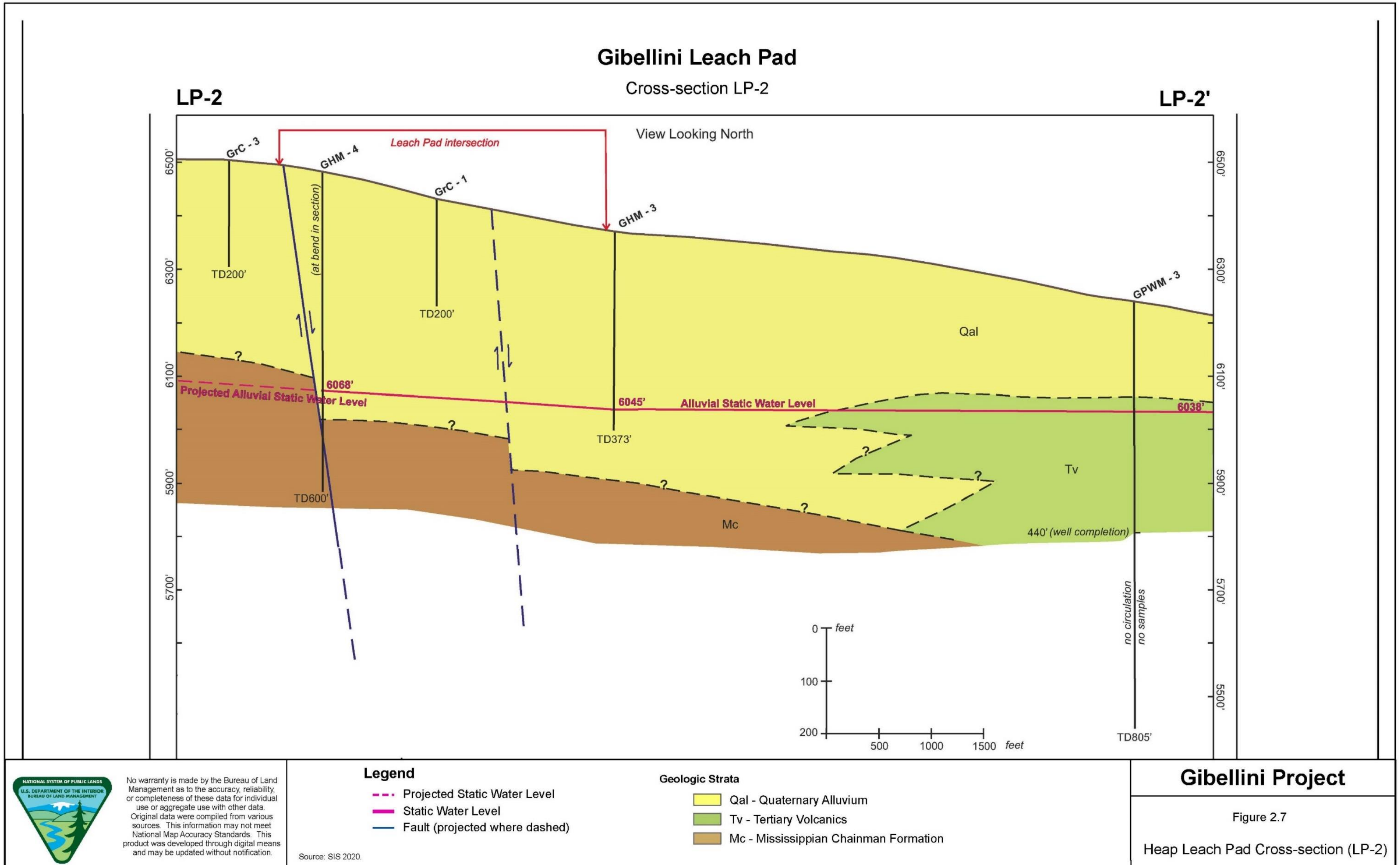


Figure 2.7. Heap Leach Pad Cross-section (LP-2)



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The location for the HLP was selected to minimize earthwork cuts and fills and allow for the preservation of some of the surficial soils that would be used for growth media and closure cover material. A small knoll rock outcrop in the Phase 1 portion of the HLP would require removal prior to the construction of the HLP. Removal of this knoll would require drilling and blasting. Due to the carbonate nature of the rock formation composing the knoll, this material would be suitable for use as part of an evapotranspiration (ET) cover layer for facility closure. Carbonate material would help to neutralize residual pH of the acid leached ore at the end of the life of the mine. Therefore, the material removed from the knoll would be stockpiled east of the HLP for future use as a cover material.

Surface water hydrologic and hydraulic calculations would be performed to establish design peak flows, runoff volumes, channel and underdrain capacities, minimum channel dimensions, and slopes required to pass the design peak flows from the onsite storm events and solution applications. The facility layout and offsite runoff diversion system route runoff around the heap leach facility. Therefore, stormwater considerations would be dictated by precipitation falling directly on the facilities.

In addition to the Phase 1 and 2 HLP, a 3-acre “test HLP” would be constructed in the same manner as the HLP, except that it would be limited to 40,000 tons of material with a maximum height of 40 feet. It would be constructed to provide improved understanding of the hydrogeochemical dynamics of the acid heap leach process without waiting until closure of mine operations. By designing, constructing, and operating a test HLP identical to, but at a smaller scale than, the operational HLP, it would be possible to gain accurate estimates of process fluid and water flow through the heap and the resulting water quality in the draindown during all phases of mining (Espell 2020).

2.1.2.1 Heap Leach Pad Stability

The slope stability analyses were performed using the computer program SLIDE Version 8.024 by Rocscience. The ore material would generally be friable and polymer agglomerated. The agglomeration process would consist of the application of a polymer binder that would bind the finer particles to the larger particles so that the resulting material consists of individual particles that are of higher strength and permeability. Considering the crushed ore product and 15-foot-high lifts planned for the heap leach materials, only minor segregation of the material would be expected during placement. Given the predominantly granular nature of the heap leach material, perched zones of fluids within the heaps were not considered in the analyses. The facility design incorporated a full underdrain system of granular overliner material and a network of underdrain pipes. This type of drainage system has proven to be successful at many other heap leach facilities in the region.

As is typical for geomembrane-lined HLPs, the results of the analyses indicate that the translational failure surfaces along the geomembrane liner interface are the most critical (lowest factors of safety). The results of the slope stability analyses indicate that acceptable minimum factors of safety (1.3 static, 1.1 pseudo-static under the operational basis earthquake and over 1.0 under the maximum credible earthquake used to model closure conditions) would be achieved in all cases (NewFields 2019a). The minimum pseudo-static factors of safety were all above 1.0. Seismic hazard analyses were completed to determine the operational basis earthquake and the maximum credible earthquake.

2.1.3 Rock Disposal Area

The RDA would be southeast of the open pit, was designed to accommodate approximately 2.5 million tons of waste rock during the entire life of mine, and would be built in two phases. The first phase would include 250,000 tons of waste rock and would be an end dump lift to create a buttress for the life of mine facility. The second phase would be built on top of the base of the first phase in lifts to an elevation of 6,810 feet. Each lift would be set back such that the crest-to-crest slope angle would match the final reclamation slope angle of 3H:1V to minimize regraded volumes. Non-potentially Acid Generating (non-PAG) waste rock would be hauled directly from the pit to the RDA, and PAG waste rock would be placed on the lined HLP. The PAG waste rock would be comingled with the ore by using the primary crusher, after which it would be agglomerated and stacked on the HLP with the ore. **Figure 2.8** illustrates a vertical cross-section of the RDA.

The RDA has been designed to accommodate a maximum capacity of 2.5 million tons of waste rock. The waste rock material is friable and would be hauled in 40- to 50-ton trucks and end dumped to create a slope no steeper than 3H:1V. NVV would construct an unlined RDA based on the Adaptive Waste Rock Management Plan (AWRMP) provided as Appendix E in the Plan of Operations. The base of the RDA would be prepared by removing surface vegetation and salvaging available growth media, which would be hauled to and deposited in growth media stockpile areas. The excavated surface would be prepared by moisture conditioning and truck compaction. Berms and/or channels would be constructed around the RDA to direct stormwater runoff around the facility. Runoff from the RDA would be directed into a sediment pond that would be discharged into the natural drainage east of the RDA.

2.1.4 Ore Processing

NVV would construct a processing area that would contain a processing facility, ancillary facilities, process offices and laboratory, septic tank and leach field, and a pond system. The pond system would include the Pregnant Leach Solution (PLS) Pond, an Intermediate Leach Solution (ILS) Pond, and an Event Pond; and evaporation ponds including a Process Solution Evaporation (PSE) Pond and a PSE Overflow Pond. The ILS Pond would serve as a secondary PLS Pond or a way to perform leaching in series when both phases of the HLP are being used for leaching. The PSE Ponds would provide a double-lined area to store excess process solutions to maintain a steady influent to the solvent extraction (SX) circuit. All five ponds have been designed to connect via overflow weirs to provide for emergency containment. **Figure 2.9** illustrates the overall process flow diagram.

Figure 2.8. Pit and Rock Disposal Area Cross-sections

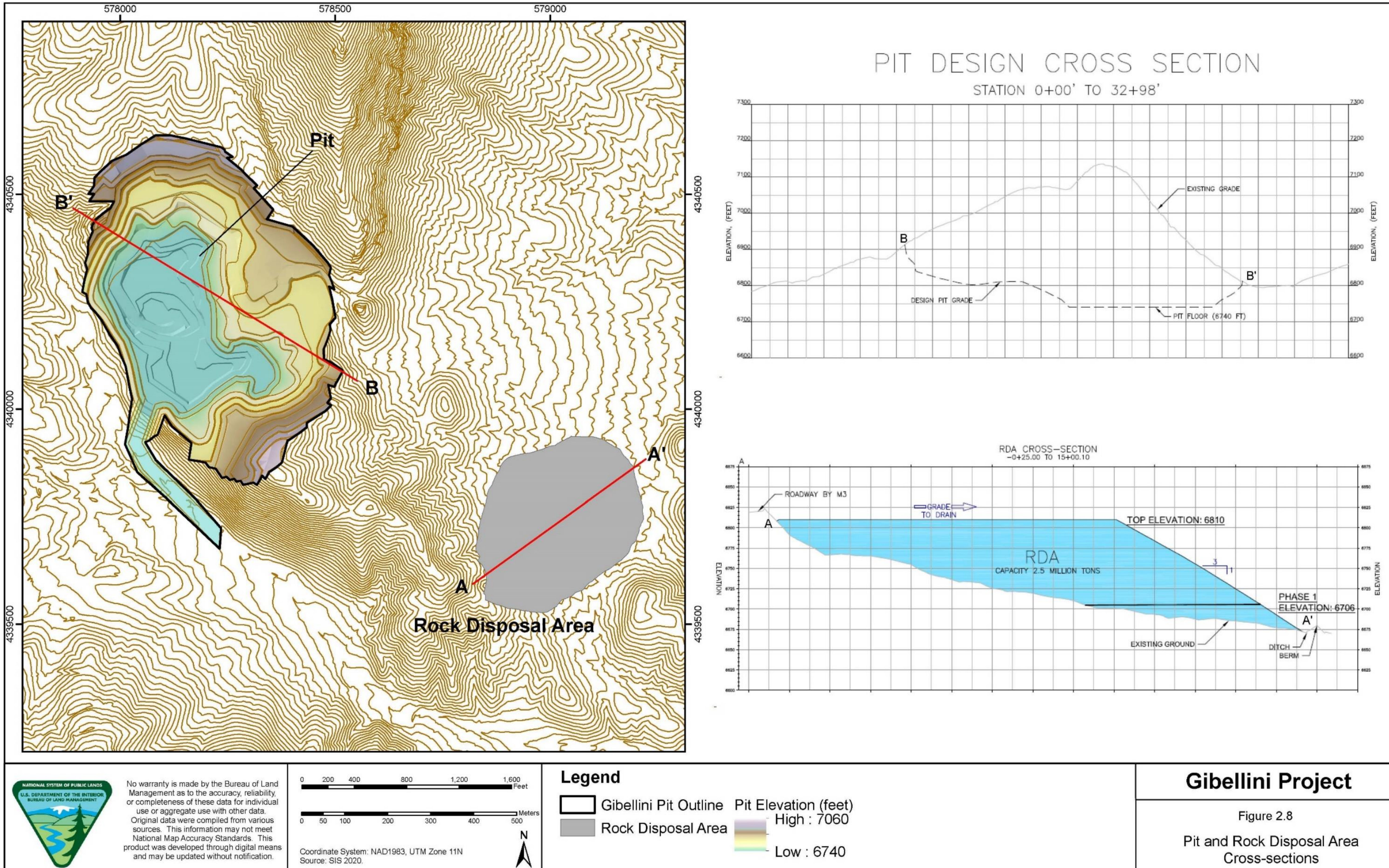
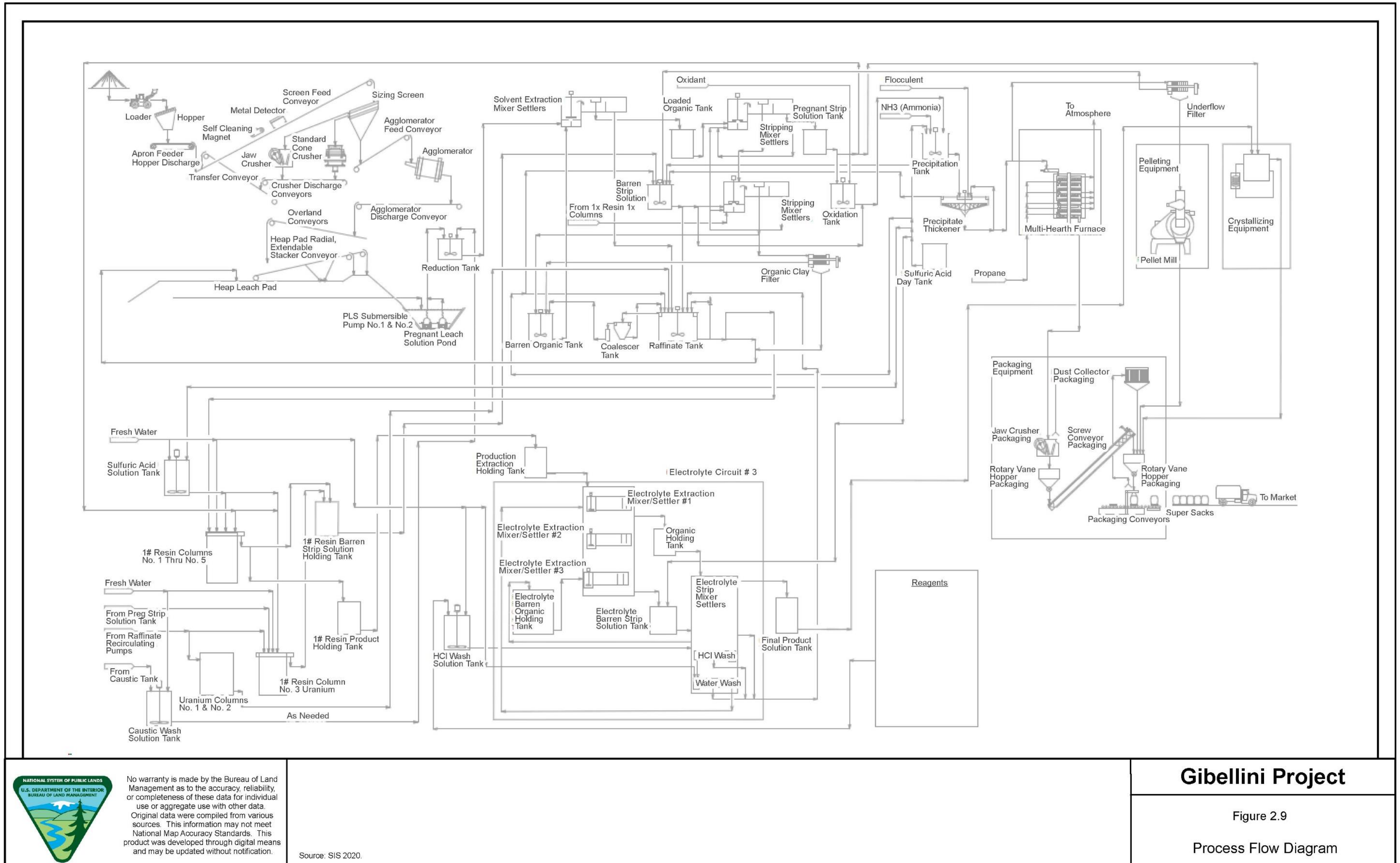


Figure 2.9. Process Flow Diagram



The processing facility would contain all processing (leaching) activities. The reagent tanks would be designed and constructed on a sealed, cement slab with secondary containment and a steel building cover supported by a steel frame. The secondary containment would be designed to contain 110 percent of the volume of the largest tank or container within the area of containment (per Nevada Division of Environmental Protection [NDEP] 445A.350-447 regulations). Each containment area has been designed based on these criteria. The detailed engineering design has been included in the Water Pollution Control Permit Application, which was filed with the NDEP.

The process office and laboratory building would contain personnel offices and a laboratory to conduct analytical activities relevant to mining and processing activities. The buried septic tank and leach field would be east of the process office building. The process area septic system and leach field would be engineered, constructed, and operated in accordance with the Bureau of Water Pollution Control regulations in NAC 445A.810 through 445A.925, for onsite sewage disposal systems.

2.1.4.1 Crushing and Stockpiling

Mined ore would be transported by truck to the primary crusher facility. The ore would be dumped directly into the feed hopper for the jaw crusher, where it would be crushed to a size 80 percent passing 2 inches. The crushed material would be transported by a covered conveyor to the coarse ore stockpile. The coarse ore stockpile would have a reclaim feeder in a tunnel underneath the stockpile to feed the secondary screening and crushing plant. The secondary cone crusher would reduce the ore to a particle size ranging from 0.5 inch to 1.5 inches and would subsequently pass over a screen where undersized material would be fed via conveyor to the agglomeration drum. Oversized material would return to the secondary crusher. The agglomerated material would be transferred onto the HLP via the heap conveyor stacking system. Ore would be stacked on the heap by a series of portable grasshopper conveyors followed by an indexing conveyor and radial stacker.

2.1.4.2 Agglomeration and Leach Pad

The crushed ore would be sent to a 10,000-ton-per-day capacity drum agglomerator where the ore, concentrated sulfuric acid, polymer binder, and water (either freshwater make-up or rinsate from Phase 1) would be blended together with an acid addition rate of approximately 70 pounds per ton of ore. An acid tank and pumping system would be used in tandem with the polymer binder fresh make-up water and storage system. The agglomerated ore would be discharged onto a belt where the material would be conveyed through an overland conveyor and a series of portable conveyors to a radial stacker. The ore would be placed directly on the pad via the radial stacker. The radial stacker would have an extendable section, which would decrease the number of times the stacker would need to be repositioned. The heap stacking lift height would be 15 feet with a maximum overall heap height of 150 feet. Once sufficient material had been stacked, distribution piping would be set up and from those distribution headers. Individual drip lines would be set up to distribute solution on the heap. A leach solution would be applied to the material at a rate of 0.0025 gpm per square foot via drip emitters. The leach solution would percolate through the stacked material until it reached the composite lining system at the base of the HLP.

2.1.4.3 Heap Leaching

The ore from the stacker would be placed on the HLP and allowed to stand (cure) for a minimum of 24 hours. Once sufficient material had been stacked, distribution piping would be set up and from those distribution headers, individual drip lines would distribute leach solution.

The vanadium would be leached out of the ore by the sulfuric acid as it percolates through the stacked material. Minor amounts of uranium would also be leached into the solution. The uranium is a contaminant in the vanadium products and would need to be removed ahead of vanadium recovery. Even though the uranium concentrations in the ore would be very low, the process for concentrating vanadium would also concentrate the minor amounts of uranium in the ore. Removal of the uranium would ensure that uranium would not be further concentrated in the process and would not present any future requirements at closure.

PLS and ILS would be collected and transported to the pond system in pipelines placed in trapezoidal-shaped lined secondary containment channels. The channel lining system would consist of an 80-mil HDPE textured geomembrane liner placed on a prepared subgrade. The PLS and ILS would be pumped from the PLS Pond and ILS Pond, respectively, to the process building for vanadium recovery.

The ILS circuit would be used when there would be a transition from one phase to the next phase. Once the ore on the preceding phase had been completely leached, the ILS system would be shut down until the next transition.

Rinsing of the completed Phase 1 portion of the HLP would occur concurrently with active leaching of the Phase 2 portion of the HLP where the sulfuric acid leachate would be recovered. After the cessation of mining and active leaching activities, both heaps would be allowed to drain and active volume reduction of the fluid inventory from the heaps would begin. Regrading of both heaps to the final reclamation slopes of 3H:1V would occur with the north- and south-facing interior slopes of Phases 1 and 2 being graded further to fill the gap between the Phases 1 and 2 to provide drainage of the top surface of the heaps to the ponds. The entire top surface of the regraded pad would then be lined with an 80-mil HDPE liner to use as an evaporation surface during the active water reduction phase. The evaporation system would consist of a network of mechanical water evaporators set in approximately 2 feet of gravel over the 91 acres of HDPE-lined top surface of the HLP. Active management of solution reduction activities would occur for approximately 3 years. During the active solution reduction phase, a water treatment system would be utilized that would first use lime treatment to raise the pH to 4.5 followed by a sulfate-reducing bioreactor (SRB) biological treatment system to reduce contaminants so that draindown could be evaporated in the evaporation cells (E-cells) during the active fluid management and during the semi-passive fluid management phase. The SRB biological treatment approach is being used as a polishing step[1], during which salts and sulfates will be removed, at the final heap draindown stage that will enhance the evaporation rate and longevity of the E-cells. During the active fluid management phase, a split stream of approximately 30 gpm of draindown solution would be treated through the SRB and then blended back into the draindown collection ponds, which would eliminate evapoconcentration of salts during the active fluid reduction phase. This treatment system would then treat all the draindown during the semi-passive period of final draindown. Conversion of existing process ponds and evaporation ponds to E-cells is anticipated to occur during the last year of the active solution reduction phase followed by an additional 30 years of semi-passive treatment and evaporation of the final heap draindown in the E-cells. The active fluid reduction phase would occur until the draindown flow is less than 24 gpm, at which point the E-cells would evaporate all the draindown flow. At this point, the active evaporation system on the surface of the HLP would be removed and an 80-mil HDPE liner would be placed over the gravel covered HDPE liner to encapsulate the salts collected in the evaporation gravels. Three feet of soil cover would then be placed over the entire regraded HLP (Phases 1 and 2). An estimated 30-year post-closure management and monitoring period would be assumed for the Project during the semi-passive water reduction phase.

A site-specific analysis of E-cell evaporation rate was performed using nearby pan evaporation data; from that analysis, the E-cells are conservatively assumed to evaporate water at a rate of 2.0 gpm per acre. The total E-cell surface area is 11.9 acres, resulting in an E-cell treatment capacity of 23.8 gpm. The heap draindown would be treated prior to entering the E-cells so that, in the event of overtopping of the E-cells, the treated water would be at or near water quality standards so ecological risks would be minimal. The ponds and later E-cells would overflow from the PLS Pond to the ILS Pond to the Event Pond to the PSE Pond; therefore, the total capacity can be summed, equaling 34.1 million gallons of capacity before addition of sand/gravel for conversion to an E-cell. Assuming 30-percent porosity of the sand and gravel material added to the E-cell, the total E-cell solution capacity would be 10.2 million gallons. The Event Pond capacity (8.48 million gallons) was designed to contain the runoff and infiltration from a 100-year, 24-hour storm event plus direct precipitation falling on the pond. Therefore, the 10.2-million-gallon capacity of the E-cells should be sufficient for the 100-year, 24-hour storm event. **Figure 2.10** shows the solution management plan phases from operations through closure.

2.1.4.4 Process Ponds and Evaporation Ponds

The process ponds would work together as a system with process and stormwater being contained in the pond system. Under normal operating conditions, solution would discharge

[1] Based on these reactions the following secondary reactions (sulfate reduction to sulfide is the primary reaction) would occur: (1) Metals such as iron, zinc, copper, lead, cobalt, mercury and arsenic are removed by the sulfides formed from sulfate reduction. These metal sulfides are very insoluble and very stable. (2) Selenium and vanadium can be reduced to their zero valent metal state. (3) Uranium and manganese are removed as carbonate minerals from the bicarbonate produced in the reaction.

directly from the HLP through a piping network that discharges into either the PLS Pond or the ILS Pond depending upon solution grade. Solution would be pumped directly from each pond into the processing plant. During events that may interrupt processing conditions, such as a power loss or storm event, solution would fill the PLS Pond and the ILS Pond. Once the maximum solution capacity of these ponds had been reached, spillways connected to these ponds would then convey and discharge the solution into the Event Pond.

A spillway would also connect the Event Pond to the PSE Pond that in turn would discharge solution into the PSE Overflow Pond to provide extra containment flexibility. It is anticipated that a minimum water ballast would be maintained in the PLS Pond and ILS Pond and the remaining maximum operating inventory may be split between the PLS Pond and the ILS Pond in varying percentages at the discretion of NVV.

The selected design requirements for the pond system include process solution storage for ballast/operating inventory and solution storage for a 48-hour power outage divided between the PLS Pond and ILS Pond with a return flow rate of 1,500 gpm. In order to achieve a return flow rate of 1,500 gpm, solution would be applied at 1,650 gpm to account for an anticipated solution loss of 10 percent due to evaporation and ore adsorption. The design solution application rate would be 0.0025 gpm per square foot.

The lining system for the ponds would consist of an 80-mil HDPE primary liner, an 80-mil HDPE secondary liner, and a geonet drainage layer. Each pond would have an independent leak detection system consisting of a lined sump constructed at the lowest point in the pond bottom and monitored using an inclined riser consisting of an HDPE pipe, which would allow for operational flexibility should it become necessary to perform routine maintenance and repairs to the ponds and pumps. Because the ponds work as a system, as long as the total operational inventory has not been exceeded in the process pond system, all design requirements would be met.

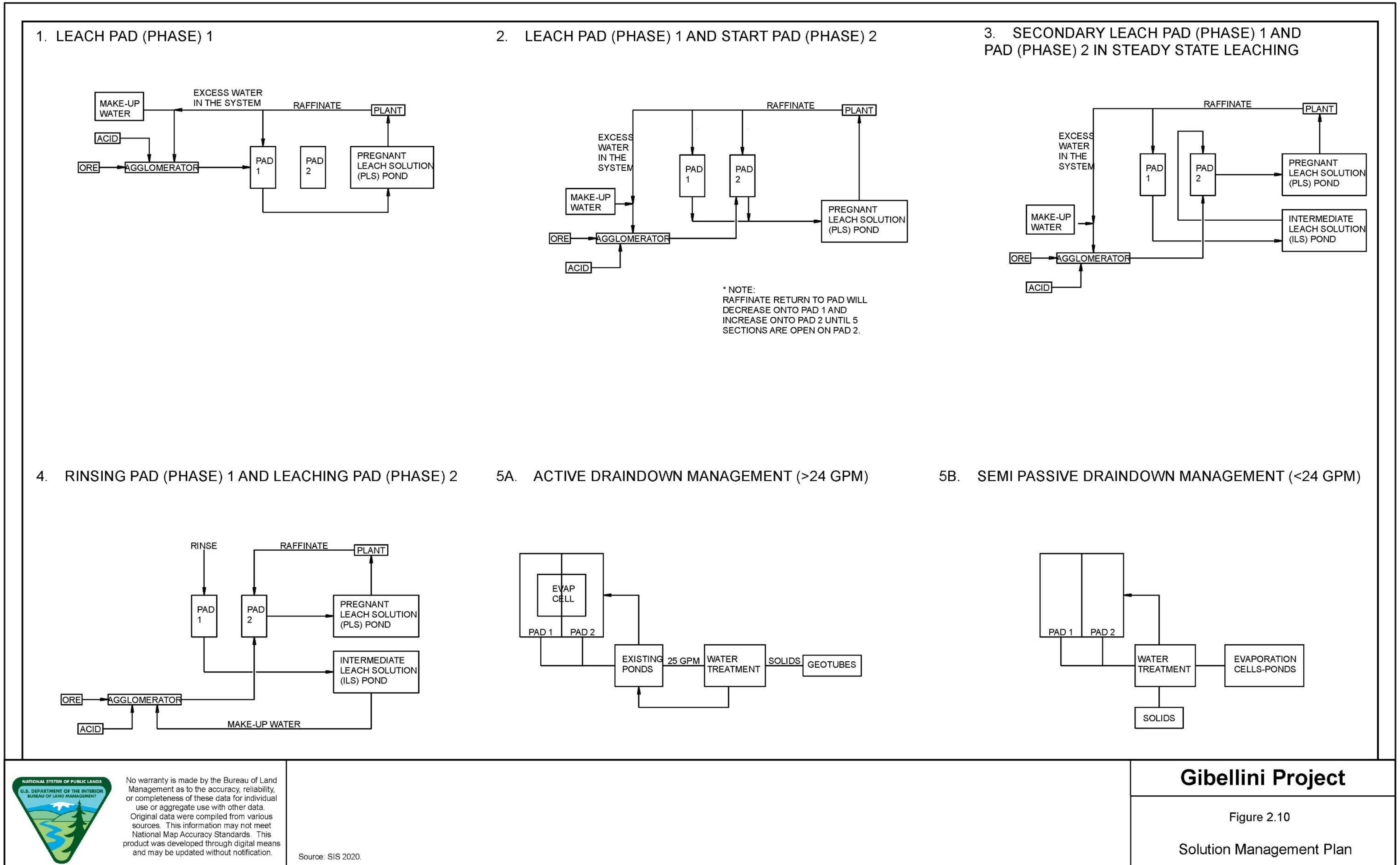
The design includes the use of ballast water to protect the PLS Pond and ILS Pond liner system from wind uplift. Sand tubes or other appropriate ballast would be used for the Event Pond and evaporation ponds, although an allowance for the accumulation of meteoric water has been incorporated into the design of these ponds.

The solution in the process ponds would be covered with bird balls to prevent exposure, and an 8-foot-tall woven wire or chain-link fence would be constructed around the pond area to prevent wildlife access, in accordance with NVV's Artificial Pond Permit.

2.1.4.5 Solvent Extraction Process

The SX process would include the extraction of vanadium from the PLS into organic extractants from which the metals can be concentrated. Uranium must be first removed from the PLS to avoid contamination of the recovered vanadium. Therefore, the SX process would consist of two SX circuits: the first circuit would utilize Di-(2-ethylhexyl) phosphoric acid to extract uranium, and the second circuit would utilize the SX organic phase to extract vanadium.

Figure 2.10. Solution Management Plan



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2.1.4.6 Uranium Recovery

The first SX circuit would be the uranium recovery circuit. The uranium would be recovered from the process by treating the organic before it would be returned to the extraction circuit. This circuit contains four stages of extraction mixer/settlers, one cleaner cell, and two stages of uranium stripping cells.

The uranium-loaded organic would be cleaned by stripping impurities out of the organic using hydrochloric acid. The uranium would be extracted from the organic phase solution using sodium carbonate to produce a clean uranium concentrate. The barren organic would be scrubbed with sulfuric acid prior to being returned to the last cell of the uranium recovery circuit, and the vanadium-bearing aqueous solution would advance to the vanadium SX circuit. The concentrated uranium would then report to the sodium diuranate (SDU) precipitation stage.

2.1.4.7 Sodium Diuranate Production (SDU) and Uranium Product Production

The SDU circuit would be fed uranium-rich liquor from the carbonate strip in the uranium recovery SX circuit for the SDU precipitation stage. SDU precipitation would be conducted in a series of agitated tanks with the addition of caustic (sodium hydroxide) solution. The SDU precipitate would be thickened and filtered in preparation for purification by re-dissolving with concentrated (6M) sulfuric acid in a series of agitated tanks. The uranium purity would then be further enhanced in a fluid-bed precipitation unit to which both hydrogen peroxide and caustic soda would be added followed by filtration, filter pressing, and drum packaging of the yellowcake product. Only in the SDU circuit would the uranium concentration exceed the regulatory threshold for permitting by the Nevada Division of Health. A separate permit from the Nevada Division of Health would be issued for this portion of the process.

The uranium extraction process would occur in a room devoted to that purpose. The uranium would be filtered from the treated organic (treated with 15 percent ammonium carbonate), the uranium would be retained in the filter, and the organic and ammonium carbonate solution would be sent to a tank. The cake from the filter press would be emptied into a hopper and the recovered uranium would be packaged in 55-gallon drums as “wet yellowcake” (more than 0.05 percent atomic mass unit by weight; more than 15 percent moisture) and would be ready for transfer. Approximately 50,000 pounds of uranium would be produced annually. Normal access to the room would be through an interior door from a change room equipped with personal protective equipment, radiation surveying equipment, and decontamination supplies. Alternate access would be through an exterior door for forklift access to allow for loading of yellowcake drums onto trucks for shipment.

The uranium extraction room would be equipped with a sump that pumps collected fluids back to the filter press for recovery of the uranium. The sump would not have an exterior discharge and all associated equipment would be above the sealed concrete floor to facilitate decontamination and eventual decommissioning.

Although the normal process would only utilize uranium in solution or as wet filter cake, it is possible that any leaks or spills may dry out and lead to dispersible uranium. The normal process would be to promptly wash down leaks or spills to the sump for recycling to the filter press, thereby minimizing the potential for dry airborne contamination. The ventilation system for the room would have a filtered exhaust to prevent the spread of airborne uranium and would be maintained at a slight negative pressure except during truck-loading operations to prevent the spread of any potential airborne contaminants. Any stack emission points would be included in the NDEP Class II Air Quality Permit.

The uranium would be placed into transport containers and shipped by truck to the end user. The frequency of uranium shipment would be approximately every 2 months to minimize onsite storage.

2.1.4.8 Vanadium Recovery

The vanadium in the treated PLS from the uranium circuit would pass into the SX circuit for uranium-free vanadium recovery into the organic phase. The vanadium recovery SX circuit would be similar to the uranium circuit in that it would have four extraction mixer/settlers, two strip cells, and one conditioning cell. When the solutions separate in the last settler, the water phase would be sent to the raffinate tank (tailing from the SX).

The raffinate from the tank would be re-acidified and sent back to the HLP where it would restart the leaching cycle. The raffinate tank would be equipped with a skimmer that reclaims any oil phase that became entrained within the raffinate solution.

2.1.4.9 Vanadium Products Production

The vanadium from the strip circuit would be treated with ammonia and the initial vanadium product (ammonium polyvanadate) would be produced. This product would be thickened and centrifuged before it would be calcined into vanadium pentoxide (V_2O_5). That V_2O_5 would then be packaged and sent to the end user.

To produce ammonium meta vanadate (AMV), the ammonium polyvanadate would be dissolved in caustic and the vanadium would be reprecipitated with ammonia to produce AMV. The final solids would be washed and thickened so they can be filtered to remove the water. The AMV would then be dried at about 400 degrees Celsius to eliminate any residual moisture prior to bagging the AMV in super sacs for shipment. The solution from the thickener would be sent back to the strip circuit where vanadium would be loaded again.

The final products that would be produced include AMV, V_2O_5, and high-purity V_2O_5. Storage of the final solid vanadium products would be in super sacs in the product storage building, which would be connected on the north side of the process building. The vanadium would be inventoried when 100 tons had been accumulated (approximately 8 days). The vanadium would then be loaded onto flatbed tractor trailers (approximately five) and shipped to the railhead to be transported to the end user.

2.1.5 Ancillary Facilities

2.1.5.1 Class III Waivered Landfill

Industrial solid waste would be generated during construction and operations. NVV would apply for a Class III waivered landfill permit within the Project area through the Solid Waste Branch of the NDEP. The landfill would be approximately 6 acres in size and constructed north of the RDA. The Class III waivered landfill site would comply with the standards for location, design, construction, operation, and maintenance set forth in NAC 444.733 to 444.747. Solid wastes generated by the offices, shop, mine, and process departments would be collected in dumpsters near the point of generation. The landfill would accept materials in accordance with the Class III waivered designation and a sign would be posted outside the area listing the materials that would be accepted or not accepted. A training program would be implemented to inform employees of their responsibilities in proper waste disposal procedures associated with the Class III waivered landfill, which would include but not be limited to:

- Disposal of hazardous wastes, liquid wastes, and petroleum products would be separated from solid wastes.
- Used antifreeze would be collected and stored in a "Used Antifreeze" tank at the truck shop. Used antifreeze would be sent to a recycling facility via a contract trucking company licensed to haul spent fluids.
- Used oil would be collected and stored in a "Used Oil" tank at the truck shop. Used oil would be tested to determine its status prior to shipping to a recycling facility or other appropriate destination.
- Used aerosol cans would be emptied in satellite accumulation can-puncturing devices in the shop and mill building, core shed, mine operations building, and other areas where aerosol cans are used extensively.
- Used haul truck tires would be placed in specific locations within the RDA and buried. Only one layer of tires would be placed at the base of the interior portion of each bench so they would not be exposed during regrading of the dump during reclamation. Tire placement would maintain a minimum setback of 100 feet from the crest of the dump lift to ensure the tires are not exposed.
- Used oil filters would be drained prior to being crushed and disposed at the landfill. Alternatively, used oil filters may be recycled.
- Used containers that held reagents or petroleum products can be disposed if fully drained and crushed.
- The landfill would be inspected daily and would be compacted or covered with soil as necessary to prohibit trash from blowing outside the area and prevent other vectors from accessing the refuse. A fence would be installed around the landfill to secure the area.

2.1.6 Electrical Generation and Power Supply

2.1.6.1 Power Usage

The anticipated electrical load for the Project would be as follows:

- Connected load: 3.8 megawatts (MW);
- Average load: 3.0 MW; and
- Power factor: 95 percent.

2.1.6.2 Power Supply

The Project would connect with the 69-kV power line that currently provides power to the Pan Mine. The 24.9-kV Gibellini power line would extend approximately 13 miles to the Project area from a tie-in point along the Pan Mine power line. The power supply for the water pumps near the Fish Creek Ranch would be provided by the incoming 24.9-kV power line to the mine site.

2.1.6.3 Main Substation

The main substation would be within the fenced portion of the Project area, north of the access road and main office. This substation would be accessed by Mt. Wheeler Power Company personnel via a gated access road into the substation. A wooden pole distribution line within the Project area would connect the process building; administration offices; crushing, agglomeration, and acid storage/distribution area; heap leach conveying and stacking; mine facility area; powder silo; and water distribution pump-house. All electrical equipment, motors, control panels, field devices, relays, control system components, and cabling systems would be approved for the environmental and hazardous conditions in which the equipment would be installed. All oil-filled electrical equipment (e.g., transformers, switch gear) would be certified polychlorinated biphenyl–free before being brought on site.

2.1.6.4 Emergency Power System

Site emergency power would be provided through a standby power generator rated for the maximum power required in the event of a utility power failure. The control of the emergency power loads would be through the process control system, which would automatically start and stop loads to keep process pumps operating to prevent spill and overflows, keep tanks properly agitated, and run the equipment such as fans for safe ventilation. Uninterruptable power supplies would be used to provide backup power to critical control systems. Emergency battery power packs would supply backup power to the fire alarm system and emergency egress lighting fixtures.

2.1.7 Explosives Storage Area

The explosives storage area (powder silo) would be north of the RDA and associated containment pond (**Figure 2.1**). Access to the explosives storage area would be strictly limited to designated personnel. Explosive agents would be purchased, transported, stored, and used in accordance with the Bureau of Alcohol, Tobacco, Firearms and Explosives; Department of Homeland Security; and MSHA regulations. Explosive agents, boosters, and blasting caps would be stored within a secured area. Signs would be posted clearly defining the area and hazards associated with the area.

2.1.8 Hazardous Waste and Petroleum-Contaminated Soil Storage Area

NVV would construct a storage building inside a fenced area with a concrete containment pad at the mine building facility location and designate it as the 90-day hazardous waste storage facility (**Figure 2.1**) in accordance with the Resource Conservation and Recovery Act and NDEP Bureau of Waste Management regulations.

NVV would obtain a Hazardous Waste Identification Number from the United States (U.S.) Environmental Protection Agency although the mine is anticipated to be in the "small quantity generator" category as defined by the agency. NVV would develop a Solid and Hazardous Waste Management Plan identifying all wastes generated at the site and their appropriate means of sampling, management, and disposal. The 90-day hazardous waste storage area would be constructed north of the warehouse area in the northwest corner of the warehouse and laydown area. The building would be constructed with a concrete pad with containment stem walls and a ramp to assist the loading and unloading of drums. A chain-link fence would encompass the area to ensure security. Proper signs would be posted for the area in accordance with the Resource Conservation and Recovery Act, which would include, but not be limited to, emergency personnel contact information, chemical hazards present, and spill cleanup procedures. An emergency spill kit would be present for personnel to safely manage spills accordingly.

NVV would build and manage a petroleum-contaminated soil (PCS) storage area per the *Guidance for Mine Site Petroleum-Contaminated Soil (PCS) Management Plans* (NDEP 2009). The storage facility would consist of a sloped, concrete pad with stem walls to allow for storage of the PCS until the material has been shipped off site to a permitted disposal facility. Roll-off bins would be placed near the mine facility shop area and, once bins are full, the contractor would replace the bin and haul away the PCS to the PCS storage area in accordance with the PCS management plan. NVV would post proper signs around the bins regarding the types of materials stored, which may be placed into the roll-off bins. Signs would also be placed on the bins indicating their contents.

2.1.9 Fencing

Fences would be constructed around 413 acres of the process facility and associated ponds, HLP, RDA, and other areas to prevent access by livestock, wildlife, wild horses, and the public. Fences would be constructed according to BLM fencing standards per BLM Handbook 1741-1. In areas where a higher level of security would be needed, chain-link fences would be constructed.

2.1.10 Borrow Areas

2.1.10.1 Rhyolite Borrow Area

Rhyolite material, which would be used for overliner, riprap, roads, and infrastructure, was identified from outcrops approximately 1 mile southeast of the Project area. The borrow source area would be in Section 7, T15N, R53E. The road to the borrow source area would cross Fish Creek Road in Section 6, T15N, R53E. Access to the borrow source area would be from a haul road (Rhyolite Haul Road), which would connect the main access road to the borrow source area. Borrow material would be drilled and blasted, then hauled to the borrow pit stockpile where it would be screened and/or crushed and subsequently stored in the borrow pit crushed rock stockpile.

The proposed maximum highwall for the borrow area would be 40 feet and the slope angle would be 35 degrees or less. The material resource estimate for the borrow pit includes sufficient material to provide crushed material for roads, platforms, laydown areas, and the HLP. With proper mining, the borrow pit would be expected to yield over 3 million cubic yards of usable material (NewFields 2019a). Borrow material not suitable for overliner material, road surfacing material, or riprap would be stockpiled for future ET cover material.

2.1.10.2 Evapotranspiration Cover Borrow Area

Final closure of the HLP would include the installation of an ET cover with a design thickness of 3 feet. The final ET cover design is described in the Design of Soil Covers Technical Report. The ET cover material would be composed of hydrologically suitable materials that have the capacity to store and release water through ET. Initial test work has shown that several sources of ET cover material would be available on site including soils and alluvial materials stripped from the HLP and process facility areas prior to construction, blasted rock from the knoll within the surface disturbance areas prior to HLP construction, and carbonate waste rock. Based on material testing completed in the borrow areas, the cleared and excavated material would consist of sandy silt or silty sand with gravel. Initial hydrologic modeling has been completed to determine that approximately 975,000 loose cubic yards of ET material would be required to cover the HLP, based on a 3-foot ET cover thickness.

2.1.11 Stockpiles

2.1.11.1 Growth Media Stockpiles

During ground clearing and grubbing operations, an average depth of 12 inches of growth media would be stripped, salvaged, and stockpiled. Growth media stockpiles would be placed in designated areas within the Project area to the nearest associated mine component. The stockpile associated with the RDA would be placed southeast of the facility and downslope of the stormwater diversion structures. Growth media stockpiles would be sized to accommodate the amount of growth media obtained from nearby surface disturbance areas associated with various mine components. Growth media would be hauled and placed in growth media stockpiles, which would range in height from 40 to 80 feet. Growth media stockpiles would have 3H:1V slopes instead of the natural angle of repose (1.5H:1V) slopes. A total of 1,789,300 cubic yards of growth media would be needed for reclamation and 1,892,500 cubic yards would be available within the Project area, which would be salvaged and stockpiled. The greatest amount of growth media would be required to provide 3 feet of ET cover on the HLP, which would require 975,000 cubic yards of growth media.

2.1.11.2 Ore Stockpile

A compacted, soil-lined, temporary coarse ore stockpile would be constructed west of the HLP area. The crusher coarse ore stockpile would include approximately 64,000 tons of primary crushed material. Stormwater diversion channels would divert surface water run-on from the ore stockpile while runoff from direct precipitation would be conveyed into the compacted, soil-lined pond north of the stockpile pad. Existing ground underneath the stockpile would be cleared and grubbed of 12 inches of growth media and then lined with a 12-inch soil liner prior to construction of the structural fill. Structural fill material would be excavated from the surrounding area and compacted in lifts to form the base of the stockpile. Four feet of overliner rock would be placed on the finished grade to protect the liner, minimize rutting, and control dust.

An emergency loadout area would be developed between the primary crusher and overland conveyor, which would only be used if the overland conveyor is down for maintenance and the coarse ore stockpile has been depleted. Any water runoff from the stockpile area would be pumped to the pond near the coarse ore stockpile or the lined HLP area.

2.1.12 Stormwater Diversion and Management

Stormwater diversion channels would divert stormwater away from the Project facilities. Cross-sections of the stormwater diversion channels are shown on **Figure 2.11**. NewFields used National Oceanic and Atmospheric Administration Atlas 14-point precipitation data to identify the 500-year, 24-hour precipitation amount for the Project area to be 3.06 inches, based on the centroid of the HLP (documented in the report titled *Climate Data and Surface Water Hydrology* [NewFields 2019b] and included in Appendix Q of the Plan of Operations).

Hydraulic elements designed as part of this Project include channels (ditches) and culverts. Hydrologic and hydraulic calculations were performed to establish design peak flows and runoff volumes from up-gradient watersheds that would be diverted around the HLP. Stormwater diversion channels were designed to transport flow around the facility and discharge into natural drainage courses. The stormwater diversion channels associated with the construction of the HLP facility were designed to accommodate the peak flow from a 500-year, 24-hour storm event. Conceptually, the diversion channels would consist of V-ditches or flat-bottomed trapezoidal channels with 3H:1V side slopes (maximum) with 0.5 feet of freeboard during peak design flow conditions. Sediment controls, including riprap, sediment ponds, detention basins, and energy dissipation structures, have been incorporated into the facility design, as appropriate.

2.1.13 Sediment Basins

Sediment basins would be constructed in locations that would capture runoff and sediment during precipitation events within the Project area. The location of these basins is shown on **Figure 2.1**.

2.1.14 Ponds

The Project would include construction of the following ponds: Fresh Water/Make-up Water Pond, Coarse Ore Stockpile Pond, RDA Sediment Pond, Truck Shop/Wash Containment Pond, PLS Pond, ILS Pond, Event Pond, PSE Pond, and PSE Overflow Pond.

NVV would apply for Industrial Artificial Pond Permits from the Nevada Department of Wildlife. Chain-link fencing would be constructed around the process ponds to prevent wildlife access. All ponds that contain solutions potentially lethal to volant wildlife would be fenced and covered with bird balls to prevent exposure.

Any pond or individual ponds that would be connected via spillways with a capacity of 20 acre-feet above the natural ground surface or with a maximum embankment height of 20 feet or more would require a dam safety permit administered through the Nevada Division of Water Resources.

2.1.14.1 Fresh Water/Make-up Water Pond

A make-up water pond used to store freshwater for use in leaching activities and for construction water and dust control would be constructed northeast and downslope of the HLP. The pond has been designed to store approximately 8,000,000 gallons of freshwater. The pond would be single-lined with an 80-mil HDPE liner.

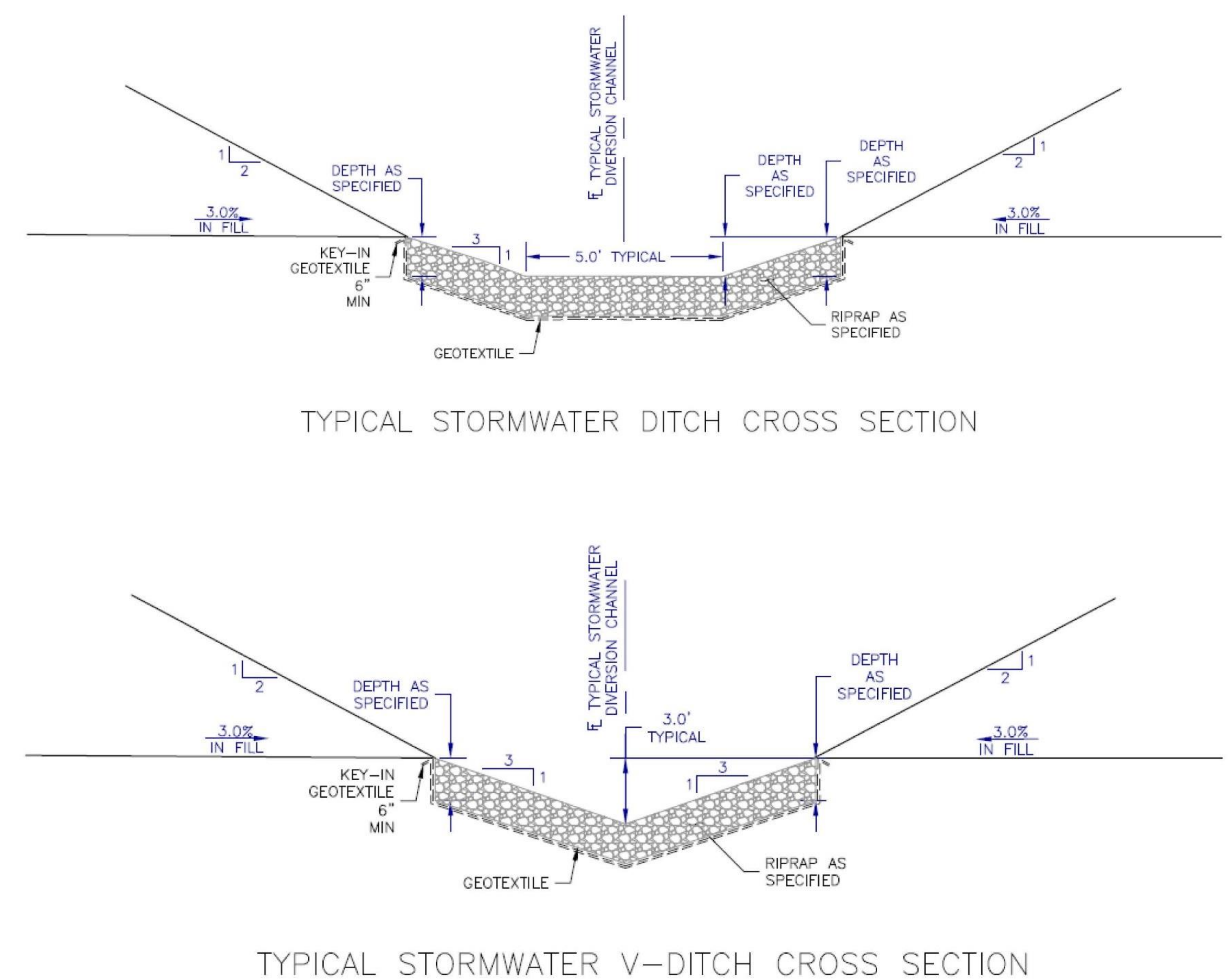
2.1.14.2 RDA Sediment Pond

The RDA would have a sediment pond constructed east of the facility, which would allow monitoring of any stormwater runoff from the RDA in accordance with the AWRMP. In addition, this pond would minimize potential sediment loads from discharging into natural drainages.

2.1.14.3 Truck Shop/Wash Containment Pond

The Truck Shop/Wash Containment Pond would be east of the truck wash, emergency generator pad, and hazardous waste containment. This pond would be lined and would collect any runoff from the truck shop pad and/or any water contaminated with hydrocarbons. Water in the Truck Shop/Wash Containment Pond would be treated using an oil skimmer, oil-water separator, and water filter and then reused in the truck wash. The design of the truck wash system would be included in the Engineering Design Report of the NDEP Water Pollution Control Permit application.

Figure 2.11. Stormwater Diversion Channel Cross-sections



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Source: SIS 2020.

Gibellini Project

Figure 2.11

Stormwater Diversion Channel Cross-sections

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2.1.14.4 Process Ponds and Evaporation Ponds

Ore processing facilities associated with the Project have been designed as zero-discharge facilities: all fluids introduced into the facilities would be contained or evaporated. The pond system would consist of process ponds including the PLS Pond, an ILS Pond, and an Event Pond; and evaporation ponds including a PSE Pond and a PSE Overflow Pond.

The pond system would be east of the HLP. The PLS Pond and ILS Pond capacities were based on a 48-hour power loss event with a nominal leach solution return rate of 1,500 gpm split between the two ponds. These ponds have been designed to accommodate an operating inventory of 5 to 8 feet; direct precipitation from a 100-year, 24-hour storm event; and maintain 3 feet of freeboard. The Event Pond has been designed to contain the runoff and infiltration from a 100-year, 24-hour storm event, plus direct precipitation falling on the pond surface, plus 3 feet of freeboard. The two evaporation ponds would each have half the capacity of the Event Pond. Rather than building these ponds at closure, NVV would construct them for operations to provide additional emergency storage for the process solutions to ensure containment under the most severe conditions. During both operations and at closure, water would flow from the ponds to the PLS Pond, ILS Pond, Event Pond, and finally to the two evaporation ponds.

The ponds would be double-lined with 80-mil HDPE geomembrane liner with an intermediate geonet drainage layer. Any potential leakage in the primary liner would flow to a depressed sump at the low point in the pond bottom, which would be monitored using an inclined riser consisting of an HDPE pipe. This leak detection system would eliminate pipe penetrations through the pond lining system.

2.1.15 Mine Facilities and Offices

The main office building would be a pre-engineered building installed on a concrete foundation. The main office building has been designed to accommodate approximately 20 staff personnel. A parking lot has been designed to accommodate employees, contractors, and visitor vehicles in addition to mine shipments via tractor trailers. An unmanned electric gate would be installed with a scale house to provide entry into the mine site. Traffic control signs and road berms would be placed immediately inside the entry gate to switch vehicles to left-hand traffic control. In addition, a ready line would be energized and would include parking for heavy equipment.

A fenced yard area associated with the warehouse would be used to store and manage larger or bulk shipments of materials, parts, and equipment. Good housekeeping practices would be maintained in this outer area, including but not limited to the following practices: use of pallets to keep materials and equipment off the ground, ample space between aisles in the yard, proper signs for designated areas, and designated parking areas for warehouse equipment within the yard.

2.1.16 Septic Systems

Three septic systems and associated leach fields would be constructed in the Project area. A septic system would be constructed east of the process office building, northeast of the office complex, and east of the mine shop facilities. The septic systems would be engineered, constructed, and operated according to Bureau of Water Pollution Control regulations at NAC 445A.810 through 445A.925 for onsite sewage disposal systems. Once engineered and designed, an application for this system would be submitted under separate cover to the NDEP.

2.1.17 Fuel Storage and Dispensing Station

A fuel facility to accommodate the haul trucks, large mobile equipment, and light-duty vehicles would be designed and constructed within the mine facility area. Two 10,000-gallon aboveground storage tanks would be used to store diesel fuel, and two 2,000-gallon aboveground storage tanks would be used to store regular unleaded gasoline and on-road diesel. All the tanks would have secondary containment engineered to contain 110 percent of the largest tank's capacity. The containment would include a sump to collect spilled materials. The fueling pad for light vehicles would be constructed with a concrete pad and sloped to a secondary containment area to capture any spills. The large mobile equipment fueling pad would be a concrete pad, which would slope to the secondary containment designed to capture any spills associated with fueling activities.

2.1.18 Truck Shop, Warehouse, and Truck Wash

The truck shop would be constructed with two large repair bays for heavy equipment and one smaller bay for light vehicles. One overhead crane would service both heavy equipment repair bays. An area would also be designated for lube oil storage and other lubricants necessary for shop facilities. Proper health and safety signs would be posted for these areas. Bulk quantities of fuels and reagents would be stored in primary (tanks, tote bins, barrels) and secondary containment to prevent releases to the environment. The secondary containment would hold at least 110 percent of the largest container or volume of containers in series. Used oil and coolant would also be stored at the maintenance building in lined containment. A licensed contractor would confirm characterization of the spent materials and either recycle or dispose in accordance with State and Federal regulations. Used coolant and oil would not be mixed. Used containers would be disposed or recycled according to Federal, State, and local regulations. Flammable cabinets would also be used for storage of aerosol cans containing hazardous components.

The warehouse would be constructed west of the main office along the main access road. A fenced yard area would be part of the warehouse facility to manage larger or bulk shipments of materials, parts, and equipment. Good housekeeping practices would be maintained in this outer area, including but not limited to the following practices: use of pallets to keep materials and equipment off the ground, ample space between aisles in the yard, proper signs for designated areas, and designated parking areas for warehouse equipment within the yard.

The wash bay would be a separate facility that would be constructed north of the shop building. The source water for the single vehicle wash bay would be from the freshwater pond northeast of the process plant. Water in the truck shop/wash containment pond would be treated using an oil skimmer, oil-water separator, and water filter and then reused in the truck wash. A 2,000-square-foot concrete slab would be constructed north of the truck shop for heavy equipment tire changes. A thick, concrete slab would be constructed to accommodate the bearing pressure from haul trucks and the bearing pressure of jack stands.

2.1.19 Water Needs and Uses

2.1.19.1 Water Usage

The estimated water use for the Project would be approximately 500 gpm 24 hours per day, 365 days per year for mine use. There would be some seasonal variability to mine water consumption mainly due to evaporative losses from road watering and process solution ponds during the summer season. Peak water requirements would occur during the summer when both water for mine dust suppression and construction would be required. An 8.0-million-gallon make-up water pond would be constructed within the Project area for use during peak usage periods.

2.1.19.2 Water Supply and Pipeline

Water for the Project would be supplied by the Fish Creek Ranch and pumped from a 15,000-gallon buried water transfer tank immediately south of the ranch to the Project area via a water pipeline. The pipeline would be within the proposed north-south power line alignment corridor for approximately 6.25 miles to the Project area.

Prior to digging a trench for the pipeline, the top 6 to 12 inches of growth media would be stripped and windrowed on one side of the pipeline trench and the remaining soil would be excavated from the trench and placed on the other side of the trench. Once the pipe has been installed, the trench would be backfilled to the ground surface, and growth media would then be spread back over the trench. The pipeline would terminate immediately inside the Project area boundary and would fill the 8.0-million-gallon mine make-up water pond. Pipeline construction would occur within a 20-foot-wide corridor, which also would include the power line alignment. The construction corridor would be utilized for the movement of construction vehicles, storage, and pipeline fusing operations. A Water Management Plan (Appendix L of the Plan of Operations [NVV 2020]) has been developed, which describes the proposed diversion and pipeline for the Project water supply.

2.1.20 Access and Other Roads

2.1.20.1 Haul, Secondary, and Mine Roads

Roadways are designed to minimize disturbance and balance cut and fill volumes, all while minimizing steep grades and sharp curves. All roads would be kept to a maximum 10-percent grade with cut and fill volumes balanced based on allowing for the top 1 foot of material within the footprint of the roads to be stripped and hauled to growth media stockpiles located strategically around the site. All haul and light vehicle roads would be unpaved.

2.1.20.2 One-way Light Vehicle Roads

One-way light vehicle roads would be used by light vehicle/light support equipment for construction/maintenance purposes. They would be seldomly used, low speed (less than 30 miles per hour), and rarely maintained by the mine personnel. These roads would have an operating width of 12 feet and a shoulder width of 5 to 6 feet. These roads would be used for access to areas such as the fire water tank and coarse ore conveyor, and for maintenance of site utilities (i.e., power lines and waterlines), stormwater diversion channels, and ponds. In specific areas, such as along the coarse ore conveyor that runs from the Primary Crusher to the Coarse Ore Stockpile, the one-way road would have designated pullouts every couple hundred feet in order to allow traffic to pass any maintenance vehicles working on the conveyor. **Figure 2.12** provides a typical cross-section view of the main access road to the Project area.

2.1.20.3 Two-way Light Vehicle Roads

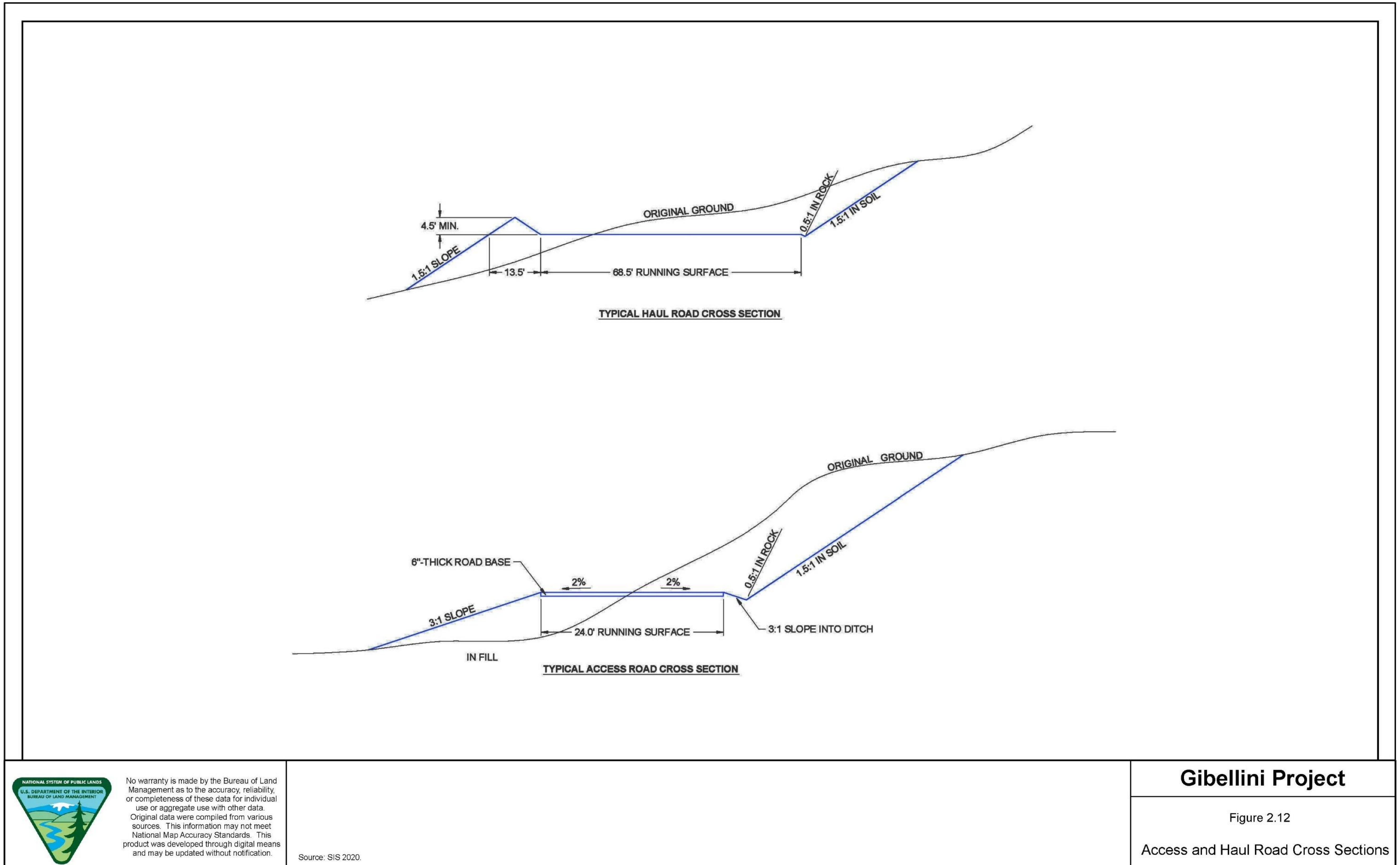
Two-way light vehicle roads would be constructed and used as the primary roads for light vehicle/light support equipment travel within the Project area. The roads would be used to access primary infrastructures and be heavily traveled by mine personnel. Travel speeds would approach up to 30 miles per hour. These types of roads are considered critical to the mining operation and therefore would be constructed with sub-base/wearing course to minimize downtime due to maintenance. Thicknesses of sub-base/wearing course would vary from 1 to 2 feet, dependent on vehicle usage. These roads would have an operating width of 24 feet and a shoulder width of 5 to 6 feet. The crusher access road, acid tank access road, mine facility roads, process facility roads, and prill silo road would be constructed as two-way light vehicle roads. These roads would be designed to meet rural county standards.

The Proposed Action would upgrade Eureka County Road M-104. The turn-off alignment onto M-104 from Fish Creek Road was moved south from the existing intersection to avoid a cultural resource site at the intersection of Fish Creek Road and M-104.

2.1.20.4 Mine Haul Roads

A mining contractor would construct the mine haul roads and associated infrastructure with a 40- to 100-ton class loader/truck fleet. The running width of the haul roads would be approximately 40 to 50 feet with an additional 9- to 15-foot-wide shoulder on either side of the road to account for safety berms and drainageways. The main haul road connecting the pit to the crusher (main haul road), temporary haul road, mine facility haul road, and Rhyolite Hill Borrow Area road would be constructed to meet MSHA haul road standards.

Figure 2.12. Access and Haul Road Cross-sections



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2.1.21 Work Force

NVV would utilize either its own work force or hire contractors for mine construction, operation, reclamation, and post-closure activities. The combined manpower for mine operation would be approximately 113 employees, composed of seven contractors and 106 staff. NVV would prefer to hire staff from towns in the Project region. **Table 2.2** identifies the anticipated workforce.

Table 2.2. Mining Personnel

Description	Number of Personnel
Mine Superintendent	1
Shift Supervisor	4
Mining Engineer	1
Geologist	1
Surveyor	1
Maintenance Supervisor	1
Drilling and Blasting[1]	7
Loading	4
Hauling	12
Roads & Dumps	8
Mechanics and Electricians	22
Maintenance Labor	4
Total Mining Personnel	66

[1] Blasting would be completed by a contractor typically using a three-man blasting crew.

The mine would operate on two 10-hour or 12-hour shifts per day, 365 days per year. The mine would require a total of 113 staff distributed over three to four shifts with approximately 30 staff on the day shift and 20 staff on the night shift. The number of staff would vary based on the mining schedule and haulage requirements. Processing manpower would include crusher, agglomerator, and conveyor operators; SX plant workers; and laboratory managers and technicians (**Table 2.3**). A total of 34 staff would be needed for processing operations. An additional six staff would provide general and administrative support to the mine (**Table 2.4**). The combined manpower for mine operation would be approximately 113 employees, composed of seven contractors and 106 staff. NVV would prefer to hire staff from towns in the Project region.

Table 2.3. Processing Staff

Unit	Number of Personnel
Plant Superintendent	1
Metallurgist	1
Shift Foreman	4

Unit	Number of Personnel
Clerk	1
Crushing and Agglomeration	8
Heap	2
SX	8
Assay Laboratory	3
Maintenance	6
Total	34

Table 2.4. General and Administrative Personnel

Description	Number of Personnel
General Manager	1
Accountant	1
Purchasing Agent	1
Environmental Manager	1
Safety Manager	1
Clerk	1
Total	6

Source: NVV 2020.

2.1.22 Exploration Operations

NVV is currently conducting exploration activities to identify new resources or expand existing reserves within the Project area under previous authorizations. Current exploration and mineral evaluations have been focused within and on Federally administered land that has been the subject of mineral exploration and development activities dating back to the 1940s. Additional exploration surface disturbance would occur for the Project and would generally include construction of access roads, drill pads, sumps, trenches, surface sampling, bulk sampling, and staging areas. Exploration methods would include both reverse circulation and core drilling, with minor trenching also planned. Exploration activities may also include monitor well installation. Future exploration would include drilling activities within the Project claim area (not including the linear access road, power line, or utility corridor).

Exact locations of the exploration disturbance have not yet been determined. A total of 46 acres of exploration surface disturbance would occur: 23 acres of road disturbance (50,000 linear feet of drill road with an average surface disturbance width of 20 feet), 22 acres of drill site disturbance (300 drill pads with an average surface disturbance area of 40 feet by 80 feet), and approximately 1 acre of surface trenching (3,000 linear feet of trench with a surface disturbance width of 15 feet). Placement of drill holes would be guided by reserve requirements, geotechnical studies, and geochemical sampling. The roads and pads would be sited to avoid any identified cultural resources. If additional disturbance for exploration activities would be necessary, an amendment to the Plan of Operations and revision to the reclamation bond cost would be prepared and submitted to the BLM for review and approval. NVV would provide the BLM and NDEP with annual documentation of surface disturbance locations for the exploration activities and any completed concurrent reclamation as required by Nevada Revised Statute 519A on or before April 15 of the following year.

2.1.23 Reclamation

Reclamation of disturbed areas would be completed in accordance with BLM and NDEP regulations. The purpose of Title 43 of the Code of Federal Regulations (CFR) Subpart 3809, Surface Management, is to prevent unnecessary or undue degradation of public land by operations authorized by the mining laws. Anyone intending to develop mineral resources on public land must prevent unnecessary or undue degradation of the land and reclaim disturbed areas. This subpart establishes procedures and standards to ensure that operators and mining claimants meet this responsibility and provide for the maximum possible coordination with appropriate State agencies to avoid duplication and to ensure that operators prevent unnecessary or undue degradation of public land by operations authorized by the mining laws. The State of Nevada requires that a reclamation plan be developed for any new mining projects and for expansions of existing operations (NAC 519A). The State also requires decontamination of the area of any residual radiation beyond background levels and a return to unrestricted use pursuant to NAC 469.3178.

The reclamation measures to be utilized by NVV for the Project are described in the following sections. The intent is to reclaim areas within the Project to a beneficial post-mining land use, prevent unnecessary degradation of the environment, and reclaim disturbed areas to ensure visual and functional compatibility with surrounding areas. The proposed post-reclamation land use is intended to allow for continued use of the Project area for livestock grazing, wildlife, and recreational use.

Final reclamation of the Project area would occur at the end the Project although every effort would be made to identify concurrent reclamation opportunities during the life of the operation. Reclamation would begin within the Project area when the surface disturbance has been deemed inactive and would no longer be used. Revegetated areas would be monitored for erosional stability and revegetation success, during the spring or fall, for a minimum of 3 years until attainment of the revegetation success criteria has been met (BLM 2016a). Reclamation activities would be coordinated with the BLM and NDEP Bureau of Mining Regulation and Reclamation (BMRR), as necessary.

2.1.23.1 Reclamation of Heap Leach Pad and Ponds

Heap Leach Pad

The HLP would be constructed in two phases (Phases 1 and 2) on one common liner so that concurrent closure would begin immediately after vanadium recovery ceased in the Phase 1 area and the Phase 2 area is being actively leached. Sequential heap closure steps would include rinsing of the Phase 1 area to recover acid for active leach of the Phase 2 area, regrading of Phase 1 and 2 areas to a 3:1 slope after completion of active leach on the Phase 2 area, construction of lined evaporation surface on the top surface of Phase 1 and 2 areas, solution volume reduction, 3-foot-thick cover placement, and long-term draindown solution management (**Figure 2.13**).

2.1.23.2 Operational and Concurrent Closure Phases

The HLP would have six distinct operational and concurrent closure stages.

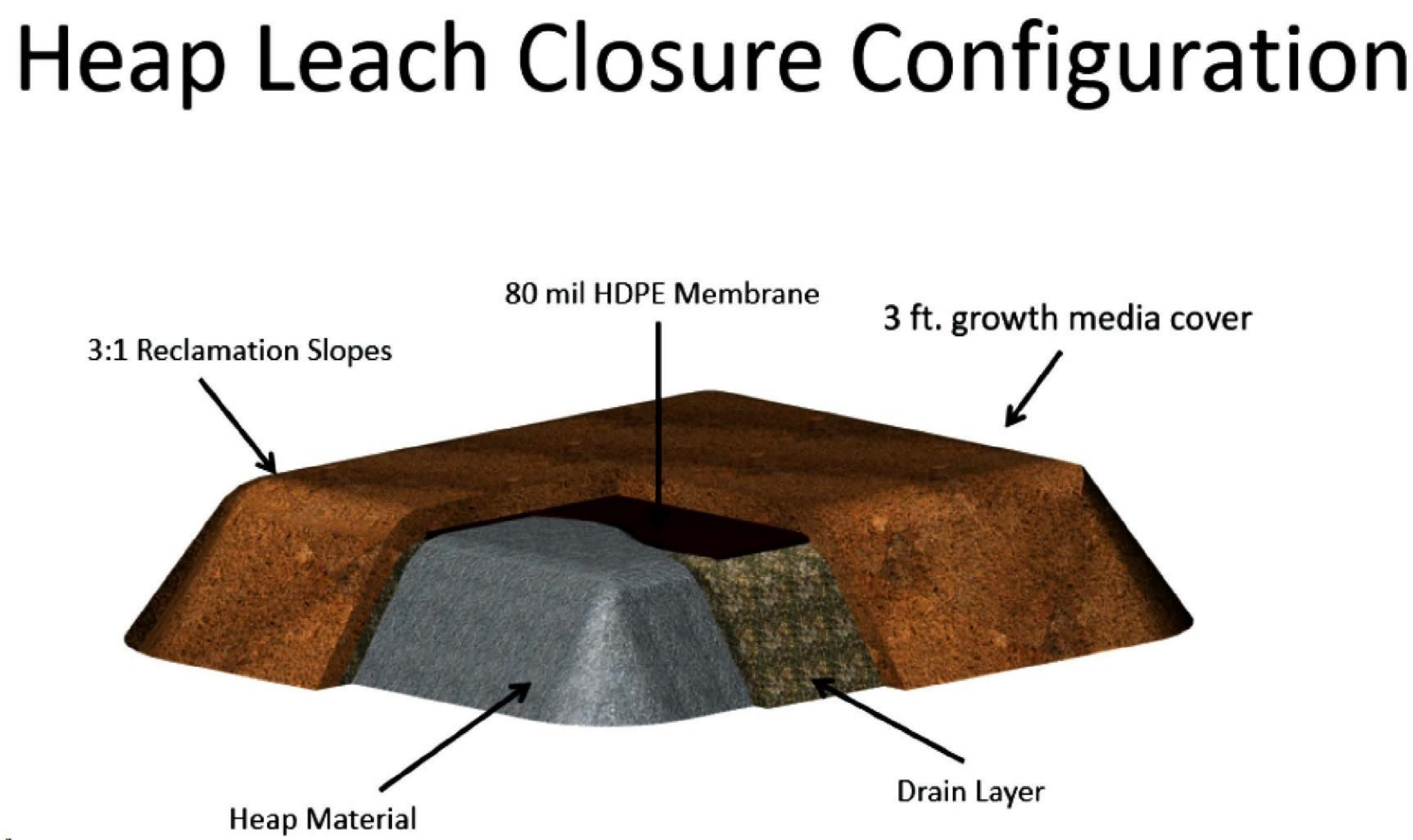
Stage 1: Phase 1 Area Active Leaching. The crushed ore would be sent to a drum agglomerator where the ore, concentrated sulfuric acid, polymer binder, and freshwater would be blended and then conveyed to the Phase 1 area. Raffinate from the process plant would be pumped to the pad for active leaching and collected in the PLS Pond to be sent to the process plant. This phase would continue until the Phase 1 area had reached capacity.

Stage 2: Phase 1 Active Leach and Begin Stacking Phase 2. The stacking of crushed ore in the Phase 2 area of the HLP would begin as soon as the Phase 1 area is stacked to its full capacity. The initial leaching of the Phase 2 area would overlap with final leaching of the Phase 1 area.

Stage 3: Phase 1 Area Secondary Leaching and Phase 2 Area Active Leaching. Secondary leaching of the Phase 1 area would occur during stacking and leaching of the Phase 2 area. New ore would be combined with make-up water from the freshwater supply and sulfuric acid in the agglomerator, which would then be conveyed to the Phase 2 area. The raffinate from the process plant would be pumped up and distributed to the Phase 1 area for completing the secondary leaching process. The solution collected from Phase 1 area would come from the ILS Pond where it would then be pumped up to the Phase 2 area. The solution from the Phase 2 area would be collected in the PLS Pond and sent to the process plant. This phase would continue until the economic recovery of vanadium had been completed in Phase 1 area.

Stage 4: Rinsing of the Phase 1 Area and Acid Recovery for Active Leaching of the Phase 2 Area. Make-up water from the freshwater supply would be pumped to the Phase 1 area to rinse the heap and recover the contained acid and any residual vanadium. The rinsate that would drain from the Phase 1 area would then be pumped up to the agglomerator for make-up water needed with the new ore and combined with the sulfuric acid. The ore would be stacked on the Phase 2 area and leached with the raffinate from the process plant. The solution from the Phase 2 area would be collected in the PLS Pond and sent to the process plant. Rinsing of the Phase 1 area would continue until active and secondary leaching of the Phase 2 area had been completed.

Figure 2.13. Heap Leach Pad Closure Configuration



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Source: Nevada Vanadium 2020

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Figure 2.13

Heap Leach Pad Closure Configuration

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Stage 5A: Draindown of Phase 1 and 2 Areas with Active Fluid Reduction. After the cessation of active leaching activities, both heaps would be allowed to drain and active volume reduction of the fluid inventory from the heaps would begin. Regrading of both heaps to the final reclamation slopes of 3H:1V would occur with the north- and south-facing interior slopes of the Phase 1 and 2 areas being graded further to fill the gap between the areas to provide drainage of the top surface of the heaps to the ponds. During regrading, the spent heap leach material would be graded over the liner in the solution collection channel and the regraded toe would intersect with the inner berm of the solution collection channel. This would protect the liner from additional reclamation activities but also ensure full containment of the draindown solutions. The entire top surface of the regraded Phase 1 and 2 areas would then be lined with an 80-mil HDPE liner to use as an evaporation surface during the active water-reduction phase. The evaporation system would utilize the process piping network to pump draindown solution to a network of mechanical water evaporators set in approximately 2 feet of gravel over the 91 acres of HDPE-lined top surface of the HLP. The evaporation pad would be bermed along the perimeter of the HLP with a drainage channel to be constructed on the downhill side that would allow excess water to drain directly back to the process solution ponds.

Active management of solution-reduction activities would occur for approximately 3 years as determined using the Heap Leach Draindown Estimator model. During the active solution-reduction phase, a water treatment system would be installed, which would consist of a combination of lime addition to raise the pH to 4.5 followed by an SRB biological treatment system to reduce contaminants so that the water from the biological treatment cell could be managed in the E-cells during the active and semi-passive fluid-management phases. The SRB biological treatment approach is being used as a polishing step, during which salts and sulfates will be removed, at the final heap draindown stage that will enhance the evaporation rate and longevity of the E-cells. During the active fluid-management phase, a split stream of approximately 30 gpm of draindown solution would be treated and then blended back into the draindown collection in the process ponds. This process would eliminate evapoconcentration of salts during the active fluid reduction phase. This treatment system would then treat all the draindown solution during the semi-passive period of final draindown. Conversion of existing process ponds and evaporation ponds to E-cells would occur during the last year of the active solution-reduction phase. The active fluid-reduction phase would take approximately 3 years to complete using the Heap Leach Draindown Estimator model and would occur until the draindown flow would be less than 24 gpm, at which the E-cells would evaporate all the draindown flow. The SX recovery circuit would be modified to facilitate alkaline addition (lime or limestone) to the collected process solution and the separation of neutralization solids.

Stage 5B: Semi-passive Treatment Phase of Heap Draindown and Final Cover Placement. When the draindown flow rate decreases to 24 gpm, which is estimated to occur in approximately 3 years, the lime and biological treatment system would be run as a semi-passive treatment system using gravity flow through the plant with the treated draindown discharged to the E-cells for evaporation. The E-cell system would be constructed in the primary PLS Pond, ILS Pond, Event Pond, PSE Pond, and PSE Overflow Pond. Each pond would be designed and constructed to meet NDEP process water pond construction requirements, including double 80-mil HDPE liners and leak detection. To facilitate management and prevent open water surfaces in the E-cell system, the ponds would be backfilled with selected sands and gravels. Spillways constructed between the ponds would allow the water from the first pond to rise to a maximum height within the cell to allow for optimum upward capillary movement and evaporation while preventing surface expression of free water. The overflow through the spillway system would allow flow into the next cell, and similarly into the third, fourth, and fifth cells (as needed). At this point the active evaporation system on the top surface of the HLP would be closed and an 80-mil HDPE liner would be placed over the gravel-covered HDPE liner to encapsulate the salts collected in the evaporation gravels. Three feet of soil cover would then be placed over the entire regraded HLP (Phase 1 and 2 areas). The cover material would be composed of growth media in addition to borrowed material within the Cover Borrow/Stockpile Area and carbonate waste rock from the pit. Test pit logs prepared during exploration of the property indicated that surface materials that would be removed and stockpiled during construction would consist of silty sand or sandy silt with gravel.

2.1.23.3 Ponds

Two evaporation ponds would be constructed in addition to the process ponds that include the PLS Pond, ILS Pond, and Event Pond. Each of the two evaporation ponds would have 50 percent of the capacity of the Event Pond. It is anticipated that the five ponds would be converted to E-cells at closure. The conversion of the ponds to E-cells would occur during active fluid management, after draindown had been reduced to less than 200 gpm. At this time, draindown would be managed in the converted process ponds until draindown reaches 10 gpm, at which time the evaporation ponds would also be converted to E-cells.

The process ponds have been designed with an HDPE apron on the uphill side of the pond to accommodate the ultraviolet stabilized GeoTubes that would filter the treatment solids (gypsum sludge) from the treated process water that would drain to the ponds. The treatment solids would be characterized at closure to determine the disposal method. Previous test work has indicated that the solids would be capable of disposal in the ponds following the draindown-reduction phase and the solids would be reclaimed with the ponds and covered.

During both operations and at closure, the PLS Pond and ILS Pond would be connected via a spillway and each would overflow into the Event Pond that subsequently overflows into the PSE Pond. The PSE Pond would overflow into the PSE Overflow Pond. Prior to E-cell conversion, representative samples of solids remaining in each pond at closure would be obtained to determine the chemical characteristics of the pond solids. Depending on the results of the characterization testing, the solids would be removed or would be left in place prior to backfilling each pond with appropriately sited ET-cover material.

2.1.23.4 Reclamation of Open Pit

The slope angles of the open pit walls would not allow soil replacement and revegetation due to access logistics and safety concerns. Operational and post-closure open pit slope configuration would be dictated by several parameters that include the geometry of the ore body, geologic and geotechnical characteristics of the host rock, equipment constraints, and safe operating practices. Entry and exit ramps into the pit would be barricaded using large boulders or berms to prevent public access. The pit floor would be graded to the pit drain in the southwest corner to prevent any ponding and subsequent infiltration of meteoric water. A safety berm would be placed around the perimeter of the open pit to prevent entry. Surface disturbance around the pit perimeter would be revegetated.

According to the *Update to Surface Water and Groundwater Quality Baseline Report* (Schlumberger Water Services 2014), the elevation of the bedrock water table in the pit would be approximately 6,630 feet above mean sea level, as measured in groundwater monitoring well GHM-7. The pit bottom (elevation of 6,740 feet above mean sea level) would be approximately 109 feet above the groundwater table, thereby avoiding the potential formation of a pit lake after mining.

2.1.24 Reclamation of Rock Disposal Area and Stormwater Diversions

2.1.24.1 Rock Disposal Area

The RDA would be constructed in two phases due to the very low volume of waste rock generated during the first 4 years of mining. The Phase 1 portion of the RDA would include 250,000 tons of waste rock and the Phase 2 portion of the RDA would include 2.25 million tons of waste rock. The Phase 1 portion of the RDA would be built as a buttress for the final facility and would be constructed at the final reclamation slope of 3H:1V to allow for concurrent reclamation.

As each successive lift of the RDA is completed, the face would be regraded. Once regraded, the lift would be covered with approximately 12 inches of growth media. The area would be subsequently seeded with the BLM-approved seed mixture (see Section 2.1.26).

An AWRMP has been developed for the Project, which specifies that all PAG material would be deposited in the lined HLP and all remaining high-carbonate waste rock would be deposited in the RDA. As such, **Figure 2.1** illustrates the full buildout of the RDA (Phases 1 and 2). It is anticipated the actual post-reclamation size of the RDA would be substantially smaller than the area illustrated in **Figure 2.1.**

2.1.24.2 Rock Disposal Area Growth Media Placement and Cover Requirements

As described in the AWRMP, the PAG waste rock would be agglomerated with the ore and placed on the lined HLP. The remaining waste rock that could not be placed on the HLP due to its high calcium carbonate content would be placed in the RDA and reclaimed. Because PAG rock would not be stored in the RDA, the function of the cover would be for revegetation purposes only. The RDA would be regraded to a 3H:1V slope and covered with 12 inches of growth media and revegetated.

2.1.24.3 Final Gradient Stability

In 2019, NewFields performed slope stability analyses on the RDA (NewFields 2019c) using industry practices and experience from similar projects. To determine the most critical failure surfaces, shallow, intermediate, and deep failure surfaces were evaluated for static loading conditions. A search was performed to find the most critical failure surface for each failure mode. A minimum acceptable safety factor of 1.3 and 1.1 was used for static and pseudo-static loading conditions. The results of the program indicated that, based on the existing soil properties, the required factors of safety were met. The results of the analyses indicated the RDA would be stable with a 3H:1V slope under static and seismic loading conditions during mine operation and closure.

2.1.25 Stormwater Diversion

Stormwater ditches and channels would remain in place where possible. Runoff from the RDA would occur following precipitation events; however, regraded slope angle, revegetation (including growth media placement), and best management practices would be used to minimize erosion and reduce sediment in runoff. Silt fences, sediment traps, or other best management practices would be installed as needed to prevent migration of eroded material until reclaimed slopes and exposed surfaces have demonstrated erosional stability.

2.1.26 Post-mining Land Use

Pre-mining land uses occurring in the Project area include mineral exploration and development, livestock grazing, wildlife habitat, and dispersed recreation. Following closure, the Project area would support the multiple land uses of livestock grazing, wildlife habitat, and recreation. NVV would work with Federal and State agencies and local governments to evaluate alternative land uses that could provide long-term socioeconomic benefits from the mine infrastructure including the renewable energy facility. Post-closure land uses would be in conformance with the BLM Eureka-Shoshone Resource Management Plan and Eureka County zoning ordinances. The objectives of the reclamation program would be:

- To provide a stable post-mining landform that supports defined land uses;
- To minimize erosion damage and protect water resources through control of water runoff and stabilization of components;
- To establish post-reclamation surface soil conditions conducive to the regeneration of a stable plant community through stripping, stockpiling, and reapplication of soil material;
- To revegetate disturbed areas with a diverse mixture of plant species in order to establish long-term productive plant communities compatible with existing land uses; and

- To maintain public safety by stabilizing all reclaimed slopes.

2.1.27 Drill Hole Plugging

All drill holes would be plugged in accordance with NAC 534.4369 through 534.4371. Drill holes would be plugged immediately after obtaining all necessary data from the drill hole. A drill hole may be left open for a period of time following the initial drilling if it is anticipated that the hole may be re-entered to drill deeper or to use down-hole geophysical techniques. Any drill holes that would need to be left open for additional data collection would be filled from the bottom of the hole with slurried bentonite as the drill rods are being raised. This would ensure no contaminants enter the drill hole, but it could be re-entered for deeper drilling. Upon final drill hole closure, a 20-foot-thick cement plug would be placed at the surface. Drill holes developed as part of a monitoring program would be plugged and abandoned following completion of monitoring activities upon approval of the BLM and NDEP. The bond cost estimate would be calculated for the maximum of six drill holes that would be open at any time to ensure adequate funds are available to plug and abandon all drill holes. In the annual summary report, NVV would identify which drill holes were left open and the reason for this action.

2.1.28 Regrading and Reshaping

The final grading plan for the Project area was designed to minimize the visual impacts of the surface disturbance areas and to provide long-term stability and revegetation that meets the post-mining land use objectives. The post-mining topography is illustrated on **Figure 2.14**. Slopes would be regraded with standard mine mobile equipment (e.g., dozers, trucks, loaders, scrapers) to blend with surrounding topography, interrupt straight-line features, and facilitate revegetation, where practical. Where feasible, large components, such as the RDA landforms, may be rounded with variable slope angles to mimic nearby topography. All regraded slopes would be flattened to 3H:1V or flatter. The RDA and HLP would be constructed in lifts where the setback of each lift would be sufficient to allow the crest-to-crest angle to be a 3H:1V angle or less. Growth media and ET cover stockpiles would be graded to 3H:1V or flatter slopes during interim reclamation to ensure revegetation of the slopes to reduce surface erosion. The open pit would not be reclaimed and would remain as a depression in the landscape.

During final mine closure, all buildings and structures would be dismantled and materials would be salvaged or removed to the proposed landfill or other authorized landfill. Concrete foundations and slabs would be broken using a track-hoe mounted hydraulic hammer or similar methods and buried in place under approximately 3 feet of material in such a manner to prevent ponding and to allow vegetative growth. After demolition and salvage operations are complete, the disturbed areas would be covered with approximately 12 inches of growth media and revegetated.

2.1.29 Revegetation

Reclamation would occur concurrently during mine construction and operation and following completion of all mining operations. Reclamation activities would include recontouring, seedbed preparation, and reseeding. For concurrent reclamation, revegetation would occur in areas where activities are no longer conducted or in areas that have been designated as "inactive."

Reclaimed surfaces would be revegetated to control runoff, reduce erosion, provide forage for wildlife and livestock, and reduce visual impacts. Seed would be applied with either a rangeland drill or a mechanical broadcaster and harrow, depending upon equipment accessibility. Seedbed preparation and seeding would occur in the fall and following grading and growth media application over reclaimed areas.

The revegetation seed mixture and application rates are shown in **Table 2.5**. A variety of plant species would be selected. This mixture would be appropriate for the elevation and precipitation regime of the Project area and would provide forage and cover species similar to pre-disturbance conditions, thereby facilitating the post-mining land uses of livestock grazing, wildlife habitat, and recreation. In addition, several taxa have been added to the seed mix to provide erosion protection. All taxa have been selected for this site based on their requisite needs (e.g., soils, precipitation). Furthermore, this reclamation seed mixture has been designed for use in all surface disturbance areas rather than using area-/soil-specific mixes. Changes or adjustments to the seed mixture or application rates would occur in consultation with the BLM and BMRR.

Seeding activities would be timed to take advantage of optimal climatic periods and would be coordinated with other reclamation activities. In general, earthwork and drainage control would be completed in summers or early fall. Seedbed preparation would generally be completed in the fall, either concurrently with or immediately prior to seeding. Seeds would be sown in late fall to take advantage of winter and spring precipitation and optimum spring germination conditions. Early spring seeding may be utilized for areas that could not be seeded in the fall. Seeding would not be completed when the ground is frozen or snow covered.

Figure 2.14. Proposed Action: Post-reclamation Topography

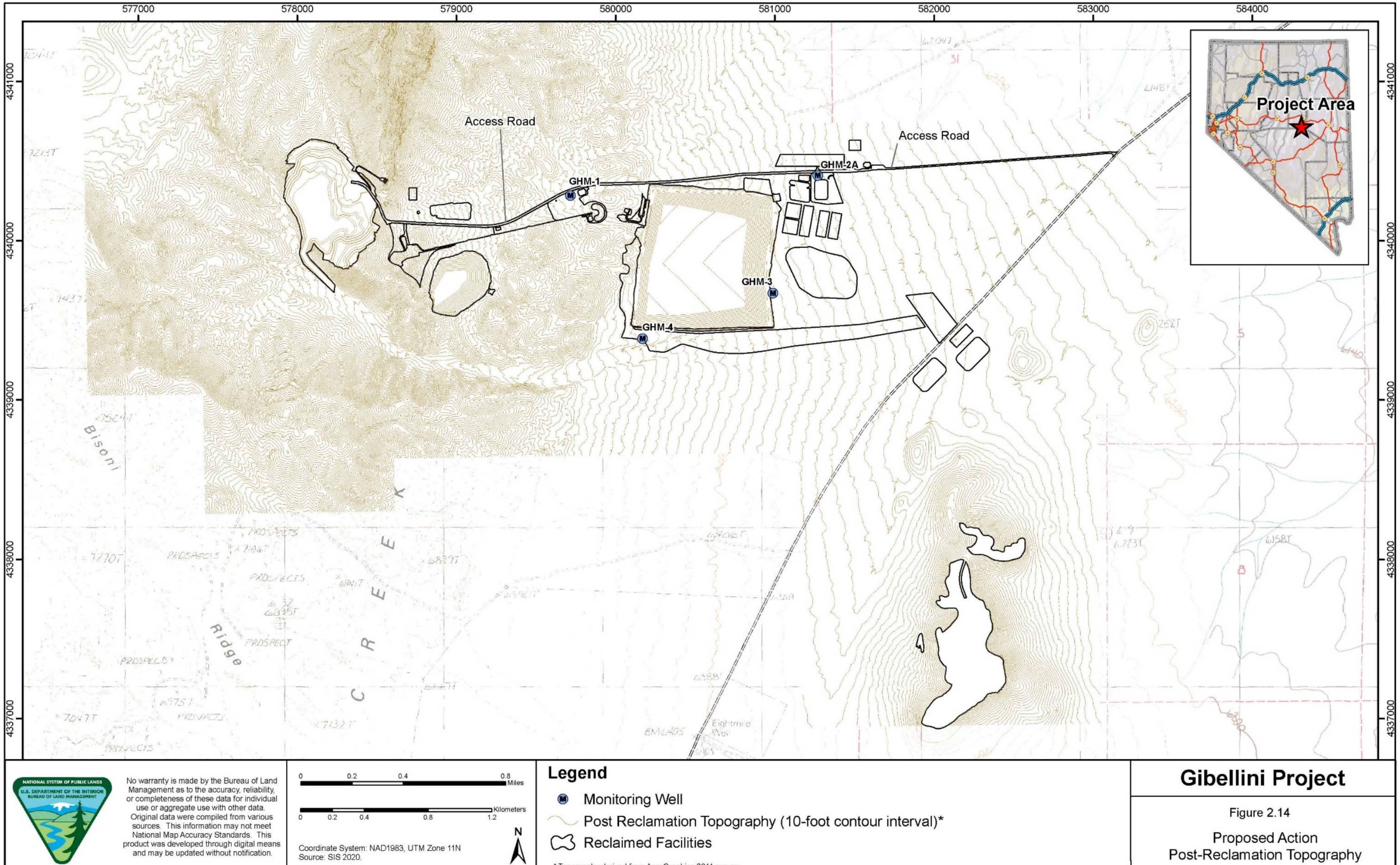

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Table 2.5. Reclamation Seed Mix

No.	Common Name	Scientific Name	Preferred Variety	PLS/lb.	PLS lbs./ac	PLS / ft^2	% PLS by Seeds/ft^2	Comment
1	Crested wheatgrass	*Agropyron cristatum*	*Ephraim*	200,000	0.20	0.9	1.8	Nonnative: erosion control
2	Bluebunch wheatgrass	*Agropyron spicatum*	*P7*	117,000	2.50	6.7	13.5	Native: excellent performer
3	Galleta	*Hilaria jamesii*	*Viva*	159,000	1.00	3.7	7.3	Native: warm season
4	Great Basin wildrye	*Elymus cinereus*	*Mangar*	95,000	2.00	4.4	8.7	Native: proven performer
5	Indian ricegrass	*Oryzopsis hymenoides*	*Nezpar*	141,000	2.00	6.5	13.0	Native: proven performer
6	Sand dropseed	*Sporobolus cryptandrus*	-	5,298,000	0.10	12.2	24.4	Native: warm season
7	Sandberg bluegrass	*Poa sandbergii*	-	925,000	0.20	4.2	8.5	Native: adapted to skeletal soils
8	Bottlebrush squirreltail	*Sitanion hystrix*	-	192,000	0.50	2.2	4.4	Native: occasional performer
Subtotal – Grasses					**8.50**	**40.8**	**81.6**	N/A
9	Lewis flax	*Linum lewisii*	*Appar*	285,000	0.25	1.6	3.3	Native: proven performer
10	Small burnet	*Sanguisorba minor*	*Delar*	55,000	0.50	0.6	1.3	Proven performer
11	Forage kochia	*Kochia prostrata*	*VNS*	407,700	0.10	0.9	1.9	Proven performer, limit amount
12	Palmer penstemon	*Penstemon palmeri*	*VNS*	610,000	0.10	1.4	2.8	Native: proven performer
Subtotal – Forbs					**0.95**	**4.6**	**9.3**	N/A
13	Winterfat	*Ceratoides lanata*	VNS	111,000	0.25	0.6	1.3	Performs occasionally
14	Fourwing saltbush	*Atriplex canescens*	VNS	52,000	0.75	0.9	1.8	Native: excellent performer
15	Wyoming big sagebrush	*Artemisia tridentata* spp. *wyomingensis*	VNS	2,500,000	0.05	2.9	5.7	Performs under correct conditions
16	Antelope bitterbrush	*Purshia tridentata*	VNS	15,000	0.50	0.2	0.3	Good forage, occ. performer
Subtotal – Shrubs					**1.55**	**4.6**	**9.1**	
TOTAL					**11.00**	**50.0**	**100.0**	

Source: NVV 2020.
Note: The 11.00 lbs./ac mix was designed for drill or broadcast seeding. If hydroseeding methods are used, the rate would be increased two times, and the seed would be placed prior to mulch application (i.e., no mixing of seed and mulch).
ft^2 = square feet; lbs./ac = pounds per acre; N/A = not applicable

2.1.30 Reclamation Monitoring

Reclamation monitoring would provide a multitude of both technical and economic benefits, especially if monitoring is implemented for concurrent reclamation. The Monitoring Plan (Appendix F of the Plan of Operations) provides detailed information regarding NVV's proposed reclamation monitoring and bond relinquishment plans.

Quantitative reclamation monitoring to measure compliance with the revegetation success criteria would begin during the first growing season after concurrent and/or final reclamation had been completed and would continue until the reclamation success criteria had been achieved. Qualitative monitoring of key indicators of site stability would continue, and the reclamation performance guidelines would apply during this time. The bond release criteria would be applied to the data collected in the third year following reclamation. Monitoring data from previous years would be used to determine the management needs. Revegetation success would be determined based on the *Nevada Guidelines for Successful Revegetation for the Nevada Division of Environmental Protection, the Bureau of Land Management and the United States Forest Service* (BLM 2016a).

NVV would submit an annual report on or before April 15 of each year to the BLM and NDEP for the preceding calendar year. The annual report would contain descriptions of the reclamation activities completed during the previous year. The annual report would also include a summary of areas reclaimed and a discussion of the general vegetation performance, surface erosion status, slope stability status, and corrective actions completed and/or proposed. An independent contractor would be retained to provide berm and sign maintenance, site inspections, and any other necessary monitoring for the period of reclamation responsibility. Post-mining groundwater quality would be monitored according to the requirements established by the NDEP upon approval of the final permanent closure plan to the water pollution control permit, with the goal of demonstrating non-degradation of groundwater quality.

2.1.31 Facilities Not Reclaimed

The open pit would not be reclaimed. As determined by the BLM, roads on public land suitable for public access or that continue to provide public access consistent with pre-mining conditions would not be reclaimed at closure. NVV would continue to use the access road from County Road M-103 (Duckwater Road) to access the Project area for monitoring and other purposes. NVV would remove the fences associated with mining activities at the end of reclamation and closure of each mine component.

2.1.32 Applicant-committed Environmental Protection Measures

NVV has committed to implement practices to prevent unnecessary and undue degradation during the Project life. These practices were derived from the general requirements established in the BLM's surface management regulations at 43 CFR 3809 and BMRR mining reclamation regulations, as well as other water regulations and BLM guidance documents. These measures are informed by the Enhanced Baseline Reports that identified potential resource conflicts and measures that could be taken to avoid or minimize those resource conflicts and are to be considered part of the operating plan and procedures. The Plan of Operations details the general Applicant-committed Environmental Protection Measures (EPMs) and resource-specific EPMs for:

- Air quality
- Water resources
- Cultural and paleontological resources
- Erosion and sediment control
- Waste rock management
- Noxious weeds, invasive, and nonnative species
- Safety and fire protection
- Hazardous materials and solid waste
- Growth media salvage and storage
- Wildlife and wild horses
- Migratory birds
- Raptors
- Big game
- Greater sage-grouse
- Pygmy rabbits and burrowing owls
- Survey monuments
- Visual resources

Appendix B of this environmental impact statement lists the Applicant-committed EPMs by resource.

2.2 SOUTH ACCESS ROAD ALTERNATIVE

The South Access Road Alternative would include the same mine components as described for the Proposed Action, except the access road would be constructed in a different location. This alternative access road would be approximately 7 miles long and extend from County Road M-103 (Duckwater Road) to the Project area (**Figure 2.15**). The access road would be constructed parallel to the power line corridor, as described for the Proposed Action, and would be constructed in accordance with Eureka County road specifications, which require sufficient sub-base and wearing course to accommodate both heavy and light vehicle access. The running width of the access road would be constructed with a 40-foot-wide running surface and up to 5-foot-wide shoulders due to the relatively flat terrain.

Overall, this alternative would result in approximately 38 additional acres of surface disturbance relative to the Proposed Action. Total surface disturbance would include 844 acres of BLM-administered land (**Table 2.6**). Post-reclamation topography would be similar to under the Proposed Action, except the access road would be in a different location and would not be reclaimed.

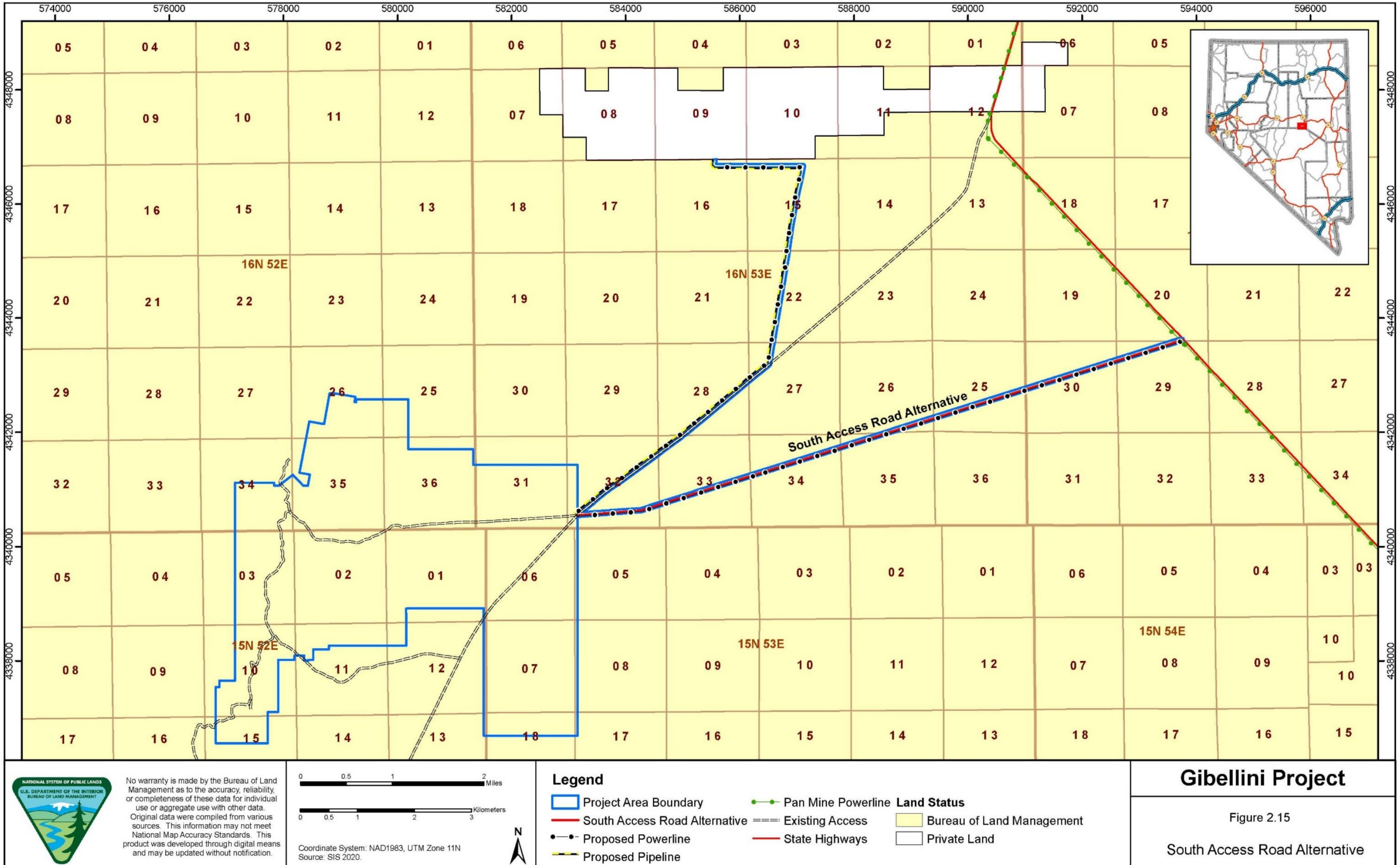
This alternative was developed to minimize environmental impacts by minimizing potential resource conflicts with Greater sage-grouse populations that utilize water in and vegetation along Fish Creek as habitat, as well as avoiding a cultural resource site near the intersection of Fish Creek Road and Duckwater Road.

Table 2.6. South Access Road Alternative: Surface Disturbance by Facility and Associated Compliance Buffers

Activity	Pre-1981 Existing Surface Disturbance (acres)	Existing Notice Level Disturbance	Proposed Surface Disturbance South Access Alternative (acres)	Buffer Area[1] (acres)
Pit	-	-	84.8	46.8
Heap Leach Pad	-	-	186.5	-
Rock Disposal Area	-	-	29.1	21.3
Process Ponds and Make-up Water Pond	-	-	14.4	-
Process Facility and Lab	-	-	2.6	2.8
Waste Rock Sedimentation Pond	-	-	0.2	-
Mine Facilities	-	-	0.7	-
Mine Facilities Retention Pond	-	-	0.4	-
Crushing Facility and Stockpile	-	-	5.1	-
Mine and Haul Roads	-	-	47.2	42.6
Access Roads	-	-	41.7	-
Office, Laydown, and Warehouse	-	-	0.7	7.0
Borrow Areas	-	-	91.8	78.8
Landfill Area	-	-	5.8	2.6
Storm Water Diversion Channels	-	-	69.8	-
Potable Water and Fire Suppression Tanks	-	-	0.1	-
Utility Corridor and Substation[2]	-	-	31.5	-
Growth Media Stockpiles	-	-	110.0	-
Explosives Area	-	-	0.1	1.1
Yards (Ancillary)[3]	-	-	73.1	-
Exploration[4]	104.5	-	46.0	-
Water and Monitoring Wells	-	2.4	2.4	-
Total	**104.5**	**2.4**	**844.0**	**203.0**

[1] Buffer areas are compliance areas surrounding facilities that are not intended to be disturbed but are to be evaluated in the Environmental Impact Statement and would not constitute non-compliance if the areas were disturbed during construction.
[2] The utility corridor comprises the buried power line and water pipeline from the mine facilities to the Fish Creek Ranch.
[3] Yards are surface disturbance associated with the mining facilities that would be revegetated but do not require regrading during reclamation.
[4] Exploration disturbance comprises access roads, drill pads, drill sumps, and trenches.

Figure 2.15. South Access Road Alternative



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2.3 RENEWABLE ENERGY ALTERNATIVE

As an alternative to the Proposed Action, which only includes use of a power line from the existing 69-kV distribution line from Mt. Wheeler Power, this alternative would include supporting the mine operations with a combination of renewable energy and a utility interconnection with large-scale battery storage whose batter type and technical specifications would be determined based on technology available at the time of procurement. This alternative was developed in response to the need for additional power generation in this part of Eureka and Nye Counties and would be built with the intention of providing this energy production facility as a long-term, post-mining resource to the local communities. This alternative would include the installation of enough solar electric photovoltaic (PV) capacity so the site would become a net generation facility with battery storage to perform peak smoothing and daily load management and provide a sustainable long-term power source servicing the remote electrical needs of southern Eureka County and northern Nye County. Total surface disturbance associated with this alternative would be 839 acres, which includes an additional 33 acres of permanent surface disturbance compared to the Proposed Action.

Onsite power generation would be achieved with the use of solar electric PV and future battery storage. The field of PV panels and the battery storage would be constructed on a 33-acre site immediately north of the process area and main office (**Figure 2.16**). The site would be cleared of vegetation and leveled, and gravel would be applied to minimize soil erosion, weed establishment, particulate emissions, and dust accumulation on the solar panels. The solar facilities would consist of 6 MW of solar electric PV generation and a battery that would deliver 2 MW at any given time with 10 MW-hour storage capability.

As part of this alternative, NVV would be required to meet all regulatory requirements for battery containment. Additionally, NVV intends to utilize a vanadium redox flow batter as part of the larger energy storage system that would be determined at the time of procurement. A key characteristic of the vanadium redox flow battery that would be used is that it has no risk of "thermal runaway" compared to solid-state batteries.

The anticipated electrical load for the Gibellini mine site would be 2.5 MW for the connected load, 1.6 MW for the average load, and a 95 percent power factor. The utility connection would supply power on demand to the mining facility to compensate for any power deficit by the renewable energy generation and storage system while the solar electric PV system is transitioning to full operation.

Based on the preliminary design of the solar electric PV system, the system would be constructed in 1-MW Alternative Capacity blocks using two 500-kilowatt SMA 500CP inverters. Two inverters would connect to a local step-up transformer that would increase the voltage from the inverter output to 24.9 kV. The transformers would be connected via daisy chain with underground medium-voltage cable and protected by breakers in the switchgear. Detailed design may take advantage of new technology and use higher-efficiency modules and larger inverters. **Table 2.7** identifies the estimated power produced from the solar electric PV system.

Table 2.7. Estimated Power Produced from 6-megawatt Solar PV Resource

Timeframe	Average Hours	Power Produced by 6 MW of Solar kVAh
January	744	867,834
February	672	932,580
March	744	1,104,840
April	720	1,281,852
May	744	1,239,678
June	720	1,311,552
July	744	1,293,732
August	744	1,255,122
September	720	1,198,098
October	744	1,131,570
November	720	951,588
December	744	887,436
1 Year	8,760	13,455,882

Source: Espell 2021.
kVAh = kilovolt amps per hour

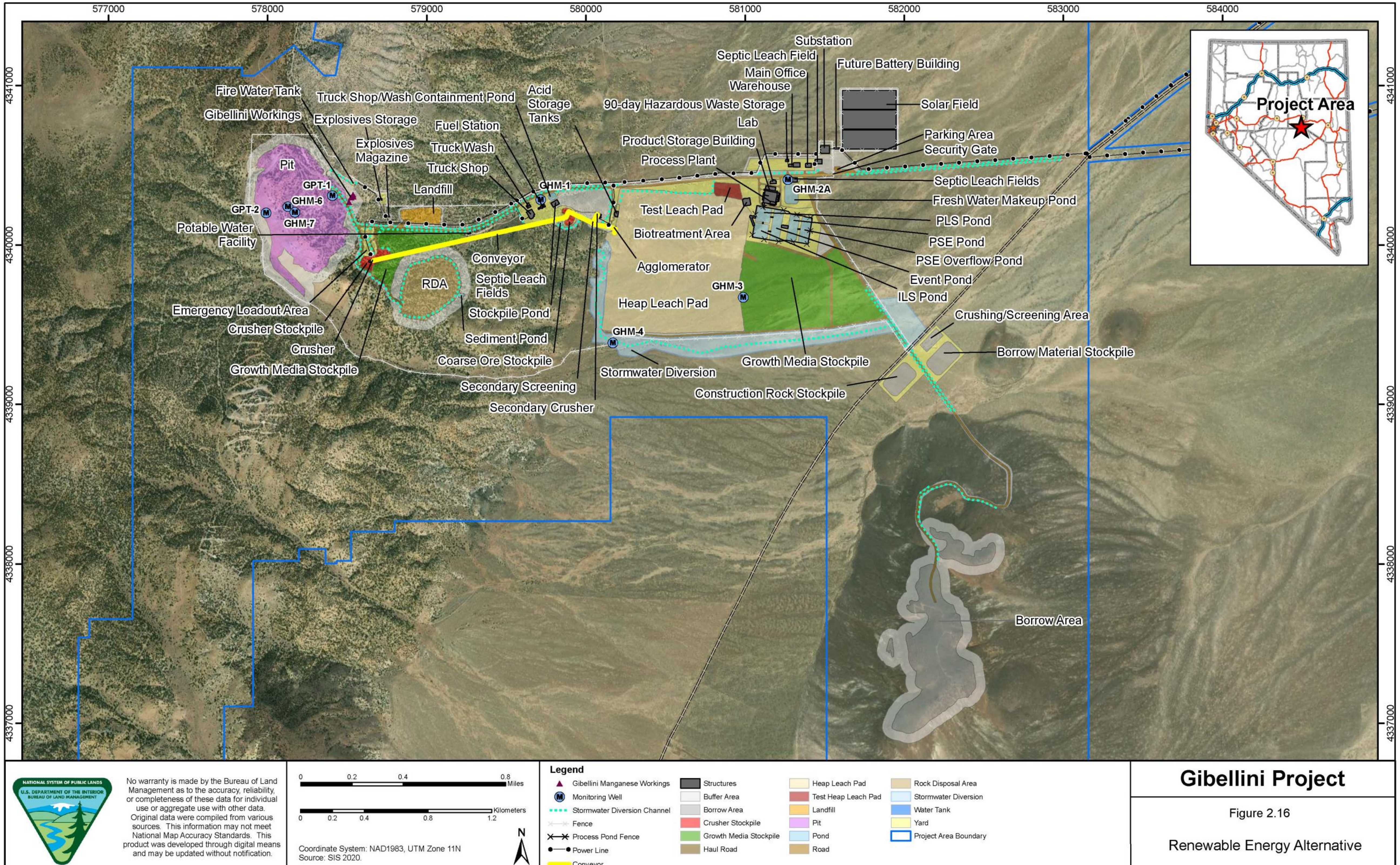
2.3.1 Utility Connection

The incoming power would be supplied by a three-phase, overhead 69-kV line from Mt. Wheeler Power. This new 69-kV line would originate at a tap location on an existing 69-kV line on Strawberry Road north of U.S. Highway 50; the existing 69-kV line currently terminates at the Pan Mine. The connection to this existing line would be made approximately 3 miles south of the Fish Creek Ranch. The new substation would be on the mine site property and would be a 69-kV/24.9-kV substation with a base transformer rating between 5 and 10 megavolt-amperes. There would be a separate 24.9-kV automatic voltage control NVV substation that would support plant operations and renewable energy production. NVV would have unrestricted access to 24.9-kV switchgear and controls in the 24.9-kV substation.

2.4 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Plan of Operations would not be authorized by the BLM, and the activities described in the Proposed Action would not occur. Mineral resources would remain undeveloped, and the construction and operation of the proposed mining and associated facilities would not occur.

Figure 2.16. Renewable Energy Alternative



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2.5 ALTERNATIVES CONSIDERED BUT NOT INCLUDED FOR DETAILED ANALYSIS

In accordance with 40 CFR 1502.14(a), agencies are required to describe the alternatives considered but eliminated from detailed study and to provide a brief rationale for eliminating the alternative. **Table 2.8** summarizes the alternatives the BLM considered but eliminated from detailed analysis.

Table 2.8. Alternatives Considered but Eliminated from Detailed Analysis

Alternative	Discussion and Rationale for Dismissal
Power Line Route	A preliminary power line route included a corridor from the southern end of the Fish Creek Ranch, following the existing site access road to the Project area. Following cultural and archaeological surveys of the Project area, a significant cultural site was found in the area. This power line route was also reviewed by the Nevada Sage Grouse Ecosystem Technical Team, who determined that the Greater sage-grouse using surface water at the ranch could be affected by the overhead power lines. As a result, the Power Line Route Alternative was eliminated from detailed analysis.
Original Pit Design	The original plan for the open pit extended to a maximum depth of 294 feet below ground elevation at the collar of monitoring well GHN-7. However, groundwater was first identified in a fault zone approximately 605 feet below ground surface, and the static water level in the monitoring well rose to an elevation potentially above the pit floor. As a result, the Original Pit Design Alternative was eliminated. The revised pit design maintains the maximum depth of the pit floor approximately 24 feet above the highest water level recorded in the fault zone and 109 feet above the projected static water level.
Heap Leach Pad Design	The 2012 HLP design was to construct one single leach pad capable of storing 30 million tons of ore. After reviewing options for closing the HLP, it was determined that if the proposed HLP was redesigned as two independent leach pads, the first pad (Pad 1) could be rinsed using the freshwater/make-up water supply to recover the acid for use during active leach of the second pad (Pad 2). As a result, the 2012 HLP design was eliminated.
Heap Leach Pad Liner Design	Use of a double geomembrane liner system for the HLP with an intermediate drainage layer was reviewed for the Project. However, using geonet as a drainage layer is not a viable option because the low interface shear strength of liner/geonet/liner would adversely affect the stability of the HLP and loads imposed by the heap would reduce the transmissivity of the geonet. A double-liner system separated by a granular intermediate fill would be needed to provide stability and promote leachate collection. The geotechnical investigations completed to date did not identify any sources of suitable granular fill materials. Overliner (i.e., drainage media) would be manufactured at a crushing and screening plant. Similarly, relatively permeable granular fill consisting of sand and gravel would need to be manufactured and/or transported to the site for use as the intermediate granular fill. Additionally, in the proposed composite lining system, the underlying clayey soil or geosynthetic clay liner in contact with the geomembrane reduces the leakage through defects because of the low permeability of the underlying clayey soil in contact with the geomembrane seals defects in the geomembrane. This is the principal advantage of a composite lining system when compared to single-liner systems or double-liner systems with an intermediate leak detection layer. The significant reduction in leakage through liner defects in composite lining systems is well documented.

Alternative	Discussion and Rationale for Dismissal
Groundwater Pumping Stations	The Proposed Action requires a water supply of approximately 500 gpm. Two options were reviewed for the water supply: a groundwater pumping option and a surface water supply from the irrigation water system at the Fish Creek Ranch that is fed by surface springs. These two options were reviewed with Eureka County and the Fish Creek Ranch water supply was preferred by Eureka County to ensure no net loss of water in the basin. As a result, the groundwater pumping station was eliminated.
Northern Rock Disposal Area Design	Two waste RDA locations were identified: the southern option and the northern option. Development of the Enhanced Baseline Reports for visual resources indicated that the southern option located the waste RDA behind a tall topographic feature such that it would not be visible from the access roads or the Fish Creek Ranch. The southern option also allows the waste RDA to be constructed in phases so that the dump can be concurrently reclaimed and vegetation can be established earlier. As a result, the northern waste RDA alternative was eliminated from further consideration.
Heap Leach Pad Cover Design	Three options were developed in the 2012 Plan of Operations for the final HLP cover: (1) a two-layer cover consisting of a base HDPE liner overlain by a 3-foot-thick soil cover; (2) a hybrid cover that would consist of a base HDPE liner over the top surface of the HLP with a 3-foot-thick soil cover over the entire HLP, including the top surface; and (3) a single-layer 3-foot-thick soil cover over the entire HLP. The hybrid cover design provided greater stability than option 1 with very similar performance in limiting infiltration of meteoric water. This option also provided the greatest area to develop a 91-acre active E-cell for reducing the draindown process water inventory at closure. As a result, the first and third HLP cover design options were eliminated.
Open Pit Backfill	Two options were evaluated for final closure of the open pit: a backfill option and a no backfill option. The backfill option was reviewed as both a full backfill and a partial backfill if needed to further reduce infiltration through the bottom of the pit. The review indicated that the mine plan could be revised to limit the pit depth to a 6,740-foot elevation, with the pit floor sloped to a gravity drain. By choosing this pit design option for the Proposed Action, the need for additional measures to reduce infiltration into the pit floor was eliminated. The revised mine plan also leaves a significant resource of primary vanadium ore in the pit that could be minable if future vanadium prices are higher or the metallurgical process is modified to increase the recovery from the primary zone. The no backfill option does not sterilize the remaining ore zone and leaves future mining of this resource available. As a result, the option of backfill of the pit at mine closure was eliminated.
Water Treatment/ Closure Options	The original closure plan included the installation of the water treatment plant at the end of the leaching operations and prior to closure of the HLP. In response to comments on the Plan of Operations, an alternative was developed to build a test heap and the closure water treatment system during the initial facility construction so the full closure process can be tested and optimized during operations. This alternative was incorporated into the Plan of Operations and the initial plan to build these facilities at closure was eliminated.
Heap Leach Draindown and Rinsing Options	A no-rinse alternative was first considered where the heap would be built in one phase that would be fully leached and then allowed to draindown at closure. A water treatment plant would have been installed to manage 24 gpm of these draindown solutions (the maximum capacity of the E-cells) and then be evaporated in E-cells converted from the process ponds. The excess draindown water would have then been recirculated back to the heap. This alternative was replaced by the two-phase leach pad design that allows concurrent rinsing of the previously leached phase of the pad, reduces the draindown time by eliminating recirculation to the leach pad, and improves final draindown water quality that reduces final treatment costs. This alternative also allows recovery of the sulfuric acid from the leached phase of the pad to be reused in the active leach cell, reducing the amount of acid required to be transported to the facility.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the existing natural and human environment that may be affected by the Proposed Action, South Access Road Alternative, Renewable Energy Alternative, and No Action Alternative. It also discloses the direct, indirect, and cumulative impacts of each of the alternatives. The affected environment described in this chapter includes the extent of potential impacts that could result from the alternatives. The analysis of impacts on the natural and human environments is grouped by resource topic. Each resource topic defines its area of analysis, which considers both the temporal bounds and the spatial area that is appropriate for analyzing impacts specific to that resource. The discussion under each resource topic included in this chapter is divided into three parts: Affected Environment, Environmental Effects, and Cumulative Effects. The affected environment is composed of areas in and adjacent to the Gibellini Vanadium Mine Project (Project) area that are likely to experience effects as a direct or indirect result of the alternatives.

Each affected environment section describes existing conditions for the resource qualitatively or quantitatively, depending on the resource indicators and measures appropriate for that specific resource topic and on information available to the interdisciplinary team. The existing conditions provide a baseline to use in analyzing and understanding the effects of the alternatives.

Each environmental effects section discloses the methodology and assumptions used in the impact analysis and assesses the direct, indirect, and cumulative effects of each alternative on the resource topic. Impacts are compared to the existing conditions and are analyzed as appropriate for each resource indicator. Effects level definitions (i.e., intensity, duration, and context) vary by resource and are discussed in each resource section below.

Each cumulative effects section analyzes the cumulative impacts on resources within a defined Cumulative Effects Study Area (CESA) that would result from the incremental addition of direct and indirect impacts from the alternatives when added to impacts from past and present actions and reasonably foreseeable future actions (RFFAs). Council on Environmental Quality (CEQ) regulations define a cumulative impact as one that “results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or nonfederal) or person undertakes such other actions” (Title 40, Part 1508.7 of the Code of Federal Regulations [CFR]).

3.1.1 General Setting

The Project is in the southern extent of the Fish Creek Range, entirely on Federal land administered by the Bureau of Land Management (BLM), pursuant to unpatented mining claims held by Eureka County, Nevada. The Project area includes 6,456 acres of BLM-administered land approximately 27 miles southeast of Eureka, Nevada. The Project area is accessed from Eureka by traveling approximately 10 miles south on United States (U.S.) Highway 50, turning south on County Road M-103 (Duckwater Road) for approximately 8 miles, and then turning southwest on Fish Creek Ranch Road for approximately 7 miles. The Project area is within the Mount Diablo Baseline and Meridian in Eureka County, Nevada.

3.2 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

3.2.1 Past and Present Actions

Past and present land uses in the Project area include mineral development and exploration projects; oil and gas development; sand and gravel operations; utilities, including water, power, roads, and telecommunications rights-of-way (ROWs); infrastructure and public purpose activities; dispersed recreation; wild horse use, and livestock grazing. Mineral and gravel mining are the dominant land disturbances in the Project area. These activities may preclude other land uses, such as livestock grazing, recreation, habitat restoration, or development of other resources. Reclamation plans focus on returning these land uses to the area after mine closure.

Public infrastructure, such as utilities and roads, often have long-term impacts on lands but facilitate other land uses. This infrastructure can increase access for all other types of disturbances, while easements can limit the types of land use in the immediate area. Some types of infrastructure can prevent other land uses, such as for rangeland or recreation.

3.2.2 Reasonably Foreseeable Future Actions

The temporal extent of RFFAs is approximately 40 years, representing the anticipated mine life timeframe of 1.5 years for construction, 7 years of operation, 4 years of active reclamation, and 30 years of post-closure monitoring. Land uses and disturbances expected to continue into the future include mineral development and exploration including mining, infrastructure and public purpose projects, wildland fires, livestock grazing (including allotment renewals), agricultural uses, and dispersed recreation.

Additional details of RFFAs specific to certain resources can be found in the supplemental environmental reports (SERs) on the Project website (https://go.usa.gov/xf2GR).

3.3 ISSUES EVALUATION

The public involvement process for the EIS was developed in accordance with the requirements of NEPA of 1969, as amended (42 U.S. Code [U.S.C.] 4321–4374); CEQ regulations implementing the procedural provisions of NEPA (40 CFR Parts 1500–1508); BLM NEPA regulations (43 CFR Part 46); and BLM’s NEPA Handbook H-1790-1. Further details of the public involvement process are provided in Chapter 4, Consultation and Coordination, of this EIS.

Based on internal and external scoping, the BLM identified a number of key issues for detailed analysis in the EIS. An issue may be affected by a proposed action or alternative and can be scientifically analyzed. The detailed analysis contained in the SERs and this EIS for each resource focuses on these key issues and evaluates potential impacts. **Table 3.1** lists the issues that were identified in the scoping process.

Table 3.1. Scoping Issues

Issue Topic	Description
Air Quality	Air quality impacts resulting from mine development and operation. This issue is addressed in Section 3.4, Air Quality and Climate.
Climate Change	Greenhouse gas emissions and climate impacts resulting from mine development and operation. This issue is addressed in Section 3.4, Air Quality and Climate.
Biological Resources	Biological resource impacts from mine development and operation, human activities, and other Project-related effects on ecosystems and ecosystem components, including: • Impacts on special status species and BLM sensitive species, including pygmy rabbits, Greater sage-grouse, golden eagles, ferruginous hawks, burrowing owls, Fish Creek Springs tui chub, and migratory birds • Impacts on fish and wildlife species and their habitat resulting from mine development and operation, including mule deer, pronghorn antelope, bighorn sheep, springsnails, migratory birds, and raptors • Impacts on wetlands and riparian areas from mine development and operation These issues are addressed in Section 3.12.2, Wildlife and Aquatic Resources.
Cultural Resources	Cultural resource impacts resulting from mine development and surface disturbance. This issue is addressed in Section 0, Cultural Resources.
Geology & Minerals	Potential issues regarding the geochemistry associated with the Heap Leach Facility and waste rock area. Concerns about ensuring effective planning, implementing, and monitoring of Heap Leach Facility draindown, mine reclamation, and post-closure activities. This issue is addressed in Section 3.19.2, Water Resources and Geochemistry.
Grazing Management	Livestock grazing impacts, including loss of animal unit months resulting from mine development and operation. This issue is addressed in Section 3.7.2, Grazing Management.
Hazardous Materials and Solid Waste	Impacts on public health and safety from uranium processing and transport. This issue is addressed in Section 3.15.2, Transportation and Access. Potential issues regarding radioactive emissions or accidental releases are discussed in Section 1.7.1, Uranium Permitting Requirements.
Socioeconomics and Environmental Justice	Impacts on social and economic conditions, including effects on local communities and the capacity of existing infrastructure, resulting from mine development and operation. Potential impacts on minority and low-income populations and Native American Traditional Cultural Properties. This issue is addressed in Section 3.13.2, Socioeconomics and Environmental Justice.
Transportation and Access	Impacts on local and regional traffic volumes and patterns and public access. This issue is addressed in Section 3.15.2, Transportation and Access.
Visual Resources	Visual resource impacts and the effects of light pollution on the night sky in the Fish Creek Valley. This issue is addressed in Section 3.18.2, Visual Resources.

Issue Topic	Description
Water Resources and Geochemistry	Impacts on groundwater quality and quantity from mine development and operation, including potential impacts on surface water flow and other water-dependent ecosystems and public and private water rights. This issue is addressed in Section 3.19.2, Water Resources and Geochemistry.
Wild Horses and Burros	Impacts on wild horses from mine development and operation. This issue is addressed in Section 3.20.2, Wild Horses and Burros.

3.4 AIR QUALITY AND CLIMATE

The affected environment for Project-related air quality impacts encompasses the area within a 50-kilometer (31-mile) radius of the Project area. This area of analysis captures the area in which construction, operations, and reclamation activities would occur, including transportation and transmission line routes, and emissions from neighboring sources within a 50-kilometer radius of the Project. The area of analysis for climate is the global atmosphere. The Final SER 2: Air Quality (BLM 2022a) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.4.1 Air Quality

3.4.1.1 Affected Environment

Air quality can be affected by emissions from naturally occurring and anthropogenic sources. Air pollutant emissions in and around the area of analysis occur from natural sources such as windblown dust and wildfires and anthropogenic air pollutant emissions occur from industrial facilities, vehicle exhaust, fugitive dust from vehicle traffic, and residential activities such as wood-burning fireplaces. The Project area is in a rural setting with a small number of industrial sources that contribute to air pollutant emissions. The industrial activities in the vicinity of the Project area include mining operations, and there is limited agriculture and grazing.

The prevailing winds in the Project area are predominantly from the northwest, with some winds from the southwest. This wind pattern would transport pollutant emissions from the mine site toward the southeast and northeast of the Project area. The highest wind speeds typically occur when winds are from the northwest and south.

The air quality in the region is determined by the magnitude and distribution of pollutant emissions and the meteorological conditions that affect pollutant transport, dispersion, and deposition. The potential for transport and dispersion of airborne pollutants from the mine site depends on several factors, including atmospheric turbulence, terrain, precipitation, wind speed and direction, and the depth of the atmospheric mixing zone. Low atmospheric turbulence and low wind speeds tend to reduce pollutant dispersion and increase ambient concentrations. High wind speeds and high turbulence dilute pollutants in the atmosphere but also can lead to higher fugitive dust emissions due to wind erosion.

Air quality and pollutant emissions are regulated under the Federal Clean Air Act and regulations implemented by the EPA, and by Nevada State laws and regulations implemented by the Nevada Bureau of Air Pollution Control (NBAPC). Both Federal and State regulations require that ambient concentrations for specific pollutants (known as criteria pollutants) not exceed allowable levels, referred to as Ambient Air Quality Standards (AAQS). These standards have been established by the EPA and the State of Nevada at levels considered to preclude adverse impacts on human health and welfare with an adequate margin of safety.

The EPA has defined air quality classifications for geographic areas that describe whether the area complies with the National Ambient Air Quality Standards (NAAQS). If a geographic area complies with the NAAQS, it is designated an "attainment" area. If concentrations of a pollutant are documented to be above the NAAQS, the area is designated as "nonattainment" for that pollutant. If there is not sufficient air quality data to determine NAAQS compliance for a geographic area, it is designated as "unclassifiable." The NBAPC does not currently monitor ambient air quality in the Project area; because no monitoring data are available, the EPA has designated the area as unclassifiable for all pollutants having an air quality standard (40 CFR 81.329). However, the air quality in the Project area is considered typical for undeveloped regions of the western U.S. For regulatory and planning purposes, the EPA treats unclassifiable areas as attainment areas (unclassifiable/attainment areas) and considers the Project area to meet all NAAQS for all criteria pollutants.

Before any construction of a potential source of air pollution can occur, an air quality operating permit (for Class II sources) or operating permit to construct (for Class I sources) must be obtained from the NBAPC. The operating permit ensures that the source would comply with Federal and State emission limitations and meet the NAAQS and the Nevada AAQS.

3.4.1.2 Environmental Effects

Primary issues related to air quality include (1) effects of Project emissions on local and regional air quality, (2) effects of Project emissions on regional haze and visibility, and (3) Project emissions of greenhouse gases (GHGs).

Effects Level Definitions

The impact analysis for air quality and climate uses the following qualifiers to describe potential impacts in terms of intensity, duration, and context.

Intensity

No Substantial Adverse Effects: Air pollutant emissions would increase as a result of the Proposed Action and are unavoidable; however, impacts fall within all applicable air quality standards and would not exceed NAAQS or Nevada AAQS.

Substantial Adverse Effects: Air pollutant emissions would increase significantly as a result of the Proposed Action and impacts would exceed applicable NAAQS and Nevada AAQS. Applicant-committed Environmental Protection Measures (EPMs) would have to be carefully coordinated and planned with local, State, and Federal agencies if a permit to proceed were to be issued.

Duration

Short-term: Changes in ambient air quality occur at a site associated with a specific activity, for the duration of that activity.

Long-term: Changes in ambient air quality would remain beyond the end of a specific activity.

Context

Localized: Changes are perceived at the location of the activity but dissipate within a specified extent.

Regional: Changes are perceived throughout the airshed.

Proposed Action

Direct and Indirect Effects

The Project would have a potential effect on air quality resources in the vicinity of the Project. The Proposed Action would result in 806 acres of surface disturbance in the Project area. The Proposed Action involves mining operations that would result in the release of regulated pollutants to the atmosphere from both point sources and fugitive sources. Point sources are those that emit air pollutants through a stack or vent, such as generators or dust collectors. Fugitive sources are those that emit air pollution in a way that cannot reasonably be routed through a stack or vent, such as vehicle traffic, mining pit operations, and wind erosion from exposed surface areas.

The Project has the potential to increase emissions of criteria air pollutants (including particulate matter of 10 microns diameter and smaller, particulate matter of 2.5 microns diameter and smaller, sulfur dioxide, nitrogen dioxide, and carbon monoxide); volatile organic compounds; and nitrogen oxides, which can form ozone; hazardous air pollutants; and GHGs. Air pollutant emissions associated with the Project would occur during construction and active mining operations. Air quality would be affected during both phases of mine activity. Emissions during construction and active mining operations are considered temporary or short-term emissions and would only occur for the duration of the active construction or mining operations. Long-term air quality impacts are those that would remain after the end of the mining activities.

During mining operations, air pollutant emissions from the Project would be unavoidable; however, several EPMs would be implemented to reduce emissions and potential impacts on air quality. The Project would be classified as a Class II source as defined by the NDEP (Nevada Administrative Code [NAC] 445B.037) and would require a Class II Air Quality Operating Permit from the NDEP. Emission control and reduction requirements are defined in the Class II operating permit issued by the NBAPC and fugitive dust control practices are described in the associated permit application (ASI 2019), which is required by the NDEP. EPMs have been developed for dust control practices and would include application of water and chemical dust suppressants as needed to reduce dust emissions generated from mine operations. The frequency of chemical suppressant applications would depend on site-specific conditions such as precipitation, temperature, and observed dust generation.

The maximum estimated Project process and ancillary source[1] emissions would be less than the EPA and NBAPC major source levels of 100 tons per year (tpy) per criteria pollutant. Therefore, the Project would be considered a minor source of air pollution for the Clean Air Act Title V and New Source Review requirements. The maximum estimated Project process and ancillary source emissions would be less than the major source thresholds of 10 tpy for a single hazardous air pollutant, and 25 tpy for all hazardous air pollutant emissions in aggregate. Therefore, the Project would be considered an area source for National Emission Standards for Hazardous Air Pollutants applicability. Because Project emissions of hazardous air pollutants would be less than the major source thresholds, no substantial adverse effects are expected from hazardous air pollutants.

Criteria Pollutant Concentrations/Compliance with National Ambient Air Quality Standards

Dispersion modeling analyses were conducted to assess potential air quality impacts on criteria air pollutant concentrations resulting from the Proposed Action mining operations. The results of these analyses, presented in **Table 3.2**, show that Project impacts would comply with the applicable AAQS.

Table 3.2. Modeled Ambient Concentrations for Proposed Action

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)	Representative Background ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Compliance
CO	8-hour	64.9	801.4	866.3	10,000	Yes
	1-hour	228.4	1,030.4	1,258.8	40,000	Yes
NO_2	Annual	7.3	1.9	9.2	100	Yes
	1-hour	133.7	9.2	142.9	188	Yes
$PM_{2.5}$	Annual	1.7	2.3	4.0	12	Yes
	24-hour	5.8	8.0	13.8	35	Yes
PM_{10}	24-hour	43.9	10.2	54.1	150	Yes
SO_2	3-hour	12.5	1.3	13.8	1,300	Yes
	1-hour	15.5	1.1	16.6	196	Yes

Source: ASI 2019.
$\mu g/m^3$ = micrograms per cubic meter; CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} = particulate matter of 10 microns diameter and smaller; $PM_{2.5}$ = particulate matter of 2.5 microns diameter and smaller; SO_2 = sulfur dioxide

[1] Fugitive dust emissions and mobile equipment tailpipe emissions are not considered for the major source determination per 40 CFR 52.21.

Class I Areas

The Clean Air Act defines Class I areas as certain national parks and wilderness areas where very little degradation of air quality is allowed. The distance from the Project area to the closest border of the nearest Class I area (Jarbidge Wilderness Area) is 275 kilometers. Based on the screening test presented in U.S. Forest Service et al. (2010), which considers Project emission rates and the distance to the nearest Class I area, Project emissions would not adversely affect visibility or acidic deposition at any Class I area. Consequently, it would also have no impact on recreational use of those areas.

Mitigation Measures

Because the analysis has demonstrated compliance with the NAAQS, no mitigation measures are required or recommended for air quality.

Residual Effects

After mining operations have concluded, the exposed surface areas would be reclaimed, including seeding to promote vegetative cover. After reclamation has been completed, most disturbed areas would develop vegetative cover, and dust emissions from wind erosion of soils would be reduced to typical levels for the area. It is expected that the open pit area would not be reclaimed, which could result in higher wind erosion dust emissions from pre-mining conditions. Reclamation activities could result in localized, short-term air quality impacts during construction.

South Access Road Alternative

Construction of the South Access Road Alternative would result in approximately 38 additional acres of surface disturbance as compared to the Proposed Action. Total surface disturbance for the South Access Road Alternative would include 844 acres of public lands. Because the additional amount of construction activity (as indicated by acreage of surface disturbance) required for the South Access Road Alternative is small relative to that of the Proposed Action, emissions from construction of the South Access Road Alternative would not differ substantially from those associated with construction of the Proposed Action.

The change in location of the access road would result in little change in the estimated operational emission totals or modeled results under the Proposed Action, because the vehicle travel distance on the relocated access road would be similar to that on the existing access road. Emissions from the operation of the mine would be the main source of emissions, and the proposed changes associated with this alternative would not result in a substantial change in the emissions or modeled impacts. As a result, Project-related air quality impacts under the South Access Road Alternative would be nearly the same as those of the Proposed Action.

Renewable Energy Alternative

The Renewable Energy Alternative would result in approximately 33 additional acres of permanent surface disturbance as compared to the Proposed Action. Construction activities for the solar field would generate exhaust and fugitive dust emissions. However, construction of the solar field would generate relatively few emissions compared to mining operations. Based on the emissions for similar construction activities, the 33 additional acres of surface disturbance associated with this alternative would result in an approximate 4 percent increase in construction-related emissions to the overall emissions total. Because the additional emissions associated with the Renewable Energy Alternative represent only approximately 4 percent of those from the Proposed Action, emissions from construction of the Renewable Energy Alternative would not differ substantially from those associated with construction of the Proposed Action.

Operation of the proposed solar field would not result in emissions of air pollutants or GHGs from operation of the solar generating equipment itself. Operation of the facility would result in minor exhaust emissions from maintenance vehicles and from water trucks for solar panel washing and dust control. Because of the relatively small mileage traveled by maintenance vehicles and water trucks, emissions from these vehicles would be very small, and the emissions from operation of the Renewable Energy Alternative would not differ substantially from those associated with operation of the Proposed Action. To the extent that the electricity produced by the Renewable Energy Alternative would displace power that otherwise would have been generated by combustion of fossil fuels, regional emissions could be reduced, which could have a small beneficial effect on air quality in the region. In all, Project-related air quality impacts under the Renewable Energy Alternative would be similar to those of the Proposed Action.

No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts in the Project area would not occur.

3.4.1.3 Cumulative Effects

The CESA boundary for air quality was defined by a 50-kilometer (31-mile) radius from the center of the Project area. The total area of the CESA encompasses 1,940,761 acres. Of the 1,940,761 acres covered by the CESA, 12,026 acres of mining disturbance are associated with past and present actions and RFFAs, which is a disturbance of approximately 0.06 percent of the CESA. The EPA has designated all areas within the CESA as unclassifiable/attainment for all criteria air pollutants.

Proposed Action

The predicted maximum ambient concentrations resulting from the Project when considered cumulatively with effects of present and RFFA emissions would be less than the applicable NAAQS and Nevada AAQS for the evaluated pollutants and averaging periods, as shown in

Table 3.3. The cumulative impacts from the Proposed Action would not have substantial air quality effects.

Table 3.3. Modeled Ambient Concentrations for Cumulative Effects

Pollutant	Averaging Period	Modeled Concentration[1] (µg/m³)	Representative Background (µg/m³)	Total Concentration (µg/m³)	NAAQS (µg/m³)	Compliance
CO	8-hour	64.9	801.4	866.3	10,000	Yes
	1-hour	228.4	1,030.4	1,258.8	40,000	Yes
NO_2	Annual	7.3	1.9	9.2	100	Yes
	1-hour	133.7	9.2	142.9	188	Yes
$PM_{2.5}$	Annual	1.7	2.3	4.0	12	Yes
	24-hour	5.8	8.0	13.8	35	Yes
PM_{10}	24-hour	43.9	10.2	54.1	150	Yes
SO_2	3-hour	12.5	1.3	13.8	1,300	Yes
	1-hour	15.5	1.1	16.6	196	Yes

Source: ASI 2019.
[1] Includes Proposed Action plus RFFA emission sources.
µg/m³ = micrograms per cubic meter; CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} = particulate matter of 10 microns diameter and smaller; $PM_{2.5}$ = particulate matter of 2.5 microns diameter and smaller; SO_2 = sulfur dioxide

South Access Road Alternative

Under the South Access Road Alternative, cumulative impacts would be the same as those described for the Proposed Action, as no additional impacts are expected from the change in location of the access road.

Renewable Energy Alternative

Cumulative effects of the Renewable Energy Alternative on air quality resources would be similar to those described for the Proposed Action, except that emissions of exhaust pollutants and fugitive dust would be slightly higher during solar field construction and operation, as described above. The cumulative emissions would not be expected to result in substantial adverse effects, would be localized, and would not result in an exceedance of applicable air quality standards. To the extent that the electricity produced by the Renewable Energy Alternative would displace power that otherwise would have been generated by combustion of fossil fuels, regional emissions could be reduced, which could have a small beneficial cumulative effect on air quality in the region.

No Action Alternative

Under the No Action Alternative, the Project would not be developed. Previously permitted activities would continue, including reclamation and closure, as well as other present actions and RFFAs. As a result, there would be no potential cumulative impacts on the area of analysis from the No Action Alternative.

3.4.2 Climate

3.4.2.1 Affected Environment

Topographic Setting

The Project area is in a region predominantly characterized by a plateau with several mountain ranges. Average elevations range between 5,000 and 6,000 feet above mean sea level. The elevation of the Project area is approximately 6,350 feet above mean sea level and the area supports shrub-dominated vegetation in all directions in the immediate vicinity and some agricultural land approximately 12 miles to the northeast. There are major mountain ranges approximately 30 miles north-northeast (maximum elevation approximately 10,600 feet above mean sea level), 28 miles east (maximum elevation approximately 10,700 feet above mean sea level), and 24 miles northwest (maximum elevation approximately 10,400 feet above mean sea level).

Local Meteorology

The climate in the Project area is typical for east-central Nevada. Average monthly high temperatures range from 74 to 85 degrees Fahrenheit in the summer and 37 to 47 degrees Fahrenheit in the winter. Yearly rainfall averages 12 inches with nearly uniform distribution from September through May. June, July, and August are typically hot and dry months; December, January, and February receive the bulk of the snowfall (AMEC 2011).

Precipitation

Precipitation in the region averages between approximately 5 and 7 inches per year and is distributed fairly evenly throughout the year. Historical data from the closest National Weather Service Cooperative station in Fish Creek Ranch (262860) reported an average of 5.6 inches of precipitation per year (WRCC 2020). The 2 years (2013–2014) of site-specific data collected at the Gibellini onsite meteorological station (coordinates 39.20964° N Latitude, 116.06083° W Longitude) show that July to September are wetter than other months while June is the driest month (**Table 3.4**). The area receives about 17 inches of snow per year (WRCC 2020). **Table 3.4** provides a summary of the monthly and annual averages for the precipitation and temperature data collected at the Gibellini onsite meteorological station. The average annual precipitation recorded at the Gibellini meteorological station was 6.44 inches.

Table 3.4. Gibellini Onsite Average Monthly Precipitation and Temperature Summary

Month	Precipitation (inches)	Temperature (degrees Fahrenheit)		
	Average	*Average*	*Average Maximum*	*Average Minimum*
January	0.26	27.5	50.5	5.0
February	0.24	31.9	55.1	8.0
March	0.13	41.1	68.4	16.0
April	0.62	45.9	74.3	21.2

Month	Precipitation (inches)	Temperature (degrees Fahrenheit)		
	Average	*Average*	*Average Maximum*	*Average Minimum*
May	0.35	55.2	84.3	29.1
June	0.05	67.9	93.9	36.3
July	1.06	73.9	95.7	53.6
August	1.40	68.4	88.9	48.1
September	1.54	61.0	86.7	33.4
October	0.13	49.2	74.4	27.1
November	0.26	37.9	66.5	13.9
December	0.41	28.2	55.1	-0.3
Annual	6.44	49.0	96.3	-0.6

Source: ASI 2019.

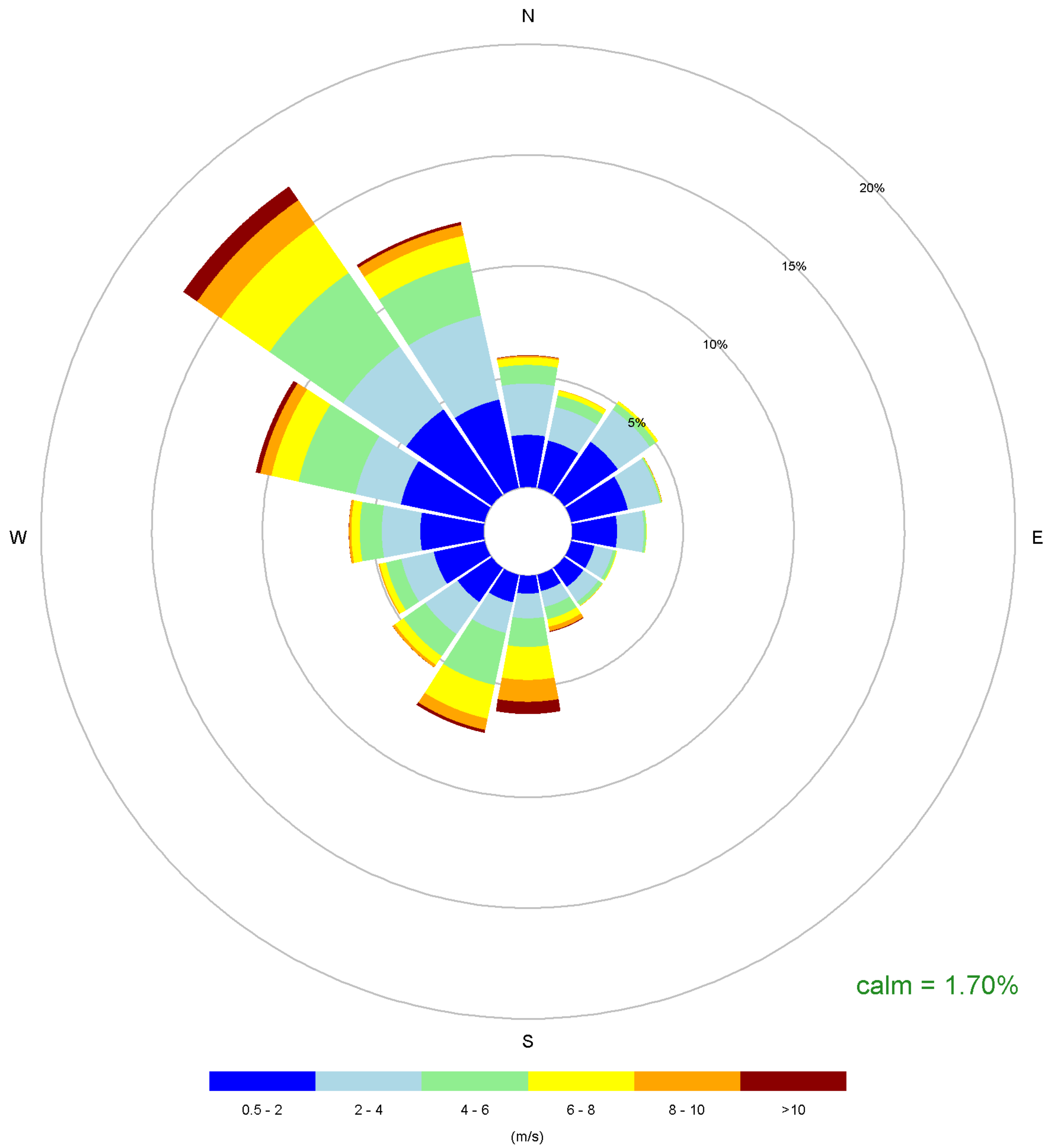
Temperature

Temperatures in the Project area are typical for east-central Nevada. Average monthly high temperatures range from 74 to 85 degrees Fahrenheit in the summer and 37 to 47 degrees Fahrenheit in the winter (AMEC 2011). **Table 3.4** provides a summary of the average, average maximum, and average minimum temperature data collected at the Gibellini onsite meteorological station. The Gibellini onsite meteorological station recorded a winter temperature range of -5 to 58 degrees Fahrenheit, and a summer temperature range of 33 to 97 degrees Fahrenheit.

Wind

Figure 3.1 provides a 2-year (2013–2014) composite wind rose derived from the wind data collected at the Gibellini onsite meteorological station. As shown on **Figure 3.1**, winds at the Gibellini meteorological station during the 2013–2014 period were predominantly from the northwest. The winds were generally light, with an average hourly wind speed of 3.5 meters per second and only 6.2 percent of winds exceeded 8 meters per second. Only 1.7 percent of hourly wind conditions during the 2-year period were calm (less than 0.5 meter per second).

Figure 3.1. Gibellini Onsite Wind Frequency Distribution Diagram (2013–2014)



Source: ASI 2019.

Greenhouse Gases

Earth absorbs heat energy from the sun and returns most of this heat to space as terrestrial infrared radiation. GHGs trap heat in the lower atmosphere (the atmosphere extending from Earth's surface to approximately 4 to 12 miles above the surface) by absorbing heat energy emitted by Earth's surface and lower atmosphere, and reradiate much of it back to Earth's surface, thereby causing warming. This process, known as the *greenhouse effect*, is responsible for maintaining surface temperatures that are warm enough to sustain life.

Human activities, particularly fossil-fuel combustion, have been identified by the Intergovernmental Panel on Climate Change (IPCC) (2014) as primarily responsible for increasing the concentrations of GHGs in the atmosphere; this buildup of GHGs is changing Earth's energy balance. Although these gases occur naturally in the atmosphere and GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused GHG concentrations to increase dramatically, and are a possible contributor to overall global climatic changes (IPCC 2014). Recent scientific evidence suggests there is a direct correlation between global warming and emissions of GHGs (IPCC 2014). Global climate impacts are caused by the cumulative effects of GHG concentrations in the atmosphere exerted over large areas and many years.

The primary GHGs in the atmosphere include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (e.g., chlorofluorocarbons, hydrochlorofluorocarbons, and sulfur hexafluoride). Of the human-made GHGs, the greatest contribution to climate effects comes from CO_2 emissions. The EPA has implemented regulations and guidelines regarding evaluation of GHG emissions and the manner in which NEPA documents should address these issues. On April 2, 2007, the U.S. Supreme Court ruled that the EPA had authority to regulate GHGs as pollutants and required the EPA to determine whether GHGs cause or contribute to global warming. In 2008, Congress directed the EPA to publish a mandatory GHG reporting rule based on the EPA's existing authority under the Clean Air Act. On October 30, 2009, the EPA published a final rule for the mandatory reporting of GHGs (40 CFR Part 98) from large GHG emissions sources in the U.S. Implementation of 40 CFR 98 is referred to as the Greenhouse Gas Reporting Program. On December 15, 2009, in response to the 2007 Supreme Court ruling, the EPA issued a determination (Endangerment Finding) that the current and projected concentrations of the primary GHGs in the atmosphere threaten the public health and welfare of current and future generations (74 *Federal Register* 66:496).

Regional Climate Projections

Global climate change refers to long-term (i.e., multi-decadal) trends in global average surface temperature, precipitation, ice cover, sea level, cloud cover, sea-surface temperatures and currents, ocean pH, and other climatic conditions. Although increases in global average GHG concentrations can be related to global climate change, local climate effects vary. Potential changes to the Project area resulting from the effects of climate change forecasted by the BLM Central Basin and Range Rapid Ecoregional Assessment Report (Comer et al. 2013) could include higher than normal growing season temperatures; increased frequency and duration of droughts, which will increase fire frequency and wind erosion of soils and decrease surface water flows; contraction or expansion of some existing vegetation communities; the expansion of existing noxious weed populations; and the introduction of noxious weed species previously undocumented in the ecoregion and Project area. The Central Basin and Range Rapid

Ecoregional Assessment forecasts an average increase in average summer maximum daytime temperatures of approximately 5 degrees Fahrenheit in the Project region by 2060 (Comer et al. 2013). These increases in average growing season temperatures are anticipated to result in low-elevation basins throughout the Central Basin and Range ecoregion potentially transitioning from the existing cool semi-desert vegetation communities into very warm and vegetated desert landscapes more typical of the Mojave Basin and Range.

Climate change analyses account for several factors, among them GHG emissions, land use management practices, and the albedo effect (ability of surfaces to reflect light). Tools are not available to quantify incremental climatic impacts of specific activities or projects associated with those factors. The Federal government and the State of Nevada have not established thresholds of significance for GHG emissions. Therefore, the climate change assessment (Section 3.4.2.2) is limited to accounting and disclosing of factors that contribute to climate change, and estimated GHG emissions are used as a reasonable proxy for a comparison of climate change impacts by alternative.

3.4.2.2 Environmental Effects

Proposed Action

GHG emissions from the Project would be created primarily by the combustion of fuel by process sources and mobile mining equipment. **Table 3.5** and **Table 3.6** present the estimated facility-wide potential GHG emissions for construction and operation of the Proposed Action, respectively.

Table 3.5. Proposed Action Facility-wide Potential GHG Emissions Summary During Construction

Source Category	CO_2 (tons)	CH_4 (tons)	N_2O (tons)	CO_2e (tons)
Construction equipment and vehicles	2,426	0.10	0.02	2,434

Source: ASI 2021a.
Note: CO_2 equivalents (CO_2e) for CH_4 and N_2O were reported in tpy. Per 40 CFR 98, Table A-1, CH_4 has a global warming potential (GWP) of 28 over 100 years, and N_2O has a GWP of 298 over 100 years.

Table 3.6. Proposed Action Estimated Facility-wide Potential GHG Emissions During Operations

Source Category	CO_2 (tpy)	CH_4 (tpy)	N_2O (tpy)	CO_2e (tpy)
Process and Ancillary	28,792	1.35	0.27	28,906
Mobile Tailpipes	13,492	0.55	0.11	13,538
Project Total	**42,284**	**1.90**	**0.38**	**42,444**

Source: ASI 2019.
Note: Per 40 CFR 98, Table A-1, CH_4 has a global warming potential (GWP) of 28 over 100 years, and N_2O has a GWP of 298 over 100 years.

Table 3.7 compares the estimated GHG emissions for the Project with State, national, and global totals reported by NDEP, EPA, and IPCC. The relationship between GHG emissions and climate change is complex and it is not currently possible to directly relate GHG emissions from a specific source to specific local climate impacts. The GHG emissions associated with the Proposed Action would by themselves have negligible effects on climate but would contribute incrementally to global climate change.

Table 3.7. State, National, and Global GHG Emissions (Million Tons CO_2e per Year)

Emission Source	Nevada[1]	U.S.[2]	Global[3]
GHG Emission Inventories	38.07	6,558	58,100
Project Operational GHG Emissions (**Table 3.2**) as Percent	0.10%	0.0006%	0.0001%

[1] NDEP 2020. Data for 2017 emissions.
[2] EPA 2021. Data for 2019 emissions.
[3] UNEP 2021. Data for 2019 emissions.

South Access Road Alternative

The South Access Road Alternative would result in approximately 38 additional acres of surface disturbance as compared to the Proposed Action. Total surface disturbance for the South Access Road Alternative would include 844 acres of public lands.

Construction of the South Access Road Alternative would cause gaseous and particulate air pollutant emissions resulting from the use of construction equipment and trucks. Emissions from construction activities would be temporary and limited to the areas in and near the roadway alignment. Potential GHG emissions from construction of the South Access Road Alternative were calculated in the same way as for the Proposed Action. **Table 3.8** provides the GHG emissions from construction of the South Access Road Alternative.

Table 3.8. South Access Road Alternative GHG Emissions Summary During Construction

Source Category	CO_2 (tons)	CH_4 (tons)	N_2O (tons)	CO_2e (tons)
Construction equipment and vehicles	102	0.004	0.001	103

Source: ASI 2021b.
Note: CO_2 equivalents (CO_2e) for CH_4 and N_2O were reported in tpy. Per 40 CFR 98, Table A-1, CH_4 has a global warming potential (GWP) of 28 over 100 years, and N_2O has a GWP of 298 over 100 years.

The change in location of the access road would not result in a change in the estimated operational GHG emission totals under the Proposed Action. The operation of the mine would be the main source of GHG emissions, and the proposed changes associated with this alternative would not result in a noticeable change in the emissions or climate impacts. As a result, Project-related GHG and climate impacts under the South Access Road Alternative would be the same as those of the Proposed Action.

Renewable Energy Alternative

The Renewable Energy Alternative would result in approximately 33 additional acres of permanent surface disturbance as compared to the Proposed Action. Construction activities for the solar field would generate exhaust emissions. However, construction of the solar field would generate relatively few emissions compared to mining operations. Potential GHG emissions from construction of the Renewable Energy Alternative were calculated in the same way as for the Proposed Action. **Table 3.9** provides the GHG emissions from construction of the Renewable Energy Alternative.

Table 3.9. Renewable Energy Alternative GHG Emissions Summary During Construction

Source Category	CO_2 (tons)	CH_4 (tons)	N_2O (tons)	CO_2e (tons)
Construction equipment and vehicles	67	0.003	0.001	68

Source: ASI 2021b.
Note: CO_2 equivalents (CO_2e) for CH_4 and N_2O were reported in tpy. Per 40 CFR 98, Table A-1, CH_4 has a global warming potential (GWP) of 28 over 100 years, and N_2O has a GWP of 298 over 100 years.

Operation of the proposed solar field would not result in emissions from operation of the solar generating equipment itself. Operation of the facility would result in minor exhaust emissions from maintenance vehicles and from water trucks for solar panel washing and dust control. In all, Project-related GHG and climate impacts under the Renewable Energy Alternative would be similar to those of the Proposed Action.

To the extent that the electricity produced by the Renewable Energy Alternative would displace power that otherwise would have been generated by combustion of fossil fuels, the GHG emissions that would have been produced by fossil-fueled power plants would be avoided. This reduction in regional emissions could have a small beneficial effect on climate change in the Project area and the larger surrounding region. The estimated reduction in regional GHG emissions is 19,429 tons per year CO_2 equivalents. The quantity of emissions actually reduced would depend on future trends in the regional generation mix (proportion of total electricity generated by each fuel or other source), in electrical demand and energy prices, and in the electrical load characteristics and power plant dispatching procedures of the regional electric grid.

No Action Alternative

Under the No Action Alternative, the Project would not be developed. Previously permitted activities would continue, including reclamation and closure, as well as other present and future actions. As a result, there would be no potential impacts on climate in the area of analysis from the No Action Alternative.

3.4.2.3 Cumulative Effects

Climate change results from the aggregate effects of GHG emissions from past, present, and future actions worldwide. Therefore, climate impacts are inherently cumulative. As noted above, the GHG emissions associated with the Proposed Action would by themselves have negligible effects on climate but would contribute incrementally to global climate change.

3.5 CULTURAL RESOURCES

Detailed affected environment and environmental consequences sections are provided in SER 3: Cultural Resources (BLM 2022b) and incorporated by reference here. A summary of the information is provided below.

3.5.1 Affected Environment

Cultural resources are defined as physical manifestations (human-made and natural physical features) associated with past or present cultures that are, in most cases, finite, unique, fragile, and nonrenewable. These resources include prehistoric and historic-era archaeological sites, historic buildings and structures (architectural resources), and locations of important historic events. Cultural resources may also refer to places of traditional religious and cultural importance, including archaeological sites, landscapes, natural landforms, and small, discrete use areas that are important to the practice and continuity of traditional practices or necessary for maintaining a community’s cultural identity. Cultural resources that are listed or eligible for listing in the National Register of Historic Places (NRHP) are called “historic properties.”

The Project area is dominated by sagebrush and pinyon juniper vegetation. Prehistorically, the Project area was occupied from the Paleoarchaic through the Late Archaic periods (circa 14,000 years before present to 150 years ago). During the ethnohistoric period, the area was occupied by the Numic-speaking Fish Springs Valley group of Western Shoshone. The mountainous portions of the area of analysis have been significantly altered by historical mining activities dating back to the 1870s, when the Fish Creek Mining District was established. In the 1940s, the portion of the district containing the Gibellini Mine was renamed the Gibellini Mining District. Local springs and pinyon-juniper woodland provided historical mining operations and ranches with raw materials throughout the nineteenth century. In particular, the abundant pinyon pine resources supplied charcoal production operations that fueled smelters in the Eureka Mining District. The BLM defined the Fish Creek Carbonari District (D172), characterized by sites providing evidence of charcoal production from 1870 to 1890.

There have been a series of inventories within the areas of potential effects (APEs) for direct and indirect effects to evaluate potential effects from the Proposed Action and South Access Road Alternative. The BLM determined that the APE for direct effects for the Project is the footprint of the proposed mine facilities plus a buffer of 98 feet, for a total of 1,963 acres (**Figure 3.2**). The APE for indirect effects resulting in viewshed changes is 5 miles around the Project footprint and approximately 2.5 miles from the utility corridors. The APE for indirect effects resulting from auditory changes is the direct APE plus a buffer extending 3,280 feet around the proposed Project boundary and 2 miles from the utility corridors. The APE for vibrational effects is a buffer extending 200 feet around the Project footprint and 3,000 feet from proposed blasting areas (**Figure 3.3**). The APE includes exploratory activities. The APEs for this project were developed by the BLM in consultation with the Nevada State Historic Preservation Officer.

Within the direct APE, inventories to identify archaeological and architectural cultural resources included desktop review followed by Class III pedestrian field surveys (30-meter transects) of the entire direct APE. Within the indirect APE, archaeological and architectural cultural resources were identified through desktop analysis followed by targeted reconnaissance field surveys. Class III inventory within the entire indirect APE was not conducted. The results of the inventories are presented in Harmon (2020) and Campana (2020) and are briefly summarized below and in **Table 3.10**.

The Class III inventories identified 104 cultural resources within the extent of the direct APE: 103 archaeological resources and one historic district. Of these, eight are eligible or unevaluated for the NRHP, including seven individual archaeological sites (one unevaluated and six eligible for the NRHP) and the Fish Creek Carbonari District (D172), and the remaining 96 resources are not eligible. NRHP-eligible and unevaluated archaeological properties in the direct APE consist of prehistoric lithic scatters and the historic Gibellini Mine.

Table 3.10. Eligible, Not Eligible, and Unevaluated Cultural Resources in the Direct and Indirect Area of Potential Effect

Area of Potential Effects	No. of Eligible Resources	No. of Not Eligible Resources	No. of Unevaluated Resources	Total
Direct	7	96	1	104
Indirect	57	316	13	386
Total	64	412	14	490

Cultural resources in the indirect APE were identified through a combination of archival review and limited field reconnaissance and resource documentation. A total of 386 archaeological resources were identified in the indirect APE; 316 of these archaeological resources are not eligible for listing on the NRHP, leaving 70 eligible and unevaluated archaeological resources that were analyzed for adverse indirect effects. The review and documentation of architectural resources identified 21 architectural resources in the indirect APE. Of these, the Fish Creek Ranch Historic District (D349) and the Fish Creek Ranch Log Cabin (B18124) have been determined individually eligible for the NRHP. Indirect effects on these resources were analyzed. Finally, the NRHP-eligible Fish Creek Carbonari District (D172) is within the indirect APE and indirect effects on it that would result from the Proposed Action were analyzed.

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Figure 3.2. Cultural Resources Direct Area of Potential Effects

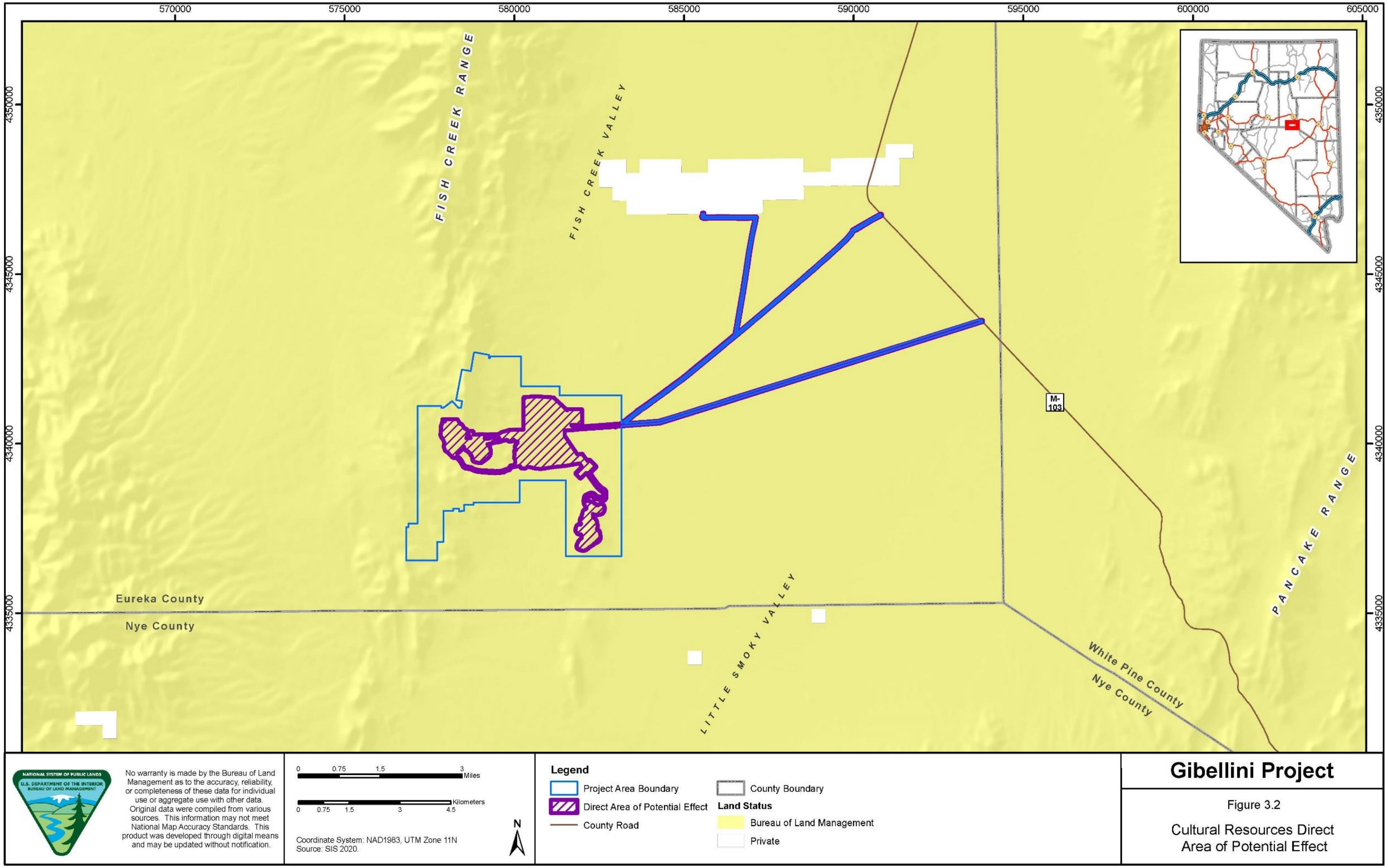
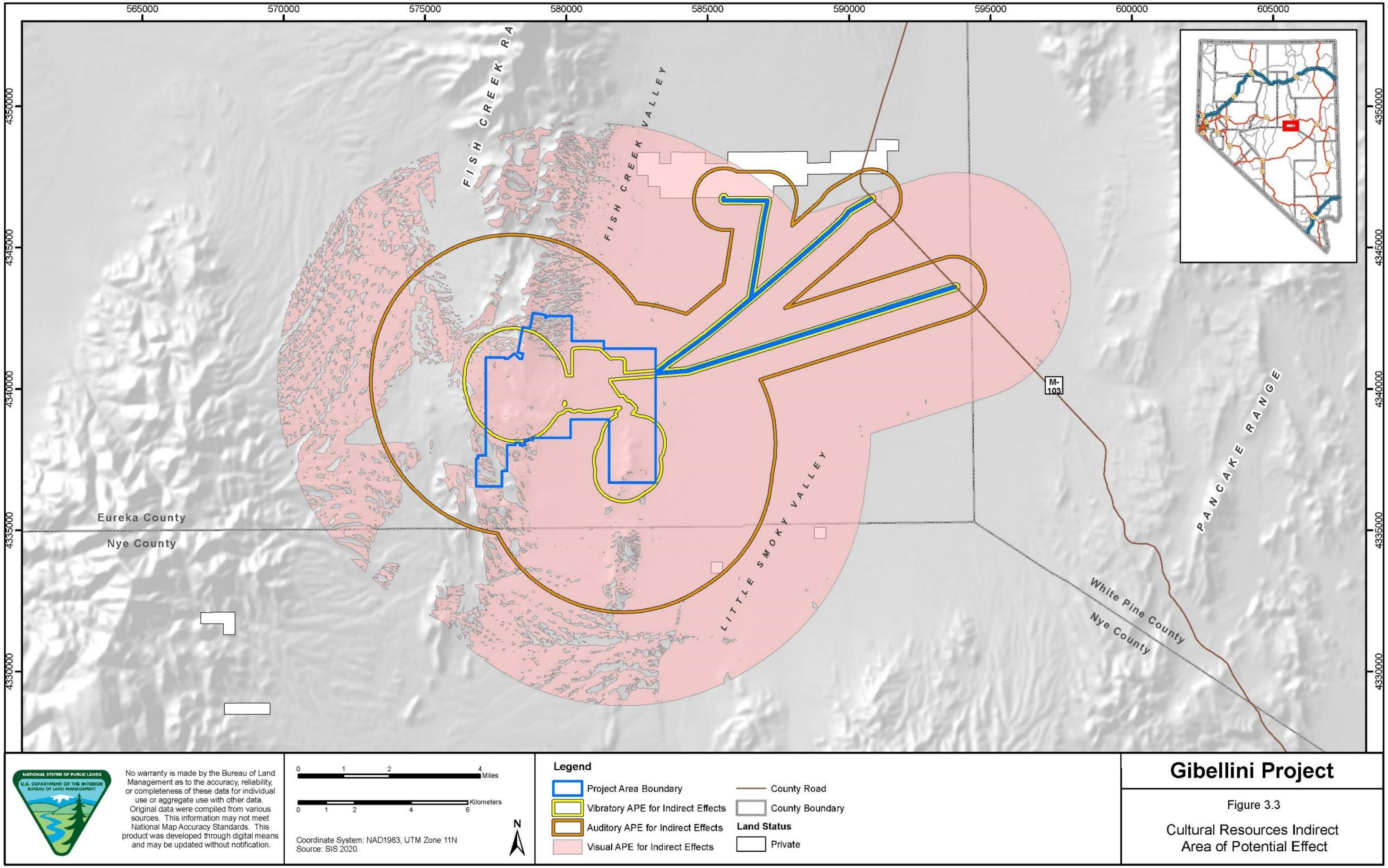


Figure 3.3. Cultural Resources Indirect Area of Potential Effects



3.5.2 Environmental Effects

The area of analysis for effects to cultural resources for NEPA is the same as the area of potential effects (APE) defined for the Project during the effects analysis conducted under Section 106 of the National Historic Preservation Act, as amended. The area of analysis, or APE, is the geographic area or areas within which actions from an undertaking may directly or indirectly impact cultural resources. For the Gibellini Project, the area of analysis includes portions of east-facing slopes of the Fish Creek Range, the fan piedmont of Fish Creek Valley, and the basin floors of Fish Creek and Little Smoky Valleys. Effects analysis under Section 106 is limited to those cultural resources that are that are listed in or eligible for listing in the NRHP (i.e., historic properties). The analysis below accounts for impacts to all cultural resources identified in the analysis area, regardless of National Register eligibility status. This analysis accounts for potential direct and indirect impacts from implementation of the Project that could result in impacts to cultural resources from physical disturbance or destruction through direct contact or vibrations, or changes to the surrounding visual or auditory baseline conditions. Impacts on cultural resources resulting from changes in air quality are not anticipated; therefore, no analysis was conducted for atmospheric effects.

Impacts on cultural resources are discussed in terms of direct, indirect, and cumulative impacts from each alternative that could result in impacts to cultural resources or adverse effects on historic properties (those resources listed or eligible for listing on the NRHP). As defined under 36 CFR 800.5(a)(1) (Criteria of Adverse Effect), an adverse effect occurs when a Federal undertaking or action would alter, directly or indirectly, any of the characteristics of a historic property that make it eligible for listing in the NRHP. An adverse effect on a historic property is not limited to physical destruction or damage but also includes relocation of the property; changes in the character of the setting of the property; and the introduction of visual, atmospheric, vibratory, or audible intrusions when those intrusions may affect the resource’s integrity and eligibility. Impacts to resources that do not qualify as “historic properties” are not classified as adverse under Section 106.

3.5.2.1 Effects Level Definitions

The impact analysis for cultural resources uses the following qualifiers to describe potential impacts in terms of intensity, duration, and context.

Intensity

The Project would result in impacts to resources that have been determined not eligible, eligible, or unevaluated for the National Register. The analysis of effects using the criteria of adverse effect under Section 106 is limited to those resources that are listed in the NRHP or have been determined eligible for listing. Resources that are determined not eligible for listing on the NRHP are fully documented during baseline studies and that documentation retained in perpetuity by Federal and State land-managing agencies. The information obtained for this resource category at the baseline level is exhaustive and considered adequate to understand the resource in its larger context. These resources would not be granted additional management consideration prior to implementation of the Project. Unevaluated resources would be evaluated through a testing program detailed in the Historic Properties Treatment Plan (HPTP), and effects on those resources determined eligible would be analyzed.

There are three categories of effect:

<u>No Historic Properties Affected:</u> A "no historic properties affected" determination indicates that no historic properties are in the APE or that there are historic properties in the APE, but the undertaking would not alter the characteristics that qualify them for eligibility to the NRHP.

<u>No Adverse Effect:</u> A "no adverse effect" determination indicates that there would be an impact on the historic property by the undertaking, but the impact does not meet the criteria of adverse impact in 36 CFR 800.5(a)(1) and would not alter any of the characteristics that make it eligible for listing to the NRHP in a manner that would diminish the integrity of the historic property.

<u>Adverse Effect:</u> An adverse effect indicates that the undertaking would alter, directly or indirectly, any of the characteristics that make it eligible for listing to the NRHP in a manner that would diminish the integrity of the property.

Duration

<u>Short-term:</u> Effects would last for the duration of the Project.

<u>Permanent:</u> Effects would last after active mining for the Project is completed.

Context

<u>Localized:</u> Effects would be limited to eligible or unevaluated sites within the area of analysis.

<u>Regional:</u> Effects would occur on eligible or unevaluated sites outside of the area of analysis.

3.5.2.2 Proposed Action

Direct and Indirect Effects

In the direct APE, there are seven known eligible archaeological sites and one known unevaluated archaeological site. Of these, five would be directly physically affected by the Project's ground disturbance; three archaeological sites would be affected by mine facilities, one archaeological site would be affected by the water pipeline, and one archaeological site would be affected by the construction and maintenance access road associated with the utility corridor that intersects with the Pan Mine 69-kilovolt (kV) power line. The three remaining sites would not be physically affected by the Project's facilities and would not be adversely affected. Under the Proposed Action, the main mine access road would not affect known archaeological sites. Although the Fish Creek Carbonari District (D172) is partially in the direct APE, none of the district's contributing elements would be directly adversely affected by the Project; therefore, direct adverse effects on the Fish Creek Carbonari District would not occur.

There are 27 eligible and unevaluated archaeological resources within the APE for vibrational indirect effects. The archaeological resources do not contain standing features whose integrity may be compromised by vibrations, and are not in steep contexts in which vibrations would compromise the stability of the underlying sediments; therefore, indirect adverse effects on archaeological sites would not result from vibrations. The Fish Creek Carbonari District (D172) is also partially in the vibrational indirect APE, but elements of this district that contribute to its eligibility would not be adversely affected by vibrations emanating from the Proposed Action; therefore, the district would not be adversely affected by vibrations resulting from the Proposed Action.

There are 69 eligible or unevaluated archaeological resources within the APE for auditory indirect effects. Changes to auditory baseline conditions in the vicinity of these resources would not affect the integrity and eligibility of these resources, and they would therefore not be adversely affected by indirect auditory effects. Because none of its contributing elements would be adversely affected by changes to auditory baseline conditions, the Fish Creek Carbonari District (D172) also would not be adversely affected by indirect auditory affects. Two eligible architectural resources are within the APE for auditory indirect effects: the Fish Creek Ranch District and Fish Creek Ranch Log Cabin. Auditory effects are expected to be short term, lasting only for the duration of construction of the Proposed Action, and would not affect the integrity and eligibility of these resources. Therefore, adverse auditory effects on architectural resources would not occur.

There are 64 eligible and unevaluated archaeological resources within the APE for visual indirect effects. Changes to visual baseline conditions in the vicinity of these resources would not affect the integrity and eligibility of these resources, and they would therefore not experience indirect visual effects. Because none of its contributing elements would be adversely affected by changes to visual baseline conditions, the Fish Creek Carbonari District (D172) would not be adversely affected by indirect visual effects. Two eligible architectural resources are within the APE for visual indirect effects: the Fish Creek Ranch District and the Fish Creek Ranch Log Cabin. Aboveground facilities contributing to viewshed changes would occur more than 5 miles from these resources. Visual simulations confirm that the viewshed changes at the Fish Creek Ranch would be minimal and barely visible at this distance therefore, adverse effects on these resources would not result from the Proposed Action.

The main mine access road in the Project area would cross relict shorelines of pluvial Newark Lake. The potential for currently unknown, undiscovered archaeological resources to be encountered during subsurface construction in the vicinity of these relict shorelines is considered high. The portion of new disturbance associated with the access road in the Proposed Action would require road base material to be filled over the existing ground, thereby minimizing the potential of discovering buried cultural resources.

Direct impacts on cultural resources under the Proposed Action would be localized, permanent, and adverse. Indirect impacts on cultural resources under the Proposed Action would be localized, short term, and not adverse.

Mitigation Measures

NVV has adjusted the mine layout and design to the extent practicable to avoid impacts on NRHP-eligible and unevaluated cultural resources; the main mine access road in the Proposed Action was developed to minimize impacts on known archaeological resources.

Because NRHP-eligible and unevaluated cultural resources would be adversely affected by the Proposed Action, a Memorandum of Agreement (MOA) and an HPTP would be developed and executed to address how adverse effects would be treated and to mitigate adverse effects in consultation with the Nevada State Historic Preservation Officer and other interested parties including Tribal organizations. Unanticipated discoveries or unanticipated effects would be treated as described in the MOA.

Adverse effects on NRHP-eligible and unevaluated cultural resources resulting from the Project would be treated per the stipulations in the MOA and HPTP. In addition to these mandated measures, NVV would commit to the following EPMs for cultural resources:

- Tribal observers from stakeholders would be invited to observe ground-disturbing activities, including both construction and archaeological investigations.
- NVV employees and its subcontractors would be provided Cultural Sensitivity Training.

Residual Effects

Upon completion of construction, mining, and reclamation activities associated with the Project, direct impacts on cultural resources would cease. Residual effects would result from the permanent removal of cultural resources and materials physically impacted by the Project.

3.5.2.3 South Access Road Alternative

Impacts on NRHP-eligible and unevaluated cultural resources under the South Access Road Alternative would be largely consistent with those described for the Proposed Action with one exception. Construction and use of the South Access Road Alternative would affect two additional eligible archaeological sites, bringing the total number of affected NRHP-eligible and unevaluated cultural resources to seven. The two additional eligible resources are prehistoric lithic scatters eligible under Criterion D for their potential to yield data important to prehistoric research objectives. These resources would be directly physically affected by construction of the South Access Road Alternative. Under the South Access Road Alternative, the adverse impacts on the five archaeological sites described under the Proposed Action also would occur.

The location of the South Access Road Alternative was developed by NVV to minimize potential impacts on currently unknown, undiscovered archaeological resources associated with relict shoreline features of pluvial Newark Lake. The main mine access road under the Proposed Action was designed to avoid all known archaeological sites but has a high potential to encounter undiscovered (buried) archaeological resources, as compared to the South Access Road Alternative. The South Access Road Alternative is several miles south of the known shoreline features and has a lower potential to encounter currently undiscovered archaeological resources but would affect two more known resources as compared to the Proposed Action. The portion of new disturbance associated with the access road in the Proposed Action would require road base material to be filled over the existing ground so the potential of discovering buried cultural resources is low compared to the disturbance of known sites under the South Access Road Alternative.

Direct impacts on cultural resources under the South Access Road Alternative would be localized, permanent, and adverse. Indirect impacts on cultural resources under the South Access Road Alternative would be localized, short term, and not adverse.

3.5.2.4 Renewable Energy Alternative

Cultural resource sites do not occur in the 33-acre solar energy facility site; therefore, the direct effects would be the same as those described for the Proposed Action. In addition, the solar field would not result in additional indirect adverse effects on historic properties from vibrations or auditory baseline changes. The solar field would be less than 5 miles (4.9 miles) from the Fish Creek Ranch (D349); however, visual simulations confirm that viewshed changes would be minimal and barely visible. Therefore, this alternative would not result in adverse visual effects to the Fish Creek Ranch.

3.5.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed. No ground disturbance would occur, and there would be no changes or alterations to the landscape. Existing conditions in the area of analysis would continue.

3.5.3 Cumulative Effects

The CESA for cultural resources is the same as the maximum extent of the area of analysis for direct and indirect effects on historic properties. The total area of the CESA encompasses 98,298 acres, including 1,601 acres of private land. Direct damage to cultural resources from past and present surface-disturbing actions can occur. Furthermore, the increases in access provided by projects can increase the likelihood for intentional (e.g., vandalism and treasure hunting) and inadvertent (e.g., recreation, erosion) damage to cultural resources. Wildland fire also can destroy structures of historical significance.

3.5.3.1 Proposed Action

While cultural resources determined not eligible for NRHP have been documented and adverse effects on historic properties in the CESA would be treated in accordance with the MOA and HPTP, the Proposed Action would result in the permanent removal of cultural resources from the landscape. Therefore, the Project could contribute cumulative impacts on cultural resources in combination with past and present actions and RFFAs.

3.5.3.2 South Access Road Alternative

Cumulative effects of the South Access Road Alternative on known NRHP-eligible or unevaluated sites and any previously unknown NRHP-eligible or unevaluated sites that may be discovered during Project construction would be the same as described for the Proposed Action.

3.5.3.3 Renewable Energy Alternative

Cumulative effects of the Renewable Energy Alternative on known NRHP-eligible or unevaluated sites and any previously unknown NRHP-eligible or unevaluated sites that may be discovered during Project construction would be the same as described for the Proposed Action.

3.5.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed, and the associated impacts on cultural resources would not occur.

3.6 GEOLOGY AND MINERALS

Detailed affected environment and effects analysis are provided in SER 4: Geology and Minerals (BLM 2021b) and incorporated by reference here. A summary of the information is provided below.

3.6.1 Affected Environment

The area of analysis for geology consists of the following:

- The Project area to capture the extent of surface-disturbing activities that may alter existing geologic conditions during construction, operation, and reclamation of the Project; and
- The footprints of the mining facilities, including the open pit, Heap Leach Pad (HLP), and rock disposal area (RDA), for evaluating physical and chemical stability of mining facilities during construction, operation, and reclamation of the Project.

3.6.1.1 Regional and Local Geology

The Project is on the eastern flank of the southern part of the Fish Creek Range, with mineralization hosted in Devonian black shales of the Gibellini facies of the Woodruff Formation (Dw). The southern part of the Fish Creek Range comprises Paleozoic sedimentary rocks of Ordovician to Mississippian age. Tertiary volcanic rocks crop out along the eastern edge of the range with north to northeast-trending faults dominating the eastern range front (Roberts et al. 1967). The range is bound by Tertiary to Quaternary-age sedimentary rocks and alluvium to the east and west in Little Smoky and Antelope Valleys, respectively.

The lithology is vertically homogenous over the entire Project area, although it changes spatially across the deposit. Shale within the Devonian sedimentary rocks that compose the Woodruff Formation contain a high percentage of quartz with lesser clay minerals and apatite. Irregular masses of dolomitized limestone are found in irregular vertical intervals up to tens of feet in some locations. Calcareous zones are lower in vanadium and are thought to be non-Woodruff blocks associated with thrust faulting.

3.6.1.2 Mineralization

The lithology of the Project deposit consists of sandstone, siltstone, and mudstone with quartz, dolomite, limonite, and abundant kerogen. The Woodruff Formation was likely deposited as eugeosyncline rocks (western assemblage) that were thrust eastward over miogeosynclinal rocks (eastern assemblage) during the Antler Orogeny in the late Devonian Period.

Vanadium ore in the Project area occurs within kerogen-rich siliceous mudstone, siltstone, and chert described as the Gibellini facies of the Woodruff Formation. The thickness of the vanadium mineral deposits ranges from 175 to 300 feet. Mineralized zones are irregular in shape but generally conform to the stratigraphy of the host shales that strike northwest to southeast and dips at low angles to the west. Vanadium is also frequently found as a coproduct of uranium (Kelley et al. 2017). As noted for the Proposed Action, uranium will be extracted as part of mining operations, processed for safe handling, and transported to end users. Approximately 24 tons of uranium would be produced annually. The frequency of uranium shipment would be approximately every 2 months to minimize onsite storage.

Near-surface rocks in the Project area have been affected by supergene weathering that has altered the form of vanadium from organic complexes into inorganic vanadate and phosphate minerals and concentrated the vanadium in the host rocks by gradual leaching and erosion. Three mineralized zones have been identified in the Project area including the Oxidized zone, the Transition zone, and the Primary zone (unaltered). The highest grades of vanadium occur within a mixture of the Oxidized and Transition zones where metahewettite ($Ca[V_2O_6, V_4O_{10}]*3 H_2O$) is the main vanadium mineral. Current vanadium ore cut-off grade is about 0.12 percent to 0.13 percent vanadium pentoxide (V_2O_5), or 800 parts per million as vanadium in the Oxidized and Transition zones, respectively. The Primary zone is not currently considered to be ore because of poor recovery in metallurgical tests to date. Calcareous material in all zones is not classified as ore regardless of grade because of excessive acid consumption. An exact carbonate cut-off level has not yet been developed although a net neutralization potential (NNP) of greater than 100 has been used as a cutoff for this EIS.

3.6.1.3 Faulting and Seismicity Hazards

Potential seismic hazards for any site include ground rupture, slope instability, seismic-induced settlement, and liquefaction or strain softening of subsurface deposits. Ground rupture is not expected to be a hazard for the Project because near-surface faulting and active faults have not been documented within the Project area. However, the Project area is close to a number of regional (within a 62-mile or 100-kilometer radius), active faults. Appendix R, Seismic Hazards Analysis, of the Plan of Operations provides details of the fault parameters for significant regional faults and their maximum magnitude. Liquefaction, which can occur within loose, saturated granular deposits, is not expected to be a hazard for the location of the Project because groundwater is relatively deep and near-surface deposits are relatively dense. Similarly, potential seismic settlement from the liquefaction of saturated, deep deposits is not expected based on the current understanding of the subsurface.

Ground motions associated with the maximum credible earthquake (MCE) and various risk levels were assessed. The MCE is the largest event considered possible under the current tectonic regime. The ground motions for the MCE were estimated using a site-specific deterministic and code-based approach, while probabilistic ground motions were developed from U.S. Geological Survey (USGS) seismic design tools.

Ground motions associated with design-level earthquakes were developed for the Project area using both site-specific procedures and publicly available information from the USGS. Based on a site-specific deterministic assessment of historical earthquakes and fault sources, the critical event would be a magnitude 6.7 event on the Diamond Mountains fault at a distance of approximately 8 kilometers, which could produce a peak ground acceleration of 0.29g in the Project area. The risk targeted MCE peak acceleration reported by the USGS for the site is 0.30g for a Site Soil Class C. The probabilistic assessment indicates a peak ground acceleration of approximately 0.12g and 0.30g for the 475-year and 2,475-year return period events, respectively.

3.6.1.4 Landslide Hazards

The present regional climate of the Basin and Range Province supports the occurrence of landslides, which tend to be concentrated in more northerly latitudes and at higher elevations, where precipitation is greater than that of the area of analysis (USGS 1982). A review of the USGS (1982) map depicting landside incidence and susceptibility indicates natural landslide incidence of less than 1.5 percent (by area) for the Project area. A review of satellite imagery of the Project area did not indicate the presence of landforms indicative of either historical or recent landslides.

3.6.1.5 Geochemical Stability

The Gibellini Mine Project Geology and Geochemistry Enhanced Baseline Report (NVV 2019) describes the geochemical characteristics of the Project area. Over 700 samples were collected in the pit area, which have been analyzed for total metals including total sulfur. Based on these analyses, the majority of the waste rock is classified as being not Potentially Acid Generating (non-PAG), and a significant fraction of the material is strongly calcareous. Of the waste samples, 84 percent were non-PAG and 16 percent were PAG.

3.6.2 Environmental Effects

The area of analysis for evaluating direct and indirect impacts on geologic and mineral resources includes the Project area boundary. Primary issues related to geology and minerals include (1) geologic hazards created or exacerbated by development of the Project; (2) regional seismic conditions that could affect stability of the open pit, RDA, and HLP under static and earthquake loads; (3) removal of geologic materials and mineral resources; and (4) exclusion of future mineral resource availability caused by the placement of the RDA and HLP.

3.6.2.1 Effects Level Definitions

The impact analysis for geology and mineral resources uses the following qualifiers to describe potential impacts in terms of intensity, duration, and context.

Intensity

Negligible: Effects on geologic or mineral resources would occur, but they would be so slight as to not be measurable using normal methods.

Minor: Effects on geologic or mineral resources would occur, but would be small and just measurable using normal methods.

Moderate: Effects on geologic resources would occur and would be readily detectable.

Major: Effects on geologic or mineral resources would occur and would be large, measurable, and easily recognized by a human observer.

Duration

Short-term: Effects lasting up to the duration of construction, operation, and reclamation.

Long-term: Effects extend after the life of the Project and could be permanent.

Context

Localized: Effects would be limited to within the Project area.

Regional: Effects would extend beyond the Project area.

3.6.2.2 Proposed Action

Direct and Indirect Effects

Direct impacts on geologic and mineral resources from the Project would include:

- The mining of approximately 24 million tons of ore material containing 66,000 tons of vanadium and 168 tons of uranium over the mine life; and

- The generation and permanent disposal of approximately 2.5 million tons of waste rock and approximately 24 million tons of heap leach material.

The Proposed Action would result in an estimated total surface disturbance of 806 acres. Disturbances associated with the open pit and construction of the RDA and HLP would change topography within the Project area. Permanent surface disturbance associated with the open pit would be approximately 84.8 acres. The disposal of waste rock generated during the proposed mining would result in approximately 29.1 acres of surface disturbance and construction of the HLP would result in approximately 181 acres of surface disturbance. Although the RDA and HLP would be reclaimed, including grading to simulate natural slopes in the surrounding area, construction of the RDA and HLP would alter the natural topography of the area. These impacts on topography would be long term and major for the open pit and long term and moderate for the RDA and HLP.

The open pit design is expected to minimize the potential risk of large-scale slope failures during operation. Stabilization of the pit walls is not proposed as part of reclamation or closure. Although localized slope failures would likely occur over time during the post-closure period, the final pit slopes were designed with reasonable factors of safety with respect to potential large-scale failures; therefore, significant impacts associated with the slope instability that would affect adjacent facilities are not anticipated during the operation and post-closure periods. A safety berm would be placed around the top perimeter of the open pit to prevent entry and appropriate warning signage would be put in place.

The results of the slope stability evaluation indicated adequate factors of safety for the pit slopes, HLP, and RDA. Therefore, substantial impacts associated with instability of the pit, HLP, or RDA are not anticipated during the operation or post-closure conditions.

Conventional drilling and blasting techniques would be used to facilitate open pit mining. Benches would be drilled and shot with ammonium nitrate and fuel oil as the blasting agent. Existing geologic information and condemnation drilling results indicate the placement of the proposed facilities would not conceal known or inferred mineable ore. No known mineralization occurs below the facilities.

Mitigation Measures

NVV has developed practices derived from the general requirements established in the BLM's surface management regulations at 43 CFR 3809 and NDEP Bureau of Mining Regulation and Reclamation (BMRR) mining reclamation regulations, as well as other water regulations and BLM guidance documents, to prevent unnecessary and undue degradation during the life of the Project. These measures are described below.

- Monitoring of the stability of the open pit would be performed in accordance with requirements under the Water Pollution Control Permit and Reclamation Permit and would include daily visual stability monitoring of the highwall and the crest area behind the highwall for any signs of movement.

- The Adaptive Waste Rock Management Plan describes the procedures for the identification, handling, and management of PAG materials to minimize potential for the formation of acidic drainage.

Residual Effects

Residual impacts on geology and mineral resources from the Project would include the permanent removal of approximately 24 million tons of ore and the permanent topographic alteration of approximately 301 acres of land associated with the open pit, HLP, and RDA.

3.6.2.3 South Access Road Alternative

Direct impacts on geologic and mineral resources from the South Access Road Alternative would be the same as those of the Proposed Action. The South Access Road Alternative would result in approximately 38 additional acres of surface disturbance compared to the Proposed Action. The total Project surface disturbance for this alternative would be 844 acres.

3.6.2.4 Renewable Energy Alternative

Direct impacts on geologic and mineral resources from the Renewable Energy Alternative would be the same as those of the Proposed Action. The Renewable Energy Alternative would result in approximately 33 additional acres of permanent surface disturbance compared to the Proposed Action. The total Project surface disturbance for this alternative would be 839 acres.

3.6.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts on geologic and mineral resources would not occur.

3.6.3 Cumulative Effects

The CESA for geology and mineral resources includes the Project area and Gibellini Mining District. The Project area encompasses most of the Gibellini Mining District with smaller-scale historical to present exploration activities extending to the southern end of the Fish Creek Mountain Range.

3.6.3.1 Proposed Action

Mining activities in the Gibellini Mining District have historically been related to minor manganese production. Mining disturbance in the district has included exploration, open cut bulk sampling, and underground mining. For the purpose of this evaluation, geologic disturbance is defined to include unreclaimed mine components that permanently alter the natural topographic and geomorphic features of the area.

Within the CESA, past and present geologic disturbance has resulted from the following activities: mineral development and exploration projects (105 acres), roads (31 acres), dispersed recreation, and livestock grazing. Based on available information, past and present actions and RFFAs within the CESA for geology and minerals would result in an estimated 105 acres of past geologic disturbance and 85 acres of proposed disturbance associated with the open pit that would result in a permanent alteration of the natural topography. Of the total acres of surface disturbance that would occur under the Proposed Action, the Project incrementally would increase the permanent alteration of topography in the CESA on approximately 85 acres.

3.6.3.2 South Access Road Alternative

Cumulative impacts on geology and mineral resources from the South Access Road Alternative would be the same as those identified for the Proposed Action, except that the Project disturbance would increase by 38 acres under the South Access Road Alternative that would be reclaimed at the end of the Project and not result in permanent alteration of topography. This acreage represents less than 1 percent increase in the total amount of land where the topography and geomorphology would be altered by mining in the Gibellini Mining District. The cumulative impacts from this alternative would be minor, short term, and localized.

3.6.3.3 Renewable Energy Alternative

Cumulative impacts on geology and mineral resources from the Renewable Energy Alternative would be similar to those identified for the Proposed Action, except that the Project disturbance would increase by 33 acres under the Renewable Energy Alternative and would not be reclaimed at the end of the Project, resulting in permanent alteration of topography. This acreage represents less than 1 percent increase in the total amount of land where the topography and geomorphology would be altered by mining in the Gibellini Mining District. The cumulative impacts from this alternative would be minor, long term, and localized.

3.6.3.4 No Acton Alternative

Implementation of the No Action Alternative would not result in any change in cumulative impacts on geology and mineral resources.

3.7 GRAZING MANAGEMENT

The Final SER 5: Grazing Management (BLM 2021c) provides detailed affected environment and environmental consequences sections and is incorporated here by reference. The Project is within the Fish Creek Ranch Allotment, where cattle and sheep grazing occur. The current grazing management plan for the Fish Creek Ranch Allotment was implemented on September 27, 2004.

3.7.1 Affected Environment

The Fish Creek Ranch Allotment consists of 289,292 acres of BLM-administered land with a current average stocking rate of 60.1 acres per animal unit month (AUM) based on a total of 4,815 AUMs (BLM 2020a). An AUM represents the quantity of forage necessary to sustain one cow-calf pair, one horse, or five sheep for 1 month. The Project area covers approximately 6,456 acres of rangeland in the Fish Creek Ranch Allotment, which is approximately 2 percent of the total allotment area.

3.7.2 Environmental Effects

The primary issues related to impacts on grazing resources would include a temporary and permanent loss of active AUMs in the Fish Creek Ranch Allotment, either through disturbance to range resources or losses due to reduced forage production. No impairments to existing range improvements and stock water resources are anticipated.

3.7.2.1 Effects Level Definitions

Effects on grazing resources are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Effects on livestock grazing would be slight and no reductions to animal unit months (AUMs) or change in livestock management would be required.

Minor: Effects on livestock grazing would alter the availability of resources that livestock grazing depends on. Small reductions to AUMs may be necessary. No adjustments to grazing management should be required.

Moderate: Effects on livestock grazing directly affect livestock access to limiting resources. Reductions to AUMs are necessary and adjustments to livestock grazing should be considered. Adverse effects would be minimized with implementation of Applicant-committed EPMs and best management practices (BMPs), but reclamation would require long-term monitoring and maintenance.

Major: Effects on livestock grazing management occur on a pasture or allotment level. Reductions in AUMs and a significant change in authorized use would be required. Adverse effects could be minimized with implementation of Applicant-committed EPMs and BMPs, but reclamation would require long-term monitoring and maintenance.

Duration

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last following Project reclamation.

Permanent: Effects on available forage for livestock would be permanent.

Context

Localized: Effects would be limited to one site within one allotment.

Regional: Effects would occur throughout one or more allotments; multiple lessees may be affected.

3.7.2.2 Proposed Action

Proposed surface disturbance in the Project area consisting of mining infrastructure, communication, water pipelines, power lines, exploration, and roads would total 806 acres of

BLM-administered lands. Project fencing would also preclude livestock grazing from 413 acres of undisturbed lands. All mine-related features would be reclaimed after the Project, with the exception of the pit.

Direct and Indirect Effects

Potential effects on grazing may include the short-term, long-term, and permanent reduction or loss of rangeland available for grazing use within the allotment. Short-term effects arise from forage removal and disturbance from Project-related activities. Effects on grazing would cease within the completion of linear construction activities (water line and power line), mine closure, and successful reclamation. Long-term effects consist of changes to vegetation communities, irrespective of reclamation success. Permanent effects typically would be associated with the construction of open pits and facilities that permanently alter the vegetation, soil, and topography of the landscape.

The Project would result in new disturbance to 806 acres and exclusion of 413 acres of undisturbed land as a result of Project fencing of the 289,292-acre Fish Creek Ranch Allotment, which would equate to 15.1 AUMs lost during the duration of the Project, or 0.42 percent (a minor impact) of the total AUMs available in the Fish Creek Ranch Allotment. The disturbance associated with the Project would be reclaimed following completion of mining operations with the exception of 85 acres in the Fish Creek Ranch Allotment associated with the unreclaimed pit. This would equate to approximately 1.4 AUMs permanently lost from the Fish Creek Ranch Allotment (1.3 and 0.1 AUMs from the Fish Creek Valley South and Antelope Valley pastures, respectively), or 0.04 percent of the total AUMs available within the pastures. Therefore, direct impacts on grazing resources from disturbance are anticipated to be minor, long term (permanent for the 85 acres associated with the unreclaimed pit), and localized.

During construction it is likely that livestock would avoid the Project area. However, over time, they are likely to become accustomed to the mining activity and begin to reoccupy areas initially avoided. Direct effects on livestock may include limited direct mortalities from Project-related activities (e.g., vehicle collisions). However, fencing in the main Project area would preclude these impacts. The unfenced borrow would only be active for 6 months during daytime hours so direct mortality of livestock would be unlikely. Impacts on livestock are anticipated to be minor, short term, and localized.

Mitigation Measures

NVV would develop an agreement with the permittee and Eureka County to ensure no economic impact would occur either during operations or post closure. Lost productivity, both temporary and permanent, would be mitigated in full consultation with the grazing permittee and Eureka County.

Residual Effects

Residual effects on forage resources under the Proposed Action would include the permanent loss of 85 acres of the Fish Creek Herd Management Area (HMA) due to the open, unreclaimed pit mine. In areas that would be disturbed by the Project but later reclaimed, the loss of shrub- or tree-dominated communities within these would represent a long-term change in vegetation community composition (i.e., shrub-dominated communities to grass/forb-dominated communities) because it would take approximately 25 years for mature shrubs to become re-established in these communities, although this would likely benefit livestock that prefer herbaceous forage.

Any reduction in permitted grazing would be done through a subsequent BLM decision based on livestock carrying capacity and resource conditions (per 43 CFR 4100.0-5), accounting for actual forage unavailable for grazing.

3.7.2.3 South Access Road Alternative

Under the South Access Road Alternative, the change in location of the access road would result in 38 additional acres of surface disturbance. The South Access Road Alternative would result in disturbance to 844 acres, plus the exclusion of 413 acres as a result of Project fencing, of the 289,292-acre Fish Creek Ranch Allotment. This would result in 15.7 AUMs temporarily lost from the Fish Creek Valley South and Antelope Valley pastures during the duration of the Project. The disturbance associated with the Project would be reclaimed following completion of mining operations with the exception of 85 acres in the Fish Creek Ranch Allotment associated with the unreclaimed pit. This would equate to approximately 1.4 AUMs permanently lost from the Fish Creek Ranch allotment (1.3 and 0.1 AUMs from the Fish Creek Valley South and Antelope Valley pastures, respectively), or 0.04 percent of the total AUMs available within the pastures. Aside from the increased disturbance acreage, the effects under this alternative would be comparable to those of the Proposed Action.

3.7.2.4 Renewable Energy Alternative

The Renewable Energy Alternative would result in 33 additional acres of permanent surface disturbance, compared to the Proposed Action. The Renewable Energy Alternative would result in disturbance to 839 acres, plus the exclusion of 413 acres as a result of Project fencing, within the 289,292-acre Fish Creek Ranch Allotment. This would result in approximately 15.6 AUMs temporarily lost during the duration of the Project. The disturbance associated with the Project would be reclaimed following completion of mining operations with the exception of 85 acres associated with the open pit and 33 acres associated with the solar photovoltaic (PV) field within the Fish Creek Ranch Allotment. This would equate to approximately 1.9 AUMs permanently lost from the Fish Creek Ranch Allotment. Aside from the increased disturbance of 33 acres during the life of the Project and left unreclaimed thereafter, the effects under this alternative would be comparable to those of the Proposed Action. The Project would not affect spring or stream flows (see SER 16: Water Resources and Geochemistry [BLM 2022f]) or the supplemental watering locations in the grazing allotment. Therefore, grazing impacts as a result of the Renewable Energy Alternative are anticipated to be minor, long term, and localized.

3.7.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts on grazing resources would not occur. Under the No Action Alternative, no new ROW authorizations, pipelines, or roadways would be required.

3.7.3 Cumulative Effects

The CESA for grazing resources is the same as the area of analysis, encompassing the Project area and the Fish Creek Ranch Allotment. The CESA consists of 289,292 acres of BLM-administered land and 5,938 acres of a mixture of private and other public lands for a total of 295,230 acres. The CESA encompasses the extent of potential effects from activities associated with the Project and interrelated actions that may result in cumulative effects when combined with potential effects from past and present actions and RFFAs.

3.7.3.1 Proposed Action

Cumulative effects on grazing resources would primarily be directly related to forage loss in either quality or quantity due to disturbance. The cattle and sheep that occur in the CESA would continue to graze in the Fish Creek Ranch Allotment throughout the Project, although use may be concentrated in other areas due to loss of grazing resource availability in the area of disturbance due to the Project.

The Project would result in a reduction of grazing resources on an additional 1,219 acres (0.41 percent of the CESA) due to construction of mining facilities and roads and removal of soil. Impacts on grazing resources as a result of the Project would be mostly temporary in nature. Pending completion of successful reclamation, grazing resources on 1,134 acres would return to pre-Project conditions, and 85 acres would be permanently lost from the Project area. This would result in 15.1 AUMs temporarily lost during the duration of the Project and 1.4 AUMs permanently lost. The reclaimed areas would be capable of supporting grazing use; however, densities and distribution may change in the long term but are anticipated to be minor and localized.

The Project is not anticipated to affect the amount and extent of available surface water (e.g., seeps and springs) in the Project vicinity or associated wetland habitat for livestock within the CESA.

3.7.3.2 South Access Road Alternative

Under the South Access Road Alternative, the change in location of the access road would result in 38 additional acres of surface disturbance. The South Access Road Alternative would reduce grazing resources on an additional 1,257 acres, or 0.43 percent of the 295,230-acre CESA. This would result in 15.7 AUMs temporarily lost and 1.4 AUMs permanently lost due to the Project.

The disturbance associated with the Project would be reclaimed following completion of mining operations with the exception of 85 acres in the Fish Creek Ranch Allotment associated with the unreclaimed pit. Aside from the increased disturbance acreage, the effects in the CESA under this alternative would be comparable to those of the Proposed Action.

3.7.3.3 Renewable Energy Alternative

Under the Renewable Energy Alternative, the construction of the solar field would result in 33 additional acres of permanent surface disturbance compared to the Proposed Action. The Renewable Energy Alternative would result in disturbance to 839 acres, plus the exclusion of 413 acres as a result of Project fencing, for 1,252 acres of rangeland that would be unavailable for livestock grazing, or 0.42 percent of the 295,230-acre CESA. This reduction of rangeland available for livestock grazing would result in the short-term loss of approximately 15.6 AUMs during the duration of the Project and long-term loss of 1.9 AUMs. The disturbance associated with the Project would be reclaimed following completion of mining operations with the exception of 85 acres associated with the unreclaimed pit and 33 acres of the solar field. Aside from the increased surface disturbance acreage, the cumulative effects in the CESA under this alternative would be comparable to those of the Proposed Action. Therefore, cumulative grazing impacts as a result of the Renewable Energy Alternative are anticipated to be minor, long term, and localized.

3.7.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be constructed, and past and present actions and RFFAs would continue in the CESA. As a result, there would be no potential for the Project to contribute to cumulative impacts on grazing resources. Cattle and sheep and the Fish Creek Ranch Allotment would continue to be managed as they currently are. Cumulative impacts on grazing resources under the No Action Alternative would be less than those under the Proposed Action but would still be anticipated to be negligible, long term, and localized.

3.8 HAZARDOUS MATERIALS AND SOLID WASTE

The Final SER 6: Hazardous Materials and Solid Waste (BLM 2021d) provides detailed affected environment and environmental consequences sections and is incorporated here by reference. **Appendix C** includes the A-K Risk Assessment conducted for the Project.

3.8.1 Affected Environment

The area of analysis for hazardous materials and solid waste includes the Project area boundary and access roads to the Project area.

The term “hazardous materials” refers to any hazardous material or hazardous substance, as defined by applicable regulatory programs, that could result in personal injury or illness during exposure, handling, use, or ingestion; or harm to the physical or biological environment if released. Hazardous wastes refer to substances that pose similar exposure risks as hazardous materials, are no longer of use, and are ready to be disposed. Solid and hazardous wastes are evaluated together as “wastes” unless specifically identified as either solid or hazardous.

The Project would require the transport, handling, storage, use, and disposal of materials classified as hazardous according to definitions in the Comprehensive Environmental Response, Compensation, and Liability Act; Resource Conservation and Recovery Act; Mine Safety Health Administration and Occupational Safety Health Administration Hazard Communication Standards; Department of Transportation regulations; Superfund Amendments and Reauthorization Act (SARA); and Oil Pollution Act of 1990. The mining operations for the Project would require the use of the following materials classified as hazardous:

- Diesel fuel, gasoline, oils, and antifreeze used for equipment operation and maintenance;
- Ammonium nitrate and high explosives used for blasting; and
- Various acids (including sulfuric acid), corrosives, oxidizers, flocculants, and retardants used throughout operations.

Hazardous materials and substances that may be transported, stored, and used at the Project area in quantities less than the Threshold Planning Quantity designated by SARA Title III for emergency planning include blasting components, petroleum products, and small quantities of solvents for laboratory use. The only chemicals on site that would exceed the Threshold Planning Quantity would be sulfuric acid and the vanadium product produced by the Project (V_2O_5). Small quantities of hazardous materials may also be managed; such materials are contained in commercially produced paints, office products, and automotive maintenance products.

Products that would require management as hazardous materials produced by the Project would include solid V_2O_5 and uranium yellowcake (secondary product). Both products are potential carcinogens if inhaled or ingested and require specific management plans to safely manage these materials. Solid and hazardous wastes, such as waste paints, waste paint thinners, spent cleaning solvents, used oil, and solid or non-hazardous refuse (e.g., garbage, recyclables), would be generated throughout construction, operations, and reclamation.

The affected environment for hazardous materials includes air, water, soil, and biological resources. These resources potentially could be affected by an accidental release of hazardous materials during transport to and from the Project area and during storage and use within the Project area. There are no identified hazardous waste sites within or near the area of analysis. The closest hazardous waste sites are more than 15 miles outside of the Project area and have been effectively responded to or remediated as appropriate.

3.8.2 Environmental Effects

Impacts on the physical or biological environment from activities associated with the Project could include the potential for an accidental spill during transport of hazardous materials; the potential for accidental hazardous materials spills or releases in the Project area during handling, storage, or disposal; and the potential for a discovery of non-Project-related sources of contamination.

The influx of new employees who would reside in surrounding areas would increase the amount of municipal solid waste that would be generated and disposed of in the local landfills. However, the increase in solid waste would not be expected to affect the capacity of local landfills.

3.8.2.1 Effects Level Definitions

Effects on hazardous materials and solid waste are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: A negligible spill of hazardous materials or fuels would be one that is quite small, easily and quickly contained, and has no measurable impact on any natural resource. A diesel fuel leak from a hose during refueling would be an example.

Minor: A minor spill of hazardous material or fuels would be one that has a measurable impact on soil or water resources but is quickly contained and remediated so that the duration and the extent of the spill are limited and there is no residual impact.

Moderate: A moderate spill of hazardous material or fuels would be one that has a measurable impact over a large area, or a spill into a water resource. Depending on the type and quantity of material spilled, this type of spill could require State and Federal agency oversight. A moderate spill would have residual long-term impacts even after containment and remediation.

Major: A major spill of hazardous material or fuels would be one that has extensive measurable impacts on water resources and requires the involvement of State and Federal agencies to assess the impact and supervise the containment and remediation. This type of spill would have long-term impacts on natural resources and would require State and Federal agency oversight for an extended period of time to ensure proper protection of critical resources and habitats. An example would be a large spill of sulfuric acid into a lake or an extensive fuel spill into a river.

Duration

Short-term: A spill that can be contained and remediated in less than 1 year.

Long-term: A spill whose impacts on water, soil, or aquatic resources last more than 1 year.

Context

Localized: A spill affecting an area the size of a small park, a parking lot, or an area consisting of less than 10 acres.

Regional: A spill affecting an area greater than 10 acres, or a flowing waterbody, or a lake.

3.8.2.2 Proposed Action

Accidental release of hazardous materials or fuels could occur during use, storage, or transport within the Project area (including amended ROWs), or along transportation routes to and from the Project area.

Direct and Indirect Effects

Except for sulfuric acid and the vanadium product, hazardous materials and substances that may be transported, stored, and used in the Project area would be in quantities less than the Threshold Planning Quantity designated by SARA Title III. All hazardous materials are required by SARA Title III to be stored within secondary containment with a volume that is 110 percent of the largest tank in the containment, with containment extending to include areas used for trucks to fill the tanks. The Project area does not contain any surface water features or resources, and throughout the Project area the groundwater is more than 250 feet below ground surface. Therefore, any fuel spill or release of a hazardous substance would only affect soil outside of this secondary containment and would be managed on site promptly following the Radiation Safety Plan, Spill Contingency Plan (SCP), Spill Control and Countermeasures Plan, and Solid and Hazardous Waste Management Plan. Therefore, a hazardous material spill or accidental release in the Project area would be minor in intensity and quickly and completely remediated, and thus short term in duration and localized. The release probability of a hazardous material along major transportation routes was calculated over a mine life of 7 years. Based on the analysis, the probability of an accident resulting in the release of hazardous material during transport outside the Project area would be less than 1 for each type of hazardous material. The truckload frequency of sulfuric acid is highest of all the types of hazardous materials being brought to or from the Project area, and the national accident rate per mile for corrosive substances is highest of all types hazardous materials. Therefore, the accident probability is highest for sulfuric acid. The safety and containment measures during handling and transport would minimize the intensity duration and extent; therefore, transportation-related spills are likely to be minor, short term, and localized.

A spill of hazardous materials or fuels along any route that does not affect a waterbody or stream channel would only affect soil adjacent to the highway. A spill of this type would be minor to moderate in intensity, depending on the size and extent of the spill. The spill would be contained and remediated immediately, making the spill or release short term in duration and localized in extent.

Both vanadium and yellowcake uranium products would be packaged as damp solids to prevent dust generation during loading into the product containers. The yellowcake uranium is required to be transported in a lined steel barrel secured with a bolt on steel lid. If the product containers were to be accidentally compromised there would only be local impacts on the soil next to the highway. A spill of this type would be minor to moderate in intensity, depending on the size and extent of the spill. The spill would be contained and remediated immediately, making the spill or release short term in duration and localized in extent.

Although there are no reported hazardous waste sites or industrial facilities within or near the area of analysis, there is a potential for discovery of non-Project-related sources of contamination during surface-disturbing activities and the potential for the nearby release of hazardous materials or wastes that could reach the Project area through runoff, groundwater migration, or other environmental transport methods. If non-Project-related contamination is identified during construction, operations, or reclamation, it would be managed appropriately through similar transport, storage, handling, and disposal methods used for Project-related hazardous materials and wastes, in accordance with applicable regulations. As a result, there would not be an adverse impact from the management of non-Project-related hazardous materials and wastes.

Final closure of the Gibellini Mine would include removal of all hazardous materials and reclamation of the mine facilities. Testing of the ore and waste rock has shown that the naturally occurring uranium concentrations in the ore are below the regulatory action levels for radionuclides and, following removal of the uranium during heap leaching, the uranium levels would be below standard analytical detection levels. All water draining from the HLP at closure would be evaporated in engineered evaporation cells (E-cells) designed to be fully contained with no discharge to the environment. Closure of the HLP would include placement of a 3-foot-thick soil cover to reduce infiltration of meteoric water by over 99 percent to eliminate draindown from the HLP.

The overall risk of acid drainage from the Project is low because all waste rock with a potential to generate acidic drainage would be placed with ore on the lined HLP. Although non-PAG rocks placed in the RDA or exposed in the walls of the open pit are not expected to generate acidic drainage, they are expected to leach metals in meteoric water at concentrations that exceed Nevada Profile I screening levels.

Mitigation Measures

No mitigation measures are recommended for hazardous materials and solid waste.

Residual Effects

Residual impacts from the use of hazardous materials under the Project would depend on the substance, quantity, timing, location, and response involved in the event of an accidental spill or release. Operation in accordance with NVV’s SCP, Spill Control and Countermeasures Plan, and Solid and Hazardous Waste Management Plan would minimize the potential for residual impacts due to an accidental spill or release of hazardous materials. Operator compliance with State and Federal regulations that govern the transport, storage, use, and disposal of hazardous materials would reduce the potential for residual impacts due to hazardous materials.

3.8.2.3 South Access Road Alternative

The change in location of the access road would not result in a change to the types or volumes of hazardous materials used or wastes produced under the Proposed Action, and there would be no change in past and present actions or RFFAs that could contribute to impacts related to the management of hazardous materials and wastes. As such, there would be no cumulative impacts from the Project under this alternative in combination with past and present actions or RFFAs.

3.8.2.4 Renewable Energy Alternative

The Renewable Energy Alternative would not result in a change to the types or volumes of hazardous materials used or wastes produced as compared to the Proposed Action. Trucks transporting hazardous materials to and from the Project area would not be traveling additional miles, so there would be no increase in the risk of accidents or spills off site or in accident rates compared to the Proposed Action.

3.8.2.5 No Action Alternative

Under the No Action Alternative, use of hazardous materials or production of wastes would not occur in the area of analysis. Any existing, unidentified sites of contamination would remain and would not likely be encountered or managed unless future proposed development activities performed site assessments or surface-disturbing activities that revealed sources of contamination. As a result, there would be no need to manage hazardous materials or wastes; therefore, no impact related to the management of hazardous materials and wastes would occur under the No Action Alternative.

3.8.3 Cumulative Effects

The CESA for hazardous materials and solid wastes is the same as the area of analysis and includes the Project area and access roads to the Project area. From Interstate (I-) 80, the Project area could be accessed by turning south on State Route (SR) 278, then turning east on U.S. Highway 50 through Eureka, turning south on County Road M-103 (Duckwater Road) for approximately 8 miles, then turning southwest on Fish Creek Ranch Road for approximately 7 miles, and then turning west on the road that accesses the Project area. Alternatively, the Project area could be accessed from I-80 by U.S. Highway 93, traveling through Ely onto U.S. Highway 50, and then turning south on County Road M-103 (Duckwater Road) to Fish Creek Ranch Road.

3.8.3.1 Proposed Action

The cumulative impacts of past and present actions related to the management of hazardous materials and wastes in the CESA are represented by the affected environment description. The RFFAs, such as development and other mining projects, would require use of hazardous materials and production of wastes during construction, operations, and reclamation. If hazardous materials and wastes from RFFAs are mismanaged, their release into the environment could lead to contamination and increased management risks in or near the CESA, particularly if a release is not identified and responded to in a sufficient manner.

The Proposed Action would require the transport, storage, handling, and disposal of hazardous materials and wastes during construction, operations, and reclamation, but these activities would be completed in accordance with permits and regulations and managed through implementation of a BLM-approved SCP, thereby minimizing the risk of mismanagement of hazardous materials and wastes. Past and present actions and RFFAs would also be required to meet permit and regulatory requirements for the management of hazardous materials and wastes. In addition, because the distance of RFFAs with the greatest potential use of hazardous materials and production of hazardous wastes, such as mining projects, would be outside of the anticipated range of hazardous materials and waste transport (i.e., greater than 0.25 mile), impacts from any mismanagement of hazardous materials and wastes would not reach the Project area. As a result, there would be no cumulative impacts from the Proposed Action in combination with past and present actions and RFFAs.

3.8.3.2 South Access Road Alternative

The change in location of the access road would not result in a change to the types or volumes of hazardous materials used or wastes produced under the Proposed Action, and there would be no change in past and present actions or RFFAs that could contribute to impacts related to the use and management of hazardous materials and wastes. As a result, there would be no cumulative impacts under the South Access Road Alternative in combination with past and present actions and RFFAs.

3.8.3.3 Renewable Energy Alternative

The addition of the field of PV panels and battery storage would not result in a change to the types or volumes of hazardous materials used or wastes as produced under the Proposed Action. In addition, there would be no change in past and present actions or RFFAs that could contribute to impacts related to the use and management of hazardous materials and wastes. As a result, there would be no cumulative impacts under the Renewable Energy Alternative in combination with past and present actions and RFFAs.

3.8.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be constructed. As a result, there would be no potential for the Project to contribute to cumulative impacts related to hazardous materials and waste management.

3.9 LAND USE AND REALTY

Detailed affected environment and effects analysis are provided in SER 7: Land Use and Realty (BLM 2021e) and incorporated by reference here. A summary of the information is provided below.

3.9.1 Affected Environment

The Project area consists of 6,456 acres of public land administered by the BLM, which includes the access road, power lines, and water pipeline corridors that extend beyond the claim boundary and are included in the Plan of Operations. There are no unpatented mining claims within the Project area. The claims within the Project area are either patented by NVV or sublet by NVV from the original patent holder. There is no State- or privately owned or other Federal agency-administered land within the Project area.

The Project area is within the administrative boundaries of the BLM Battle Mountain District, Mount Lewis Field Office. BLM-administered land in the Project area is managed under the Shoshone-Eureka Resource Management Plan (RMP) (BLM 1986a). The Project area is in Eureka County, which is managed under the Eureka County Code (Eureka County 2018) and Eureka County Master Plan (Eureka County 2010). Other land management designations that overlap the Project area include the Gibellini Mining District, the Fish Creek Ranch Allotment, and the Fish Creek Wild Horse HMA. No specific recreational areas are within the Project area. Land uses within the Project area include mining, wild horse uses, livestock grazing, and dispersed recreation. Land use specific to grazing is addressed in SER 5: Grazing Management (BLM 2021c), recreation-related land uses are addressed in SER 10: Recreation and Wilderness (BLM 2022e), access and transportation networks are described in SER 13: Transportation and Access (BLM 2021h), and wild horse uses are addressed in SER 17: Wild Horses and Burros (BLM 2021k). There are no other uses (e.g., sand and gravel free use permit areas, oil and gas leases, or power lines) in the Project area.

Several sand and gravel pits, authorized and pending oil and gas leases, power lines, roads, and telephone/telegraph lines and ROWs were returned in a search query of BLM's LR2000 lands and realty database. Although these authorizations and pending lease sales appear in the records, on close examination of the list, most of the records do not overlap or cross through the Project area. However, one power line ROW is within the Project area, namely the Pan Mine power line (NVN 091899), which is the same power line that NVV would tie into for this Project.

3.9.2 Environmental Effects

3.9.2.1 Effects Level Definitions

Effects on land use and realty are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Effects on land use, access, realty actions, and existing established communities would either not occur, or impacts would be so slight as to not be measurable or perceptible. No access restrictions to existing land use authorizations would occur. The Project would not result in any inconsistencies with existing land use plans, goals, and policies, or any inconsistencies could be resolved without modifications to land use plans.

Minor: Effects on land use, access, realty actions, and existing established communities would be measurable and perceptible, but would be small and would not affect the validity of existing land use authorizations or the ability to implement future realty or land use authorizations. Access to existing land use authorizations would be maintained. The Project would not result in any inconsistencies with existing land use plans, goals, and policies, or any inconsistencies could be resolved without modifications to land use plans. Applicant-committed EPMs would effectively minimize impacts on land use, access, and realty.

Moderate: Effects on land use, access, realty actions, and existing established communities would be readily apparent and measurable, and they may affect the validity of existing land use authorizations and the ability to implement future realty or land use authorizations. The Project would conflict with land use plans, goals, and policies, and may require modifications to these plans for conformance. Substantial Applicant-committed EPMs may be required to minimize impacts on land use, access, and realty, but these measures likely would be successful.

Major: There would be significant conflicts with existing land uses, realty actions, and existing established communities, as well as the ability to implement future realty or land use authorizations. The Project would result in significant conflicts with land use plans, goals, and polices and modifications to these land use plans would be required. Substantial Applicant-committed EPMs may be required to minimize impacts on land use, access, and realty, and these measures would have to be monitored to determine their effectiveness.

Duration

Temporary: Effects would occur during construction activities or during maintenance activities.

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last after active mining for the Project is completed.

Permanent: Effects on land use, realty actions, or access would be permanent.

Context

Localized: Effects on lands uses, realty actions, and access would be limited to the area of analysis, or to one community.

Regional: Effects on land uses, realty actions, and access would extend to multiple communities.

3.9.2.2 Proposed Action

Direct and Indirect Effects

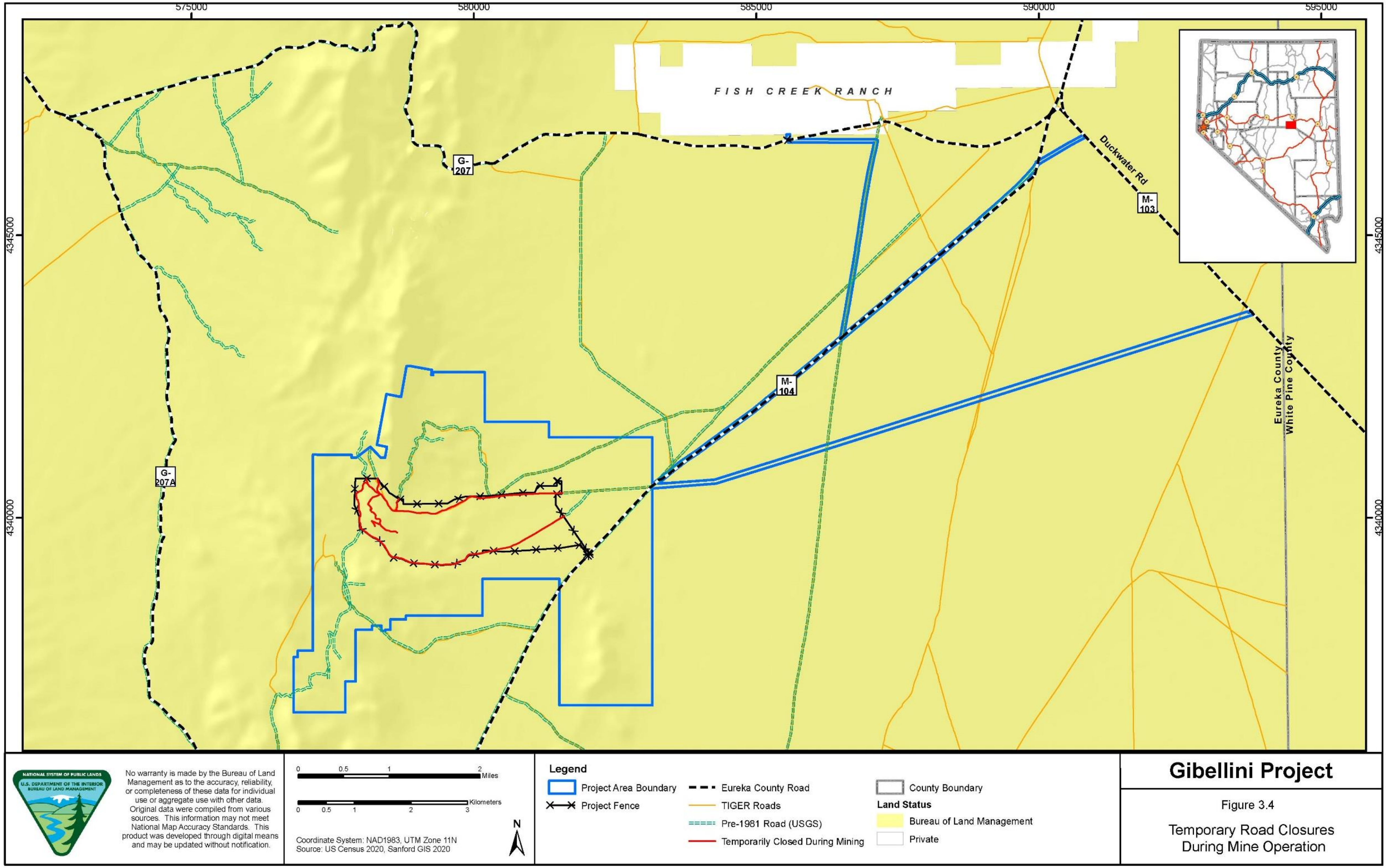
The Project would result in 806 acres of new surface disturbance from mine construction and operation and exploration activities. A total of 760 acres of disturbance would occur in the Project area boundary, consisting of mining infrastructure, communication, water pipelines, power lines, and roads. An additional 46 acres of disturbance would occur from exploration.

Most of the surface disturbance would be reclaimed at the end of mine life. Surface disturbance associated with the pit (85 acres) would be permanent because it would not be reclaimed.

The Project would be consistent with BLM plans and policies that designate land use within the Project area as open for mineral exploration and development, as described in the Shoshone-Eureka RMP (BLM 1986a). Mining-related activities would be consistent with Eureka County plans, policies, and controls as outlined in the Eureka County Master Plan (Eureka County 2010) and Eureka County Code (Eureka County 2018), with implementation of EPMs and required mitigation. The Project would not be in conflict with the goals and policies described in the FLPMA and would be considered reasonably incident under the BLM's occupancy regulations at 43 CFR 3715. The Project would comply with adopted plans and policies of potentially affected governmental entities. The Project would not conflict with any active or pending land use authorizations in the Project area.

There would be no effects on the Pan Mine power line from the interconnection of the proposed power line, as the ROW would not be terminated or modified and would not conflict with power line operation. Existing land uses in the Project area including grazing, wild horse use, transportation and access, and recreational uses, including hunting. The proposed surface disturbance would reduce the amount of land available for livestock grazing and wild horse use as discussed in the SERs for these resources (BLM 2021c and 2021k, respectively). Grazing impacts would be minor, long term (permanent for the 85 acres associated with the fenced area), and localized. Wild horse use impacts would be moderate, long term, and localized. Recreational opportunities would be reduced in the Project area, although not to a large extent, as discussed in SER 10: Recreation and Wilderness (BLM 2022e). One road claimed by Eureka County would be temporarily closed by the perimeter fence and reopened in its original configuration at closure of the Project (**Figure 3.4**). Other roads in the vicinity that connect to the one road that would be temporarily closed could be affected (see SER 13 [BLM 2021h] for additional transportation and access impacts discussions). Impacts from radiological materials are provided in SER 6: Hazardous Materials and Solid Waste (BLM 2021d) and SER 16: Water Resources and Geochemistry (BLM 2022f). Reclamation following closure would provide for post-mining land uses that include wildlife and recreational use (BLM 2022g and 2022e, respectively). Most surface disturbance would be reclaimed. These post-mining land uses would be consistent with local and BLM land use plans and guidelines. The net effect of the Project on land use and realty would be negligible, short term, and localized.

Figure 3.4. Temporary Road Closures During Mine Operation



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Mitigation Measures

No mitigation measures are recommended for land use and realty.

Residual Effects

After completion of construction, mining, and reclamation activities associated with the Project, impacts on land use and realty would cease. This land would return to post-mining land uses consistent with local and BLM land use plans and guidelines. Permanent loss of 85 acres of land access would occur, associated with the open pit, which would not be reclaimed. These 85 acres would be permanently removed from land available for grazing, wild horse, and recreation land uses. Specific impacts on these resources associated with the Proposed Action and South Access Road Alternative are discussed in more detail in each respective SER (BLM 2021c, 2021k, 2022e).

3.9.2.3 South Access Road Alternative

Under the South Access Road Alternative, the overall Project would be the same as the Proposed Action, except the access road would be in a different location and would include an additional 38 acres of surface disturbance associated with power lines and access roads. This additional disturbance would create a temporary impact on grazing, wild horse, and recreation land uses, as described in the SERs for these resources (BLM 2021c, 2021k, 2022e). Direct impacts on land use and realty would, therefore, be greater under this alternative, but indirect impacts on land use and realty from the South Access Road Alternative would be the same as those of the Proposed Action.

3.9.2.4 Renewable Energy Alternative

Under the Renewable Energy Alternative, the overall Project would be the same as the Proposed Action, except for the addition of the solar facility, battery storage, and new 69-kV power line, and would include an additional 33 acres of permanent surface disturbance associated with the solar facility and power lines. This additional disturbance would create a permanent impact on grazing, wild horse, and recreation land uses, as described in the SERs for these resources (BLM 2021c, 2021k, 2022e). Direct impacts on land use and realty would, therefore, be greater under this alternative, but indirect impacts on land use and realty from the Renewable Energy Alternative would be the same as those of the Proposed Action.

3.9.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts on land use and realty would not occur. Existing land uses including other mining, grazing, and agriculture would continue as they are currently. Because the Project would not be approved under this alternative, no reclamation would occur including some minor areas of previous surface disturbance. Under the No Action Alternative, no new pipelines or roadway modifications would be required.

3.9.3 Cumulative Effects

The CESA for land use evaluated impacts within the Little Smoky Valley Hydrographic Basin (Northern Part) – Nevada Hydrographic Basin 155A (Basin 155A). The CESA encompasses 378,240 acres, which includes Eureka County and portions of Nye and White Pine Counties, and is a combination of BLM-administered, State, and private land. Most of the BLM-administered land in the CESA is managed under the Shoshone-Eureka RMP (BLM 1986a), with the remainder managed under the Ely RMP (BLM 2008). The CESA is the context for the range of potential cumulative effects resulting from the Proposed Action and alternatives.

3.9.3.1 Proposed Action

Approval of the Project would increase surface disturbance within the CESA by 806 acres in addition to surface disturbance associated with past and present actions and RFFAs (34,316 acres) for a total disturbance of 35,122 acres, which is approximately 9.3 percent of the CESA. Overall, this would be a small increment of the acreage of public lands in the Project vicinity and would have minimal effect on land uses displaced by past and present actions and RFFAs in the CESA. The cumulative unreclaimed surface disturbance that would remain after completion of the interrelated actions, including the Project, would be a small percentage of the total land area in the CESA and would have a negligible, long-term cumulative effect on land use.

3.9.3.2 South Access Road Alternative

Cumulative impacts on land use associated with the construction, operation, and reclamation of the South Access Road Alternative would be slightly greater than under the Proposed Action because this alternative would result in an additional 38 acres of surface disturbance. The additional acres would increase, but to a negligible extent, associated cumulative impacts on grazing, wild horse use, and recreation (BLM 2021c, 2021k, 2022e). Overall, the cumulative impacts associated with the South Access Road Alternative would be slightly greater than those associated with the Proposed Action; however, this small increase in disturbance would still only constitute a small increment of the public land in the CESA. Disturbance associated with this alternative would be reclaimed after the life of the Project, with the exception of the 85-acre unreclaimed pit. Cumulative effects on land uses as a result of the South Access Road Alternative would be negligible, long term, and cumulative.

3.9.3.3 Renewable Energy Alternative

Cumulative impacts on land use associated with the construction, operation, and reclamation of the Renewable Energy Alternative would be slightly greater than those of the Proposed Action because this alternative would result in an additional 33 acres of permanent surface disturbance. The additional acres would increase, but to a negligible extent, associated cumulative impacts on grazing, wild horse use, and recreation (BLM 2021c, 2021k, 2022e , respectively). Overall, the cumulative impacts associated with the Renewable Energy Alternative would be slightly greater than those associated with the Proposed Action; however, this small increase in disturbance would still only constitute a small increment of the public land in the CESA. The majority of disturbance associated with this alternative would be reclaimed after the life of the Project, with the exception of the 33 acres associated with the solar facility and battery storage area, the new 69-kV power line, and the 85-acre unreclaimed pit. Cumulative effects on land uses as a result of the Renewable Energy Alternative would be negligible, long term, and permanent for the solar facility and battery storage.

3.9.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed and no changes to the existing land uses would occur. Under the No Action Alternative, no impacts on lands and realty would result from the Project and, therefore, no contribution to cumulative impacts would occur.

3.10 NOISE

The area of analysis for Project-related noise consists of a 5-mile buffer around the Project area. This spatial extent is based on the rate at which noise levels decay over distance for the types of Project-related noise sources. This area of analysis includes the closest sensitive receptor, the Fish Creek Ranch residence, and the closest active Greater sage-grouse (*Centrocercus urophasianus*) lek, the Fenstermaker Wash lek, 3.8 miles west of the Project on the western side of the Fish Creek Range. The total area of analysis encompasses 144,114 acres. The Final SER 8: Noise (BLM 2022c) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.10.1 Affected Environment

The Project area is in a remote, rural area of Nevada. Terrain in the vicinity of the Project area is characterized as high-desert and rolling topography, with mountainous terrain to the west. Land uses nearest the Project area are predominantly livestock grazing and agricultural use. There is one residence within the area of analysis: the Fish Creek Ranch residence (referred to as R1), approximately 5 miles northeast of the Project area. In the Project area, traffic noise on the existing ranch roads and natural sounds, including wind, insects, and birds, are notable contributors to existing baseline noises.

Sound is mechanical energy transmitted by pressure waves through a medium, such as air. Sound is measured in units of decibels (dB). Within the usual range of environmental noise levels, loudness can be approximated by A-weighted sound levels. A-weighting refers to an adjustment technique that simulates human perception of sound. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. Therefore, sound tends to be expressed in units of dBA, and is reflected in this report.

The dB scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound. A 3 dBA change is considered a just-noticeable difference by humans, whereas a change of only 1 dBA in sound level cannot be perceived (Cowan 1994).

Many environmental noises vary over time, including variations over different times of day or from season to season. To describe the time-varying character of environmental noise, statistical noise descriptors were developed. L_{10} is the A-weighted sound level equaled or exceeded during only 10 percent of the measurement time. L_{10} provides a good measure of the maximum sound levels caused by intermittent or intrusive noise. L_{50} is the A-weighted sound level that is equaled or exceeded 50 percent of the measurement time period; it represents the median sound level. L_{90} is the A-weighted sound level that is exceeded 90 percent of the time, thus representing the quietest 10 percent of recorded sound levels. L_{90} commonly represents ambient or residual sound levels. Another statistical tool to measure noise levels is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A-weighted sound level containing the same total energy as a time varying signal over a given time period (usually 1 hour). Day-night average sound level (L_{dn}) values can be calculated based on 1-hour L_{eq} measurements. L_{dn} is the average equivalent sound over a 24-hour period, with a penalty added for noise during the nighttime hours of 10:00 p.m. to 7:00 a.m. During the nighttime period, 10 dB is added to reflect the impact of the noise.

Wildlife species occurring in and near the Project area are typical of species found in the Great Basin ecoregion. Special status species occurring in the Project area include game species and furbearers, protected bird species, and other non-game special status species. Individual Greater sage-grouse have been recorded by the NDOW using Fish Creek as a water source, although there are no leks in that area. The closest active lek to the Project area is the Fenstermaker Wash lek, approximately 3.8 miles west of the Project area.

Noise levels were monitored near the Greater sage-grouse lek, at R1, and in the Project area over a continuous, 14-day period from May 11 through June 11, 2019. The noise monitoring data collected in 2019 were conservatively corrected for instrumentation noise floor. Final noise levels were reported for daytime and nighttime for R1 and the Project area, and during Greater sage-grouse lekking hours (4:00 a.m. to 9:00 a.m.) and all hours (12:00 a.m. to 12:00 a.m.) for the location near the lek.

All sites exhibited typical daily patterns, with lower sound levels during evening and early morning hours and elevated levels during daytime hours. Median baseline noise levels (L_{50}) were higher than L_{90} levels at all locations monitored, meaning that continuous sounds, as reflected in L_{90}, were less common than intermittent sounds, as reflected by L_{50} or L_{10}. Particularly elevated intermittent sounds were recorded at the lek location between 4:00 a.m. and 9:00 a.m., thought to reflect the sounds of sage-grouse display. Traffic noise on the existing ranch roads and natural sounds, including wind, insects, and birds, are notable contributors to ambient noise throughout the area of analysis.

The mean baseline sound level at the Greater sage-grouse lek, using the L_{eq} metric, for all hours (corrected for noise floor), was 25.4 dBA. “Ambient” or residual noise levels, defined by the

American National Standards Institute as sound levels in the absence of anthropogenic influence, approximated (according to the American National Standards Institute) by L_{90}, averaged 10.24 dBA at all hours of the day and 12.5 dBA during lekking hours as calculated by Noise Protocol Clarification Calculation Method #2. Daytime noise levels near R1 averaged 42 L_{dn} during daytime hours and 34 L_{dn} during nighttime hours.

3.10.2 Environmental Effects

Noise impacts are commonly evaluated using two general criteria: the extent to which a project would exceed Federal, State, or local noise regulations and the estimated degree of disturbance to people or certain wildlife. Wildlife species and related issues addressed by this analysis were determined through consultation with the NDOW. Issues identified for noise impacts include:

- Noise levels that would exceed human health standards developed by the EPA (1972) and the Federal Highway Administration (23 CFR 772);
- Noise levels at sensitive human receptor sites in excess of 70 dBA maximum noise level; and
- Noise levels that would adversely affect wildlife behavior such that it negatively affects reproduction, nesting ability, or other behaviors essential for population preservation, particularly for golden eagles and Greater sage-grouse.

3.10.2.1 Effects Level Definitions

Effects on noise resources are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Noise levels below or only slightly above perceptible thresholds at sensitive land uses, and vibration and air blast levels at or below perceptible thresholds at sensitive or historic land uses.

Minor: Noise levels at sensitive land uses that would be at or below EPA nighttime residential guidelines throughout the day and night. Air blast levels that would be perceptible at sensitive land uses, but that would occur at a consistent time every day and would be sufficiently muffled that they would not startle most people in the vicinity of the Project.

Moderate: Noise levels at sensitive land uses that may occasionally exceed EPA daytime residential guidelines but would be at or below nighttime guidelines and day-night average guidelines. Air blast levels that would be perceptible at sensitive land uses, would occur at a consistent time every day, but would be sufficiently intense that they would startle most people in the vicinity of the Project.

Major: Noise levels at sensitive land uses that would exceed EPA daytime residential guidelines consistently, and/or exceed nighttime or day-night average guidelines. Air blast levels that would be sufficiently intense that they would commonly startle most people in the vicinity of the Project.

Duration

Temporary: Effects would occur during construction activities or during maintenance activities.

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last after active mining for the Project is completed.

Permanent: Effects on structures that would be permanent.

Context

Localized: Noise levels at or above statutory or EPA guidelines at noise-sensitive receptors within the 5-mile-radius area of analysis.

Regional: Noise and vibration impacts are limited to the local area of the Project; regional impacts are not applicable.

3.10.2.2 Proposed Action

The Project would include new surface disturbance and development of mining facilities. New noise sources would occur during Project construction, operations, and reclamation. The sources of noise are associated with pit operations, borrow and stockpile areas, the heap leach facility, the waste rock storage facility, haul roads, milling operations, and support facilities. Blasting would occur in the pit and at the Rhyolite Hill borrow area. Operations would also generate noise from traffic associated with mine personnel or materials transport.

Noise level changes from proposed operations were modeled using both onsite noise measurement data and file data collected for similar mining operations. Modeled noise sources were placed at proposed locations of the Project's primary noise-generating facilities as described above. Modeled noise levels would be greatest within the disturbance footprint and rapidly attenuate as sound moves outward from the Project area. Predicted noise levels within the Project area (as measured near the mine adits) were estimated up to 65 dBA L_{50}, resulting in changes compared to baseline levels of up to 50 dBA L_{50}. Noise levels would dissipate to less than 25 dBA L_{50} within 2 miles of the Project area boundary.

Direct and Indirect Effects

Human Health

Expected noise levels due to the Project would not exceed human health standards. During operations, blasting would be conducted to break up the rock for hauling and processing. Blasting would typically occur once per day at Project locations more than 5 miles from the nearest human residence. Blasting is not anticipated to occur during nighttime hours. The Project would implement measures as appropriate to reduce noise impacts during blasting and would meet required safety standards.

Other operational activities were modeled with respect to changes in noise levels at the nearest human residence. Predicted noise levels from the Project received by the nearest human receptor site were estimated at 22 dBA L_{dn}, which is less than baseline noise levels near the residence (42 L_{dn}) and less than human health standards (55 dBA L_{dn}). As a result, noise impacts on the nearest human residence during operations would be localized and negligible.

Greater Sage-grouse

Predicted noise levels nearest the Fenstermaker Wash lek would be 15 dBA L_{50} due to Project operations, which is less than current baseline noise levels (17–20.3 dBA L_{50}) and far below the Approved Resource Management Plan Amendment (ARMPA) guideline of a 10-dBA increase in noise levels. Baseline noise levels in general are highest during daytime hours; therefore, Project-related noise level changes near this lek would be lowest during daytime hours.

Following NDOW guidance on adding predicted median noise levels (L_{50}) to baseline noise levels exceeded 90 percent of the time in the environment and, thus, commonly used to represent ambient sound levels (L_{90}), the modeled increase in noise would be 4 dBA near the modeled lek, which is also below the ARMPA guideline of 10 dBA. Even though this approach is conservative because it is using baseline L_{90} rather than median or L_{eq} estimates (as human health standards do), Project-related noise level changes would be less than thresholds thought to affect sage-grouse lekking behavior. All mine activities, including exploration activities, would be limited to ensure noise levels do not exceed 10 decibels above ambient sound levels at least 0.25 mile from active and pending leks, from 2 hours before and after sunrise and sunset during the breeding season. Therefore, no impacts on Greater sage-grouse breeding behavior would occur due to noise from the Project.

The Conservation Credit System (CCS) is being used to quantify all Project impacts on Greater sage-grouse. The Proposed Action would generate 1,932 term debits and 0 permanent debits (numbers subject to change pending SETT review). It is anticipated, based on ongoing modeling, that indirect impacts on Greater sage-grouse would be localized, short term, and moderate.

Other Wildlife

As with many other types of disturbance, the intensity of response by wildlife to noise or human presence depends on the familiarity to the disturbance. The Project's noise sources are based on a 24-hour/7-day operating schedule. During construction and operation, increased noise levels would occur due to heavy equipment operation and increased vehicular and human presence along roads and land clearing areas Noise changes from the Project would be more or less constant over the duration of the Project.

The most common wildlife response to noise and human presence is avoidance. Avoidance would result in direct impacts such as displacement of wildlife from a larger area than the actual disturbance area. If a species could not leave an area, noise could be damaging or disturbing. Damaging noise would result in harming the direct health, reproduction, or survivorship of the individual. A disturbing noise would result in detectable changes in behavior or physiological stress. Human presence can also cause wildlife avoidance and changes in behaviors. Modeled noise levels during operations ranged from 34 to 38 dBA L_{50} near the three nearest golden eagle nests, which are about 1.5 miles away from the Project boundary and were all inactive in 2019 and 2020. Estimated L_{eq} from the Project would be 1 to 5 L_{eq} higher than the L_{50} estimates. Therefore, these modeled noise levels would not be expected to affect golden eagle behavior because the noise levels are below levels identified in other studies of noise impacts on golden eagle behavior and nesting (BLM 2005; Grubb et al. 2010).

Mitigation Measures

No mitigation measures are recommended for noise. An Enhanced Baseline Report (Saxelby Acoustics 2019) and SER (BLM 2022c) were developed for noise where key receptors were analyzed through modeling for potential impacts. Due to the distance of the Project from these receptors, noise levels were below levels that would require mitigation.

Residual Effects

Upon completion of construction, mining, and reclamation activities associated with the Project, noise emissions would cease and there would be no residual noise impacts from the Project.

3.10.2.3 South Access Road Alternative

Under the South Access Road Alternative, the change in location of the access road would not result in a change in the estimated noise levels produced during Project construction, operations, and reclamation under the Proposed Action. Using the CCS model, the South Access Road Alternative would generate 1,863 term debits and 0 permanent debits. There would be fewer impacts on Greater sage-grouse due to the increased distance between noise generated on the access road and the important mesic habitats at the Fish Creek Ranch. As a result, noise impacts on Greater sage-grouse under the South Access Road Alternative would be localized, short term, and minor.

3.10.2.4 Renewable Energy Alternative

The inverters and the transformer included in the solar field typically have some sound associated with them. Solar modules require the use of other electrical equipment, such as inverters and connection boxes, which emit some noise. The frequency of most inverters is 50–60 Hertz, the same as alternating current electricity in a typical home or commercial building, which is within the range audible to humans and well below the higher frequencies used to repel animals. Sound is generally not audible at the edge of the fenced boundary, but, if audible, the sound is similar in volume to background noises and dissipates to inaudible 50 to 150 feet from the edge of the boundary. Because this noise is anticipated to dissipate within 150 feet, the estimated noise levels would not be anticipated to affect Greater sage-grouse at the Fish Creek Ranch. Using the CCS model, the Renewable Energy Alternative would generate 1,961 term debits and 0 permanent debits. Noise impacts on Greater sage-grouse under this alternative would be localized, short term, and minor.

3.10.2.5 No Action Alternative

Under the No Action Alternative, noise levels within the affected environment would remain at current condition levels. Noise impacts under the No Action Alternative would not change from the existing condition.

3.10.3 Cumulative Effects

The CESA boundary for noise is the same as the area of analysis and encompasses an area within a 5-mile radius around the Project area. The total area of the CESA encompasses 144,114 acres. Within the CESA, past and present disturbance has resulted from mineral development and exploration projects (105 acres); utilities, infrastructure, and public purpose activities (17 acres); roads (410 acres); dispersed recreation; and livestock grazing. Wildland fires in the CESA may occur in the future, as would restoration projects, livestock grazing, and dispersed recreation. These activities would lead to similar disturbances as those described for past and present actions. No additional RFFAs were identified within the CESA.

3.10.3.1 Proposed Action

Past actions would have no impact on noise in the Project area because noise emissions terminate at the completion of a project or activity. Any potential cumulative noise impacts from present actions is included in the measured background levels for the Project, although few noise impacts were observed at the time of the field monitoring. Noise from RFFAs would not be expected to cause cumulative impacts with noise from the Project because noise tends to be localized to the area within 2 to 5 miles of an activity and there are no RFFAs close enough to the Project, and with sufficiently strong noise emissions, to create cumulative noise impacts at the identified noise-sensitive receptors. Therefore, there would be no cumulative impacts from the Proposed Action in combination with past and present actions and RFFAs.

3.10.3.2 South Access Road Alternative

Under the South Access Road Alternative, the change in location of the access road would not result in a change to the number or types of noise generated under the Proposed Action, and there would not be a change in past and present actions or RFFAs that could contribute to noise impacts. As a result, there would be no cumulative impacts from the South Access Road Alternative in combination with past and present actions and RFFAs.

3.10.3.3 Renewable Energy Alternative

Cumulative impacts under the Renewable Energy Alternative would be similar to those of the Proposed Action. However, because the solar field would remain a sustainable long-term power source servicing the remote electrical needs of southern Eureka County and northern Nye County, the noise associated with the inverters and transformer would continue as long as the solar field is being used. With the noise anticipated to dissipate within 50 to 150 feet, cumulative impacts would be negligible in combination with past and present actions and RFFAs.

3.10.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed. As a result, there would be no potential for the Project to contribute to cumulative impacts related to noise.

3.11 PALEONTOLOGY

Detailed affected environment and effects analysis are provided in SER 9: Paleontological Resources (BLM 2022d) and incorporated by reference here. A summary of the information is provided below.

3.11.1 Affected Environment

Paleontological resources are any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth's crust, that are of paleontological interest and that provide information about the history of life on Earth. Paleontological resources are considered non-renewable resources because the organisms they represent no longer exist, and such resources, if destroyed, cannot be replaced. Although all fossils offer scientific information, not all provide significant scientific information. Fossils are generally considered scientifically significant if they are unique, unusual, rare, or diagnostically or stratigraphically important, or in any other way add to the knowledge in a specific area of science. The types of fossils in a specific area can generally be predicted prior to field survey, based on the age of the rock formations and depositional environment. Most fossils are found in sedimentary deposits.

The Potential Fossil Yield Classification (PFYC) is a ranking of geologic units according to their relative abundance of significant paleontological resources and the sensitivity of these contained resources to adverse impacts. The BLM has assigned a PFYC ranking (1–5) to each geologic unit (formation, member, or other distinguishable unit) based on the taxonomic diversity and abundance of previously recorded scientifically significant paleontological resources associated with the unit and the potential for future discoveries, with a higher-class number indicating higher potential (BLM 2016b). In the Project area, there are geologic units identified as PFYC classes 1, 2, and 3.

No known scientifically significant paleontological localities are documented or were found in the Project area. Common invertebrate fossils have been documented during mineral exploration in the study area and mentioned in related studies (Desborough et al. 1979). Records indicate those fossils (conodonts) are a common species that were used to definitively determine the age of the Woodruff Formation.

The only documented significant paleontological resources have been recorded in the Newark Canyon Formation. The early Cretaceous Newark Canyon Formation, named by Nolan and others (1956), was originally mapped in the Project area (Hess and Johnson 1997); however, refined mapping of the Cockalorum Wash Quadrangle and Gibellini Hill (AVC 2011; Hose 1983; Desborough et al. 1987) concluded that the Newark Canyon Formation is not in the Project area. There are Newark Canyon exposures within the Fish Creek Range 4 miles south near Cockalorum Wash and these exposures continue intermittently to the southwest.

3.11.2 Environmental Effects

The primary issues related to paleontology are the removal, damage, or destruction of any significant paleontological resource, or loss of valuable scientific information by the disturbance of the stratigraphic context in which significant paleontological resources are found; a significant paleontological resource is defined as one that is considered to be of scientific interest.

3.11.2.1 Effects Level Definitions

Effects on paleontological resources are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

<u>Negligible:</u> Effects on paleontological resources would be small and not of scientific importance. Geologic strata yielding little information on paleontological potential would be encountered. Few or no fossils would likely be encountered by the Proposed Action.

<u>Minor:</u> Effects would occur on geologic strata considered to possibly yield information on paleontological potential, but effects on fossils would be minimized with Applicant-committed EPMs or BMPs. There would be a low probability of effects on fossils due to ground-disturbing activities. Few or no fossils would likely be encountered by the proposed activities.

<u>Moderate:</u> Effects on paleontological resources would occur, and may occur over a relatively large area. Effects on fossils due to ground-disturbing activities would be predicted. Several to many fossils may be affected.

<u>Major:</u> Effects on paleontological resources would occur and would substantially change the geologic characteristics over a large area. There is a high probability of intercepting fossils during ground-disturbing activity. Many fossils would likely be lost.

Duration

<u>Short-term:</u> Effects would last through the life of the Proposed Action.

<u>Long-term:</u> Effects would extend beyond the life of the Proposed Action (i.e., 37 years).

<u>Permanent:</u> Because paleontological resources (rock formations, fossil-bearing strata, and fossils) are essentially non-renewable, ground disturbance that directly affects paleontological resources would be permanent.

Context

<u>Localized:</u> Effects would be limited to the Project area.

<u>Regional:</u> Effects would extend beyond the Project area and would affect the overall paleontological resources in the region.

3.11.2.2 Proposed Action

Direct and Indirect Effects

The Proposed Action would result in an estimated total surface disturbance of 806 acres. The activities proposed would occur strictly within the Project area and not disturb areas with the potential for significant paleontological resources. Existing geologic information and condemnation drilling results indicate the placement of the proposed facilities would not disturb geologic formations with known significant paleontological resources.

Mitigation Measures

NVV has developed the following practices to prevent unnecessary and undue degradation during the life of the Project. These practices are derived from the general requirements established in the BLM's surface management regulations at 43 CFR 3809 and NDEP-BMRR mining reclamation regulations, as well as other water regulations and BLM guidance documents.

- All Project personnel would receive training that covers the importance of paleontological resources and that if any potential fossils are discovered during the life of the Project, the fossils should be left in place untouched, the BLM would be notified, and a qualified BLM-permitted paleontologist would be employed to assess the discovery and make further recommendations.
- In the event that any significant paleontological resource is discovered by the Project personnel or any person working on their behalf during the course of activities on Federal land, it would be immediately reported to the authorized officer by telephone, with written confirmation. The permit holder would suspend all operations in the immediate area of such discovery and protect it until an evaluation of the discovery can be made by the authorized officer. This evaluation would determine the significance of the discovery and what mitigation measures are necessary to allow activities to proceed. The permit holder is responsible for the cost of evaluation and mitigation. Operations may resume only upon written authorization to proceed from the authorized officer.

Residual Effects

No residual impacts on paleontological resources would occur as a result of the Project, as the geologic formations affected do not contain significant paleontological resources. No geologic units that contain significant paleontological resources would be affected by the Project.

3.11.2.3 South Access Road Alternative

Direct impacts on paleontological resources from the South Access Road Alternative would be the same as described for the Proposed Action, as no additional geologic formations with significant paleontological resources would be affected. The South Access Road Alternative would result in approximately 38 additional acres of surface disturbance as compared to the

Proposed Action. Total Project surface disturbance for this alternative would include 844 acres of public land.

3.11.2.4 Renewable Energy Alternative

Direct impacts on paleontological resources from the Renewable Energy Alternative would be the same as those of the Proposed Action, as no additional geologic formations with significant paleontological resources are noted in the area of the solar facility. The 33 acres of additional surface disturbance under the Renewable Energy Alternative would not be reclaimed at the end of the Project, as the solar facility and battery storage would be permanent; however, the solar facility would not result in removal of geologic materials or disturbance. The impacts from this alternative would be negligible, localized, and permanent for the solar facility but short term for the remainder of the alternative's actions.

3.11.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts on paleontological resources would not occur.

3.11.3 Cumulative Effects

The CESA for paleontological resources encompasses the Project area and Gibellini Mining District. The Gibellini Mining District is primarily contained within the Project area with small-scale historical to present exploration activities extending to the southern end of the Fish Creek Mountain Range.

3.11.3.1 Proposed Action

Under the Proposed Action, mineral production in the Gibellini Mining District historically has been limited to minor, sporadic manganese production. None of the historical mining activities have been within geologic formations known to contain significant paleontological resources.

Based on available information, past and present actions and RFFAs within the CESA for paleontology would result in an estimated 105 acres of past geologic disturbance and 85 acres of proposed disturbance associated with the open pit that would result in a permanent removal of geologic materials. Of the total acres of surface disturbance that would occur under the Proposed Action, the Project incrementally would increase the permanent alteration of topography (as unreclaimed open pit) in the CESA on approximately 85 acres. Within the increased acreage of disturbance, no geologic materials containing significant paleontological resources would be affected.

3.11.3.2 South Access Road Alternative

Cumulative impacts on paleontological resources from the South Access Road Alternative would be the same as those identified for the Proposed Action, except that the Project surface disturbance would increase by 38 acres under the South Access Road Alternative that would be reclaimed at the end of the Project and not result in permanent removal of geologic materials or disturbance. Within the increased acreage of disturbance, no geologic materials containing significant paleontological resources would be affected.

3.11.3.3 Renewable Energy Alternative

Cumulative impacts on paleontological resources from the Renewable Energy Alternative would be similar to those identified for the Proposed Action. The 33 acres of additional disturbance under the Renewable Energy Alternative would not be reclaimed at the end of the Project, as the solar facility and battery storage would be permanent; however, the solar facility would not result in removal of geologic materials or disturbance. This acreage represents less than a 1-percent increase in the total amount of surface disturbance in the CESA. Within the increased acreage of surface disturbance, no geologic materials containing significant paleontological resources would be affected.

3.11.3.4 No Action Alternative

Implementation of the No Action Alternative would not result in any change in cumulative impacts on paleontological resources.

3.12 RECREATION AND WILDERNESS RESOURCES

The area of analysis for recreation includes the Project area and Basin 155A, which consists of 365,977 acres of BLM-administered land and 5,500 acres of private land, for a total of 371,477 acres. The area of analysis for wilderness includes Basin 155A plus all Wilderness Inventory Units (WIUs) that overlap the Project area. The wilderness area of analysis totals 378,945 acres. The Final SER 10: Recreation and Wilderness (BLM 2022e) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.12.1 Affected Environment

The majority of the BLM-administered lands are without formally constructed trails for foot, horse, bike, or motorcycle travel. Historical and present recreational activities that have occurred and are occurring include primarily dispersed recreational activities. The area of analysis intersects with Game Management Units 145, 131, 163, and 164, managed by the NDOW, where big-game hunting for mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), and elk (*Cervus canadensis*) is permitted.

The BLM utilizes WIUs contained as a basis for determining the wilderness potential of the affected area and the effects the Project may have on the wilderness character of the area. WIUs are documented in the Shoshone-Eureka RMP, and a new inventory was completed in 2017. WIUs are based on a wilderness characteristics inventory, which is the process of determining the presence or absence of wilderness characteristics. The BLM must document existing conditions as opposed to potential future conditions. The wilderness characteristics inventory process does not mean that the BLM must conduct a completely new inventory and disregard the inventory information that it already has for a particular area. Rather, the BLM must ensure that its inventory is maintained. Additionally, the preparation and maintenance of the inventory shall not, of itself, change or prevent change of the management or use of public lands.

WIUs do not impart any special protections or management directives to the lands and are not to be misconstrued as designated Wilderness, BLM Wilderness Study Areas (WSAs), USFWS areas Proposed for Wilderness Designation, U.S. Forest Service WSAs or areas of Recommended Wilderness, or National Park Service areas Recommended or Proposed for Designation. Furthermore, WIUs are not National Park Service areas merely considered “Eligible for Wilderness Study,” and do not include Forest Service Roadless Areas unless they are also designated as “Recommended Wilderness” through a Forest Plan Revision. WIUs also do not apply to Wilderness areas designated by Congress or WSAs pending before Congress.

The BLM utilizes WIUs in this analysis in conformance with Section 201 of the FLPMA of 1976. For more information, please consult BLM Manual 6310, Conducting Wilderness Characteristics Inventory on BLM Lands.

There are no WSAs that overlap the Project area, but two WSAs occur within the area of analysis: the Park Range WSA and the Antelope Range WSA. The Park Range WSA includes 48,784 acres of land, of which approximately 18,113 acres overlap with Basin 155A. The entirety of the Park Range WSA is recommended as suitable for wilderness due to its pristine qualities, unique high meadows and volcanic spires, archaeological and historic values, lack of conflicting resource uses, and nearly unanimous public support. The Antelope Range WSA includes 78,602 acres that have been recommended as suitable for wilderness and 5,114 acres that have been recommended not suitable for wilderness. Of the WSA acreage that overlaps the area of analysis, 8,139 acres have been recommended as suitable for wilderness and 4,478 acres have been recommended not suitable for wilderness.

There are five WIUs identified by the Battle Mountain District Office that overlap the Project area. All of these WIUs were determined to have wilderness characteristics and were identified as Lands with Wilderness Characteristics during the 2017 inventory. Routes within the five WIUs were inventoried again in 2020. The wilderness route inventory indicated that 13 miles of the approximately 30 miles of routes inventoried exhibited signs of recent use, maintenance by blading, and drainage improvements.

3.12.2 Environmental Effects

Issues identified for recreation and wilderness resources include:

- Effects on existing access to recreational opportunities, such as such as hunting or motorized recreation (e.g., off-highway vehicle use or driving for pleasure);
- Changes to wilderness characteristics in the WIUs; and
- Impacts on WSAs, such as changes to existing visual or auditory characteristics.

3.12.2.1 Effects Level Definitions

Effects on recreation and wilderness resources are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Recreationists may notice changes to the recreational setting, but proposed activities would not affect their experience. The quality, quantity, and use of recreation areas would not be affected to a measurable or detectable level. There would be no conflicts with existing Federal, State, and local statutes or management plans.

Minor: Recreationists may notice changes in recreational setting and the availability of recreational opportunities, and these changes may affect the recreational experience. Effects on the quality, quantity, and use of recreation areas may be measurable and detectable, and displacement of recreationists to areas outside of the area of analysis likely would occur. However, overall access to recreational opportunities and the ability to find comparable recreation experiences would not be affected. Applicant-committed EPMs would effectively minimize impacts on recreational uses in the area.

Moderate: Changes to the recreational setting and availability of recreational opportunities would be measurable and detectable within the area of analysis. Effects on the quality, quantity, and use of recreation areas within the area of analysis would be apparent and would potentially restrict access to recreational areas, reduce recreational opportunities, and/or reduce the quality of recreational areas. Displacement of recreationists to areas outside of the area of analysis would occur, but it would not affect overall access to recreational opportunities outside of the area of analysis. Substantial Applicant-committed EPMs may be necessary to offset adverse impacts, but these measures likely would be successful.

Major: Changes to the recreational setting and availability of recreational opportunities would be measurable and detectable within and outside of the area of analysis. Effects on the quality, quantity, and use of recreation areas within and outside of the area of analysis would be apparent. There likely would be restricted access to recreational areas, reduced recreational opportunities, and/or reduced quality of recreational areas. Displacement of recreationists to areas outside of the area of analysis would occur and would affect quality and quantity of recreational opportunities outside of the area of analysis. Substantial Applicant-committed EPMs may be necessary to offset adverse impacts, and these measures would need to be monitored to determine their effectiveness.

Duration

Temporary: Effects would occur during construction activities or during maintenance activities.

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last after active mining for the Project is completed.

Permanent: Effects on recreation would be permanent.

Context

Localized: Proposed activities would affect recreational activities and recreationists within the area of analysis.

Regional: Proposed activities would affect recreational activities and recreationists outside of the area of analysis to the larger region.

3.12.2.2 Proposed Action

Direct and Indirect Effects

Recreational activities, such as hunting or dispersed camping, would still be permitted in most of the Project area, as long as these activities occur outside of the mining facilities and exclusionary fence. A short-term loss of recreation access and use of 1,912 acres of the 365,977 acres of public land in the area of analysis (approximately 0.3 percent) would occur from the Project. The Project would result in a permanent loss of 85 acres of land for recreation that is associated with the unreclaimed pit. Based on the route inventory of the WIUs, the Proposed Action would result in approximately 2.5 miles of public routes being closed; these routes occur within the area that would be fenced and closed to the public (refer to **Figure 3.4**). Overall, impacts on access of recreation resources are expected to be negligible, short term to permanent, and localized.

Outside of the active mining area, visual or noise-related disturbances from mining activity may affect dispersed recreational opportunities in the immediately adjacent areas, particularly if visible from a public road or trail. Impacts on the experience of recreation users would be minor, short term, and regional. Additional indirect impacts on recreation uses or resources could involve avoidance of the area surrounding the mining activity by game species. Impacts of the Proposed Action on hunting activities is expected to be minor, short term, and localized.

There would be no direct effects of the Project on WSAs in the area of analysis. The development of the mine could affect the wilderness characteristics of WIUs in areas within and adjacent to proposed surface disturbance. **Table 3.11** provides the estimated surface disturbance acreage within the affected WIUs. The construction and operation of the Project would reduce the high degree of naturalness, outstanding opportunities for solitude, and outstanding opportunities for primitive and unconfined recreation in the WUIs. Noise and dust from mine construction and operation activities or changes to the recreational setting may extend beyond the physical footprint of the mine to impact adjacent lands. Sights, sounds, and evidence of other people would become more frequent as the mine is developed. Within the area of analysis for WIUs, visitors would still have opportunities to isolate themselves from others but may be forced to visit other areas of the WIUs managed to maintain wilderness characteristics. Therefore, impacts to recreation use of the WIUs are expected to be moderate, short-term, and localized.

Table 3.11. Changes to WIU Acreage Due to the Project

Wilderness Inventory Unit (WIU)	Current Acreage	Loss of Acreage due to Surface Disturbance	Remaining Acreage	Acreage of WIUs Bisected by the Powerline	
				North of Powerline	South of Powerline
NV-060-254, Eight Mile Well	6,418	117	6,301	739	5,561
NV-060-255A, North Little Smokey Valley	8,037	4	8,033	4,121	3,912
NV-060-256, Lil' Smokey	7,842	9	7,832	5,109[1]	2,723
NV-060-262, Fish	16,838	7	16,831	NA	NA
NV-060-263, Fish Creek Valley	5,530	3	5,527	NA	NA

[1]An additional 89 acres comprising the northern most tip of this parcel would be isolated due to the construction of the northern access road.

Mining activities that reduce WIU acreage below 5,000 acres, cause changes to naturalness, opportunities for solitude, and supplemental values, may result in the removal of the Lands with Wilderness Characteristics designation. Loss of acreage due to surface disturbance would not directly result in the acreage of any WIU to be reduced below 5,000 acres. All losses due to surface disturbance would be reclaimed upon mine closure.

Surface disturbance associated with the utility corridor and water pipeline would bisect WIUs NV-060-254, NV-060-255A, and NV-060-256 into isolated parcels. The surface disturbance would be temporary to short-term because the water line and powerline would be buried. Additionally, 89 acres within parcel NV-060-256 would be isolated due to the construction of the northern access road. The acreage for bisected parcels of each WIU is provided in **Table 3.11**.

For each of the WIUs intersecting the Project area, one or both of the resulting portions after the powerline bisects the WIU would be less than 5,000 acres (**Table 3.11**). As a result of this acreage change, as well as the route inventory and photo documentation collected for the WIU analysis (SWCA 2020), portions of units NV-060-254, NV-060-255A, and NV-060-256 would be ineligible for Lands with Wilderness Characteristics status until final reclamation is completed. Therefore, impacts to the wilderness characteristics of WIUs are expected to be moderate, temporary to short-term, and regional.

Mitigation Measures

No mitigation measures are recommended for recreation and wilderness.

Residual Effects

Upon completion of construction, mining, and reclamation activities associated with Proposed Action or South Access Road Alternative, residual impacts would occur on the permanent loss of 85 acres of land available for recreation from the unreclaimed pit.

3.12.2.3 South Access Road Alternative

Under the South Access Road Alternative, the change in location of the access road would result in 38 additional acres of surface disturbance associated with power lines and access roads compared to the Proposed Action. Therefore, the South Access Road Alternative would result in the temporary to short-term loss of an additional 38 acres of land available for recreation. Acres of permanent loss and other short-term losses associated with the Project would be the same as under the Proposed Action. The South Access Road Alternative would increase public access in the area by providing 7 miles of new recreational road opportunity in the Project area. Impacts on the experience of recreation users would be minor, short term, and regional.

Impacts on wilderness characteristics would be similar to those of the Proposed Action. The access road would be constructed immediately adjacent to the power line and result in comparable impacts with regard to the bisection of WIUs NV-060-254, NV-060-255A, and NV-060-256. The additional loss of acreage would be slightly greater than under the Project in the southern halves of each bisected WIU; however, impacts of this additional loss of acreage would be comparable to those of the Proposed Action and would be moderate, temporary to short term, and regional.

3.12.2.4 Renewable Energy Alternative

Under the Renewable Energy Alternative, the construction and operation of the solar electric PV field and battery storage would result in an additional 33 acres of permanent surface disturbance compared to the Proposed Action. Therefore, the Renewable Energy Alternative would result in the long-term loss of recreation and use on an additional 33 acres when compared to the Proposed Action. The solar field would not be reclaimed at the end of the Project because it would remain as a long-term power source servicing the remote electrical needs of southern Eureka County and northern Nye County. While implementation of the Renewable Energy Alternative would result in greater impacts on dispersed recreation in the vicinity of the PV field and battery storage area, recreation activities would still be permitted in most of the Project area and impacts on the experience of recreation users would be minor, long term, and regional.

Impacts on wilderness characteristics would be the same as described under the Proposed Action. The PV field and battery storage area would be constructed immediately north of the process area and main office and outside the boundaries of WIUs. As a result, the Renewable Energy Alternative would result in the same surface disturbance and related impacts on WIUs described under the Proposed Action. Impacts of this loss of acreage on WIUs would be similar to those of the Proposed Action and would be moderate, temporary to long term, and regional.

3.12.2.5 No Action Alternative

Under the No Action Alternative, the landscape and existing roads and trails would not be altered. Therefore, the existing recreational activities, settings, and experiences would remain the same (no change from current conditions) and there would be no need to change current WIU determinations.

3.12.3 Cumulative Effects

The CESA for recreation and wilderness resources is the same as the area of analysis. The recreation CESA encompasses the 371,477 acres of Basin 155A, which consists of 365,977 acres of BLM-administered land and 5,500 acres of private land. The wilderness CESA encompasses Basin 155A plus the WIUs that overlap the Project area, for a total of 378,945 acres. The CESA encompasses the extent of potential effects from activities associated with the proposed Project and interrelated actions that may result in cumulative effects when combined with potential effects from past and present actions and RFFAs.

3.12.3.1 Proposed Action

Cumulative effects on recreation resources primarily would be directly related to loss of either access or availability of recreation resources within and adjacent to the Project area. Recreation that occurs in the CESA would continue to be available to recreation users, although use may be concentrated in other areas due to changes in access or availability due to the Project. Cumulative impacts on recreation combined with past and present actions and RFFAs would be negligible, short term to permanent, and localized.

Cumulative effects on wilderness resources primarily would be related to changes in the wilderness designations of the WIUs overlapping the Project area. Project-related surface disturbance would result in the loss of seven acres of WIU NV-060-262 and three acres of NV-060-263, which would not change their designations. WIUs NV-060-254, NV-060-255A, and NV-060-256 would be bisected leaving portions less than 5,000 acres in size. As a result of this acreage change, as well as the route inventory and photo documentation collected for the WIU analysis (SWCA 2020), portions of these units would be ineligible for Lands with Wilderness Characteristics status until final reclamation is completed.

3.12.3.2 South Access Road Alternative

Cumulative impacts on recreation and wilderness from the South Access Road Alternative would be similar to those of the Proposed Action. Under the South Access Road Alternative, the change in location of the access road would result in 38 additional acres of surface disturbance, but public access would increase due to the South Access Road Alternative. Cumulative impacts on recreation and wilderness combined with past and present actions and RFFAs would be negligible, short term to permanent, and localized.

3.12.3.3 Renewable Energy Alternative

Cumulative impacts under the Renewable Energy Alternative would be the same as described for the Proposed Action except an additional 33 acres of permanent surface disturbance associated with the PV field and battery storage area would contribute slightly greater cumulative impacts within the CESA. Cumulative effects on wilderness resources related to changes in the wilderness designations of the WIUs overlapping surface disturbance areas would be the same as described under the Proposed Action. Overall, the small increase in surface disturbance under the

Renewable Energy Alternative would constitute a small increment of the public land within the CESA. As a result, cumulative effects on recreation and wilderness as a result of the Renewable Energy Alternative would be negligible, long term, and cumulative.

3.12.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be constructed, and past and present actions and RFFAs would continue in the CESA. As a result, there would be no potential for the Project to contribute to cumulative impacts on recreation or wilderness resources. Recreation and wilderness resources would continue to be managed as they currently are. Cumulative impacts on recreation and wilderness resources under the No Action Alternative would be less than those under the Proposed Action and would be anticipated as negligible, long term, and regional.

3.13 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The area of analysis for social and economic values and environmental justice considerations includes Eureka and White Pine Counties and the Duckwater Shoshone Reservation. The rationale for the area of analysis is that the Project would be in Eureka County; however, the largest community in the vicinity is Ely, which is in White Pine County, approximately 85 miles east of the Project area. The Duckwater community is within Nye County, near the Project area, but few Project impacts would be expected in Nye County. It is assumed that the majority of the effects of the Project would be concentrated within Eureka and White Pine Counties, with the town of Eureka (and neighboring Diamond Valley) and city of Ely as the largest communities in the area of analysis. The Final SER 11: Socioeconomics and Environmental Justice (BLM 2021f) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.13.1 Affected Environment

3.13.1.1 Population, Income, and Employment

Nevada had been one of the country's fastest growing states in the last three decades of the twentieth century, but it was one of the hardest hit by the recession in the first decade of the twenty-first century. Between 2010 and 2019, almost the entire area of analysis saw small changes in populations, which was also observed in Nevada's population change of 0.02 percent. Ethnically and racially, counties in the area of analysis are notably less diverse than in the State as a whole. The counties do have higher percentages of Native Americans than the State does, particularly in Eureka and White Pine Counties and the Duckwater Shoshone Reservation in Nye County.

Median household incomes in Eureka and White Pine Counties and per-capita wages in Eureka County are higher than those of the State of Nevada. As a result, the percentage of people living below poverty threshold is slightly lower in Eureka and White Pine Counties compared to the State. Median household and per-capita incomes in the Duckwater Shoshone Reservation are lower than Nevada's averages, but the percentage of people living below poverty threshold is comparable. Average mining wages and salaries are the highest for any industry in Nevada; average natural resources and mining wages were reported at $101,850 in Eureka County and $85,210 in White Pine County.

The agriculture, forestry, fishing and hunting, and mining employment sector employs the highest percentage of employees, ranging from 22.0 percent (387 residents in the city of Ely) to 39.6 percent (381 residents in Eureka County). The unemployment rates throughout the area of analysis are lower than the State average of 6.9 percent. Unemployment rates have declined substantially from their recessionary highs.

3.13.1.2 Housing

The U.S. Census Bureau identified 5,850 housing units in the area of analysis: 4,525 units in White Pine County 1,174 units in Eureka County, and 151 units in the Duckwater Shoshone Reservation. Eureka and White Pine Counties contain higher vacancy rates (36 and 22 percent, respectively) than the State of Nevada (12.9 percent); however, the physical number of vacant housing units (424 and 996 units, respectively) is low. The vacancy rate in Duckwater Shoshone Reservation is lower than the State average, with 15 units vacant.

3.13.1.3 Livestock Grazing

As stated in Section 3.7.1, the Fish Creek Ranch Allotment consists of 4,815 AUMs (BLM 2020a). An AUM represents the quantity of forage necessary to sustain one cow-calf pair, one horse, or five sheep for 1 month. The 5-year average adjusted value of production per AUM is $59.53 (2019$).

3.13.1.4 Public Facilities and Services

The current tourist and recreational opportunities for the area of analysis includes swimming, shooting, fairgrounds, parks and other associated facilities, museums, shopping, golfing, hiking, hunting, camping, and fishing.

Municipal utilities provide water service to town residents in the city of Ely and the town of Eureka. Most rural residents obtain water from wells or springs. Wastewater treatment capacity is sufficient or better for each of the larger communities in the area of analysis. There are public landfill operations in both counties in the area of analysis. Generally speaking, current levels of law enforcement, fire protection, and ambulance services are adequate in the area of analysis.

Health care services in the area of analysis include the Eureka Medical Clinic in Eureka, the William Bee Ririe Hospital & Rural Health Clinic in Ely, and the Duckwater Shoshone Tribal Health Clinic in Duckwater. School districts are delineated along county lines, resulting in two school districts in the Project region: White Pine County School District and Eureka County School District. Across the 2015 to 2018 school years, White Pine County's high school graduation rates fell behind the Nevada State average and Eureka County's high school graduation rates consistently exceeded the Nevada State average. The Duckwater Shoshone

Tribe operates an elementary and middle school in a one-room schoolhouse on the reservation. Most students in grades 8 to 12 attend Eureka County High School, 47 miles north of Duckwater.

3.13.1.5 Public Finance and Fiscal Conditions

Fiscal data available for government in the area of analysis included Eureka County, White Pine County, and the city of Ely. Within the area of analysis, only Eureka County posted excess revenue for Fiscal Year 2019.

3.13.1.6 Nonmarket values

Many of the sections above address *market* values. These market values of BLM public lands and Federal mineral estate are relatively easy to understand and assess. Commodities produced through use of BLM public lands (e.g., oil and gas, other minerals, livestock, timber, electricity from renewable energy projects) have a price in the marketplace that can be easily determined. Economic methods are readily available for measuring the flow of income and employment resulting from the production of commodities.

The term *nonmarket values* refers to the benefits individuals attribute to experiences of the environment or uses of natural and cultural resources that do not involve market transactions and therefore lack prices. Examples include the benefits received from wildlife viewing, hiking in a wilderness, or hunting for recreation. Nonmarket values are often overlooked in impact analyses as a result of being difficult to assess or quantify. Nevertheless, such values are important to consider because they help tell the entire economic story. Estimates of nonmarket values supplement estimates of income generated from commodity uses to provide a more complete picture of the economic implications of proposed resource management decisions.

Despite the difficulties associated with measurement of these values, it is well accepted that the natural and cultural resources of an area, and the open space the area may provide, can have a dollar value. For example, it is common for real estate investors to pay more for view lots or for property adjacent to open space, or for people to make financial donations to help protect old-growth forests, endangered species, or other sensitive resources. There are many types of nonmarket values, including the economic benefits to local communities from the amenity values provided by open space and scenic landscapes; the economic benefits to individuals such as the unpriced value recreationists experience; and ecosystem service values, which refers to the ways that healthy ecosystems support, enable, or protect human activity.

In examining nonmarket values, economists often distinguish between "use values" and "non-use values." *Use value* refers to the benefits an individual derives from some direct experience or activity, such as climbing a spectacular peak, hunting, or wildlife viewing. In contrast, *non-use value* refers to the utility or psychological benefit some people derive from the existence of some environmental condition that may never be directly experienced: an unspoiled Grand Canyon or the continued presence of an endangered species.

While nonmarket values are discussed here, this section is not inclusive of all nonmarket values associated with BLM- and U.S. Forest Service–administered lands. For instance, Sections 3.4, 3.5, 3.14, 3.16, 3.17, 3.18, 3.19, and 3.21 focus on resources (e.g., water, wildlife, vegetation, wetlands, cultural resources, visual resources). Relevant resource sections reveal important nonmarket values of those resources even though those sections do not use the language of nonmarket values used by economists generally.

Use Values

Economists measure nonmarket use values by estimating the "consumer surplus" associated with these activities, which is defined as the maximum dollar amount, above any actual payments made, that a consumer would be willing to pay to enjoy a good or service. For instance, hikers pay a market price for gasoline used to reach a trail but pay nothing to use the trail. Any amount that a recreationist would be willing to pay to use this otherwise free resource represents the nonmarket consumer surplus value of that resource to that consumer. There are many techniques for measuring this nonmarket use value. One common way is to collect data on variations in what recreationists do pay (e.g., gasoline, hotels, restaurants, entry fees, guides or outfitters); economists then use quantitative techniques to impute the additional willingness to pay that constitutes consumer surplus.

As stated in Section 3.12 (Recreation and Wilderness Resources), big-game hunting for mule deer, pronghorn, and elk is permitted in the area of analysis. Regarding potential wilderness recreation, there are no WSAs that overlap the Project area, but two WSAs occur within the area of analysis: the Park Range WSA and the Antelope Range WSA.

Non-Use Values

With respect to non-use values, economists differentiate various types, including option values and existence values. *Option value* represents the benefits from having natural or cultural resources available for future use, while *existence value* reflects the benefits derived from knowing these resources simply exist. Evidence for the existence of these non-use values is ample. Local, State, and national taxpayers support a large variety of conservation and protection programs (e.g., National Park Service, state parks, local parks and parkways, open space initiatives) through their tax dollars—programs that are very popular but support many resources that many taxpayers will never visit. While this generalized evidence of non-use values is clear, estimating non-use values for specific resources is difficult and often controversial. BLM guidance recommends that use values be emphasized rather than non-use values.

One resource with potential nonmarket value that could be affected by the Proposed Action is wild horse and burro populations. BLM planning efforts in other locales potentially affecting these populations have elicited considerable public interest. Relative to adoption values or use values, estimating non-use values for any species under any circumstances is both difficult and controversial. Non-use values are estimated by stated preference models, which are difficult to master, expensive to administer, and often attacked. A study would need to establish not just an estimate of non-use value, but also the size of the population holding such values. To date, no studies have been published focusing specifically on either use or non-use values related to wild horses and burros (Jakus 2018). As stated in Section 3.20 (Wild Horses and Burros), the current estimated Fish Creek HMA population is approximately 120 wild horses.

3.13.1.7 Environmental Justice

Seven block groups within the area of analysis and the Duckwater Shoshone Reservation were identified as containing low-income and/or Native American environmental justice communities.

There are concentrated populations of Native Americans living within one or more of the block groups included in the analysis. The Native American population for the State of Nevada as a whole is 1.2 percent. The population percentages of Native American environmental justice communities would be considered “meaningfully greater” if it is more than or equal to 10 percentage points higher than the State average.

Based on the environmental justice analysis, low-income environmental justice populations are present. The percentage of the population classified as low income in most of the block groups analyzed is equal to or more than 10 percentage points higher than that of the State of Nevada.

3.13.2 Environmental Effects

3.13.2.1 Effects Level Definitions

Effects on socioeconomics and environmental justice are discussed in terms of intensity, duration, and context, based on the following definitions.

Socioeconomics

Intensity

Negligible: There would be a very small impact on the local and/or regional economy, population, government revenues and/or expenditures, and public services and infrastructure demands. The consequences of the action would have little to no measurable impact on the social or economic environment.

Minor: There would be a small but noticeable impact on the local economy, population, government revenues and/or expenditures, and public services and infrastructure demands, but there would be minimal to no impact on the regional socioeconomic environment.

Moderate: There would be a measurable impact on the local and/or regional economy, population, government revenues and/or expenditures, and public services and infrastructure demands. Adverse and beneficial impacts would not prove significant enough to result in long-term impacts on the socioeconomic environment.

Major: There would be a substantial impact on the local and/or regional economy, population, government revenues and/or expenditures, and public services and infrastructure demands.

Effects would reverberate throughout the socioeconomic environment, significantly altering existing conditions in beneficial or adverse ways.

Duration

Temporary: Effects would occur during construction activities or during occasional maintenance activities in the operational period.

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last after active mining for the Project is completed.

Context

Localized: Effects would occur at a locally focused scale, including Eureka and southern Eureka County.

Regional: Effects would occur across a broader area, including all of Eureka County, or more.

Environmental Justice

Intensity

Negligible: There would be no identifiable environmental, health, or socioeconomic impacts of the Project or alternatives that would affect minority or low-income communities disproportionately relative to impacts on the total population of the area of analysis.

Minor: Environmental, health, or socioeconomic impacts on minority or low-income communities would occur, but impacts would be localized with minimal identifiable differences between impacts on minority or low-income populations compared to impacts on the population at large.

Moderate: Environmental, health, or socioeconomic impacts on minority or low-income groups would occur, would be readily apparent, and would be measurable, but localized with moderate consequence. The Project would noticeably affect minority and low-income communities more than the total population of the area of analysis.

Major: Environmental, health, or socioeconomic impacts would be predominantly borne by minority or low-income communities, and the population at large of the area of analysis would not experience the impacts to a reasonably proportionate degree.

Duration

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last beyond the duration of the Project.

Context

Localized: Effects would occur within the area of analysis with primary emphasis on southern Eureka County and the Eureka community as represented by the block groups in the analysis.

Regional: Effects would occur across all of Eureka County.

3.13.2.2 Proposed Action

Direct and Indirect Effects

Employment

Under the Proposed Action, 120 employees would be needed during the construction phase of 1.5 years, 113 employees would be needed during the operation phase of 7 years, four employees would be needed during the reclamation phase of 4 years, and one employee would be needed during the post-closure monitoring period of 30 years. NVV would prioritize hiring staff from towns in the Project region. Estimated increases in population from the Proposed Action represent about a 1-percent increase in the population area of analysis. Overall, population changes in the area of analysis would be minor, short term, and regional.

Construction activities would require employment of approximately 120, primarily contractor, workers for an estimated 18 months at the outset of Project development. The anticipated employment impact during construction would represent approximately 2.6 percent of total employment in the two-county area and an employment increase of approximately 9.8 percent in the natural resources and mining sector in the area of analysis over this timeframe.

The Project would add 113 workers during the operation phase. Approximately 68 of the 113 workers required for Project operations would be non-local hires. This would be considered a minor, long-term effect in the context of the local area of analysis and minor for the regional economy that would be supplying the additional workers. The direct employment impact during operations would represent 2.4 percent of total employment in the two-county area and an employment increase of approximately 9.2 percent in the natural resources and mining sector in the area of analysis. Indirect employment would also increase from the proposed Project. In total, the longer employment period associated with operations would generate direct, indirect, and induced employment estimated at approximately 198 jobs.

During the construction and operation phases, the Proposed Action would increase labor income and economic output in the area of analysis. It is estimated that NVV would spend $116 million during construction and between $44 million and $45 million during operations. Based on the Impact Analysis for Planning (IMPLAN) economic modeling for this mining industry in Nevada, the Proposed Action’s total construction economic output would be $155.2 million, and the total operations economic output would be between $58.9 million and $60.3 million. The total economic impact of employment during the reclamation phase (four employees) and post-closure phase (one employee) would have beneficial impacts on labor income, but the small number of employees required during these phases would not appreciably change economic conditions in the area of analysis.

Housing

The estimated number of total households from new, non-local workers is expected to be 91 households during construction and 86 households during operations. Estimated rental units comprise 6.9 and 11.1 percent of all vacancy rates in the two-county area of analysis, respectively. Assuming approximately 91 temporary housing units would be needed, for approximately 110 vacant rental units in White Pine County and 29 vacant rental units in Eureka County, this level of demand could result in significant, short-term competition for temporary housing. There are four hotels in the town of Eureka and more than 10 hotels in the city of Ely. The combined room availability of these hotels would be expected to accommodate some construction workers. It is possible that use of hotels by workers may affect available lodging for tourists in the area. Additionally, as stated in Section 2.1.2.1, NVV would prioritize hiring staff from towns in the Project region.

Development of the Project would generate demand for an estimated maximum of 86 new households during operations. Based on the most current census data, there were approximately 1,420 vacant housing units in the area of analysis, which indicates there would be more than enough housing available to accommodate Project-related demand. Even if household demand is concentrated entirely in the towns of Ely and Eureka, supply should accommodate demand; these areas show 147 and 364 vacant housing units available, respectively. NVV has agreed to purchase existing lots in the subdivision built by Eureka County and plans to build homes on these lots to minimize housing impacts. Demand for housing from the Proposed Action may also increase housing prices and rent within the area of analysis, which may affect the ability of those living within the area of analysis of finding affordable housing. Overall impacts on housing would be moderate, short term, and regional.

Livestock Grazing

As stated in Section 3.7.2.2, Project-related disturbance and exclusion would result in temporary loss of 15.1 AUMs and permanent loss of 1.4 AUMs after the life of the Project. The permanent loss of 1.4 AUMs would result in a loss of $83.35 (1.4 AUMs x $59.53) of direct economic value annually in perpetuity. The temporary loss of 15.1 AUMs would result in a loss of $898.94 (15.1 AUMs x $59.53) of direct economic value annually for the duration of the temporary disturbance.

Public Facilities and Services

The impacts on tourist, recreational, and cultural spending would be related to the potential exclusion of hunting opportunities within the fence line of the Project, the closure of some public roads, and the preclusion of public access within this area. The Project area was not identified as being a driver of tourist, recreational, or cultural attraction in the area of analysis; therefore, it is unlikely that the tourist, recreational, and cultural spending and activity in the area of analysis would be significantly affected by the Project.

Public facilities are either adequate or NVV would work closely with Eureka County to participate in the necessary infrastructure upgrades (e.g., roads, emergency services) for mine development. Additionally, NVV would cooperatively develop a road maintenance agreement with Eureka County for the life of mine access from U.S. Highway 50 to the Project area along Fish Creek Ranch Road. NVV would work cooperatively with Eureka County to minimize disruptions to local citizens and the additional burdens placed on community services to accommodate the growth in populations from the Project. Therefore, impacts on public facilities and services would be minimal. Given these considerations, the overall impacts on public services would be minor, short term, and regional.

Access to healthcare facilities is somewhat limited in the area of analysis, so any increase in demand on healthcare services would be a potential strain on the existing facilities. Because most of the workers needed during construction would not be anticipated to permanently relocate with their families to the area of analysis, school enrollment during the construction phase would likely not increase substantially.

Public Finance and Fiscal Conditions

The Project would generate public revenues from sales and use taxes, net proceeds of mines taxes, ad valorem property taxes, and business taxes. Sales taxes would be collected in the jurisdiction where purchases were made and would be distributed among the State, the school district(s), the county, and the statewide counties' revenue sharing pool. School districts are significant beneficiaries of sales and use taxes, receiving approximately 38 percent of the proceeds. Eureka County's share of sales taxes is relatively modest at approximately 7 percent of the revenue.

Net proceeds taxes and ad valorem property taxes would be a more substantial contributor to Eureka County, which would be the primary beneficiary of these revenues. Net proceeds of mines are categorized and taxed similar to real property. NVV estimates property taxes from the Project would be approximately $2 million over the life of the mine. Net proceed taxes from the Project are estimated at $26.7 million over the life of the mine, although the payments may vary from year to year. The combination of property taxes and net proceed taxes from the Project would have a major beneficial impact on Eureka County revenues. In addition to the public revenues derived from the Project itself, salaries and benefits to workers would contribute to the local economy and local public revenues.

NVV expects to fund potential expenses to the local government as a result of the Proposed Action such as road maintenance, first responder training, and purchase of lots in a Eureka County subdivision to support property taxes. NVV and Eureka County have a road maintenance agreement that covers from the intersection of Highway 50 and County Road M-103 (Duckwater Road) to the Project site. NVV will develop and provide training to local first responders (Eureka and White Pine Counties, Highway Patrol) on responding to any unique hazardous material incidents (spills, fire, transportation) that could occur at the site. NVV has agreed to purchase existing lots in the subdivision built by Eureka County and plans to build homes on these lots, which would be subject to property taxes. Lastly, NVV has been an active participant in the Eureka County Economic Development group and donates to programs focused on employee participation in the community.

In summary, construction of the mine would have a short-term, localized, moderate, beneficial fiscal impact on the public entities in the area of analysis, and operation and maintenance of the mine would have a short-term, beneficial fiscal impact on those jurisdictions. These impacts would effectively cease when the Project is completed and reclaimed.

Nonmarket Values

Regarding use values, as stated in Section 3.12 (Recreation and Wilderness Resources), recreational activities, such as hunting or dispersed camping, would still be permitted in most of the Project area, as long as these activities occur outside of the mining facilities and exclusionary fence. A short-term loss of recreation access and use of 1,912 acres of the 365,977 acres of public land in the area of analysis (approximately 0.3 percent) would occur from the Project. The Project would result in a permanent loss of 85 acres of land for recreation that is associated with the unreclaimed pit. Based on the route inventory of the WIUs, the Proposed Action would result in approximately 2.5 miles of public routes being closed; these routes occur within the area that would be fenced and closed to the public (refer to **Figure 3.5**). Overall, impacts on access of recreation resources are expected to be negligible, short term to permanent, and localized. Impacts of the Proposed Action on hunting activities are expected to be minor, short term, and localized. The development of the mine could affect the wilderness characteristics of WIUs in areas within and adjacent to the Project area. Impacts on the wilderness characteristics of WIUs are expected to be moderate, temporary to short term, and regional.

Regarding non-use values, as stated in Section 3.20 (Wild Horses and Burros), the Project would result in 806 acres of surface disturbance and the facility fencing would exclude wild horse access from an additional 413 acres of undisturbed lands on the 252,772-acre Fish Creek HMA, which is 0.48 percent of the HMA. The Project area does not represent important or highly used areas by wild horses; rather, wild horse use in the Project Area is infrequent and incidental. Therefore, direct impacts on wild horses from use area disturbance are anticipated to be minor, long term (permanent for the 85 acres associated with the unreclaimed pit), and localized. Effects on wild horses from human presence and noise could cause them to reduce or eliminate use of a larger land area than the Project area, thereby increasing use of other portions of the Fish Creek HMA over the life of the Project. The Project area is not an important foraging area for wild horses and there are no water sources nearby. Therefore, impacts on wild horses are anticipated to be minor, long term, and localized.

Environmental Justice

Environmental effects that may occur at a greater distance from the Project area, such as air quality or traffic effects, would affect the analysis area’s population essentially equally without regard to race, ethnicity, or income level. Therefore, EPMs that protect air quality and promote sustainability to populations in the area of analysis would avoid impacts on the population in the area of analysis equally without regard to race, ethnicity, or income level.

Seven block groups and the Duckwater Shoshone Reservation were identified as having potential environmental justice communities within the area of analysis. The Project area is within one of the block groups (Block Group 320110001002). This block group contains a low-income environmental justice community but does not contain a Native American environmental justice community. Although the Proposed Action falls within a low-income environmental justice community, no disproportionate impacts on this community would occur because Project impacts include measures to minimize significant impacts where feasible. Also, the portion of County Road M-103 (Duckwater Road) that would be used to access the Project area does not bisect the Duckwater Shoshone Reservation. The transport of uranium secondary yellowcake product once every 2 months would not go through the reservation; it would go north on County Road M-103 (Duckwater Road) away from the reservation. Additionally, the low-income population could benefit from the Project construction and operations increase in job opportunities and regional economic output. The remaining identified areas contain either a Native American environmental justice community or a low-income environmental justice community, or both. All would experience similar indirect impacts from the Project, and none of these impacts would be disproportionately high or directed toward any one of these block groups. Additionally, any low-income populations in these block groups could benefit from Project construction and operations in job opportunities and regional economic output.

Mitigation Measures

No mitigation measures are recommended for socioeconomics or environmental justice.

Residual Effects

Most of the social and economic impacts from the Proposed Action would be short term in nature, largely ending after the Project is completed. There would be public and private investment from revenues generated by the Project in homes and businesses that would have economic life beyond the life of the Project. These impacts would be beneficial but would be minor to negligible in the long term.

3.13.2.3 South Access Road Alternative

Under the South Access Road Alternative, Project employment and anticipated expenditures would be the same as under the Proposed Action because the only difference between the Proposed Action and this alternative is the location of the primary access road. All other components are the same for the Proposed Action and this alternative. As a result, no additional or different socioeconomic or environmental justice issues would occur under this alternative that were not already described for the Proposed Action.

3.13.2.4 Renewable Energy Alternative

Under the Renewable Energy Alternative, the installation of up to 6 megawatts of solar electric PV capacity would allow the site to become a net generation facility with battery storage to perform peak smoothing and daily load management and provide a sustainable long-term power source servicing the remote electrical needs of southern Eureka County and northern Nye County.

Under the Renewable Energy Alternative, an average of 15 laborers would be reallocated from the concurrent mine construction under the Proposed Action. As the majority of the solar electric

PV construction would occur during the cold season (November to March), no delay from the reallocation of workers is expected; therefore, total Project employment would be the same as under the Proposed Action. This alternative would require additional capital expenditures estimated to total $12 million as compared to the Proposed Action. Employing the derived IMPLAN multiplier of 1.34 to the $12 million expenditure yields an expected $16.1 million in economic output in addition to the Proposed Action. The generated solar power is predicted to provide the Project with 60 percent savings in energy cost over the Project's expected life.

This alternative would result in approximately 33 additional acres of permanent surface disturbance compared to the Proposed Action. Total surface disturbance for the Renewable Energy Alternative would include 839 acres of public land. This additional disturbance would create a permanent impact on grazing and recreation land uses, as described in the SERs for these resources. Pertaining to grazing impacts, the surface disturbance under the Renewable Energy Alternative would result in approximately 15.6 AUMs temporarily lost throughout the duration of the Project, a loss of $928.67 of direct economic value annually for the duration of the temporary disturbance. Surface disturbances to the pit and solar field would equate to approximately 1.9 AUMs permanently lost yielding a loss of $113.11 of direct economic value annually in perpetuity.

Aside from the increased capital expenditure and increased temporary and permanent disturbance acreage, the effects under this alternative would be comparable to those of the Proposed Action.

3.13.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be constructed, and potential impacts on demographics, employment, and economics associated with the Project would not occur.

3.13.3 Cumulative Effects

The CESA boundary is the same as the area of analysis for direct and indirect impacts. The total area of the CESA encompasses 8,369,280 acres.

All data described in Section 3.13.1 on socioeconomic conditions, fiscal conditions, public services, and utilities apply to the CESA analysis. The socioeconomic effect of past and present actions for the Gibellini Mine are reflected in Section 3.13.2. Therefore, any cumulative effects with the assessed action alternatives are reflected in the discussion of environmental consequences.

Mineral exploration and development, sand and gravel operations, and oil and gas exploration and development provide direct wages to the economy. These industries also provide for a portion of the CESA tax base, both in direct payments to governments and in property and sales taxes. Similar economic opportunities exist at the other resource development disturbances in the CESA. Resource development within the CESA also has a direct impact on the economic and social conditions within the area of analysis.

The main drivers of socioeconomic impacts associated with the Proposed Action and alternatives is related to increased employment, local expenditures, and production. RFFAs that would have a cumulative effect on local employment, expenditures, and production include mining operations, exploration activities; grazing and agriculture; oil, gas, and geothermal leasing; and utility and infrastructure development. Mining-related employment in at least portions of the CESA is projected to decline through 2025 based on local employment projections for several major mines. The development of the Proposed Action and other proposed projects in the CESA would be expected to offset the projected decline in mining-related employment.

Other disturbances, such as wildland fires, rangeland management, and recreation/tourism, also would be expected to contribute to the local economy. These disturbances would continue to have an economic impact on the CESA, continuing local employment and wage growth. Wildland fires in the CESA may occur in the future, as would restoration projects, livestock grazing, and dispersed recreation. These activities would lead to similar disturbances as those described for past and present actions.

3.13.3.1 Proposed Action

The Proposed Action, in addition to the past and present actions and RFFAs, would result in cumulative social values and economics of the CESA. Under the Proposed Action, employment opportunities would increase, and the employment base effects would be beneficial with in the CESA through direct wage earnings, direct tax expenditures (e.g., industrial tax, sales and property tax), and indirect and induced industrial support spending (e.g., construction support, retail, food service). Resource development is a contributor to the CESA’s economy.

RFFAs within the CESA could increase competition for workers and result in greater population growth. The economic impacts of the Project, in combination with other future projects, are expected to be mostly beneficial to the CESA. Cumulative housing impacts from all present and RFFA mining projects in the CESA are anticipated to be moderate. As mentioned in Section 3.13.1.2 (Housing), overall impacts of the Proposed Action on housing would be moderate, short term, and regional. This compounds with RFFAs in the CESA. Local housing and education services demands would increase along with demands for public services such as health care, emergency, and law enforcement services. The incremental increase in social and economic effects primarily would be positive in the context of the economies of the two local counties. Overall, it is anticipated that minor cumulative social or economic impacts from population growth would occur as a result of the Proposed Action.

3.13.3.2 South Access Road Alternative

Under the South Access Road Alternative, the change in location of the access road would not result in a change to cumulative social or economic impacts in the CESA. As a result, the cumulative impacts from the Project under the South Access Road Alternative in combination with past and present actions and RFFAs would be the same as those of the Proposed Action.

3.13.3.3 Renewable Energy Alternative

Under the Renewable Energy Alternative, the construction of the solar field would result in 33 additional acres of surface disturbance compared to the Proposed Action. The reduction of rangeland available for livestock grazing would result in the short-term loss of approximately 15.6 AUMs during the duration of the Project (a loss of $928.67 annually) and long-term loss of 1.9 AUMs, estimated to be a loss of $113.11 of direct economic value annually in perpetuity. Aside from the increased surface disturbance acreage, the cumulative effects in the CESA under this alternative would be comparable to those of the Proposed Action. Therefore, cumulative social or economic impacts as a result of the Renewable Energy Alternative would be minor, long term, and regional.

3.13.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed. As a result, there would be no potential for the Project to contribute to cumulative impacts related to social or economic values.

3.14 SOIL RESOURCES

The Final SER 12: Soil Resources (BLM 2021g) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.14.1 Affected Environment

The Project is in the southeastern portion of Eureka County, Nevada, at the southern end of the Fish Creek Range. The utility corridor and portions of the Project area extend into Fish Creek Valley, to the east of Fish Creek Range. Little Smoky Valley is to the east and south of the Project area and Antelope Valley is west of the Project area.

The area of analysis for Project-related soil impacts encompasses the Project area. This area of analysis captures the area in which construction, operation, and reclamation activities would occur, including transportation and transmission line routes.

3.14.2 Environmental Effects

The primary issues associated with soil resources include the loss of soil productivity or productive post-mining land uses, and the physical and chemical stability of the reclaimed landscape and Project components.

3.14.2.1 Effects Level Definitions

Effects on soil resources are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

<u>Negligible:</u> Effects on soils would be so slight as to not be measurable.

Minor: Effects on soils may occur and would be detectable, but small and of little consequence to soil quality and productivity. Effects would occur within the area of analysis. Effects would be minimized with implementation of Applicant-committed EPMs, BMPs, and reclamation of the Project.

Moderate: Effects on soils would occur and would be measurable and would occur over a larger area. Effects on soil quality and productivity may occur. However, effects likely would still occur within the area of analysis. Substantial Applicant-committed EPMs and BMPs may be necessary, but these measures would most likely be effective.

Major: Effects on soils would occur both within and outside of the area of analysis and would be measurable and apparent. Effects on soil quality and productivity likely would occur within and outside of the area of analysis. Substantial Applicant-committed EPMs and BMPs may be necessary, and these measures would need to be monitored to determine their effectiveness.

Duration

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last after active mining until reclamation is complete.

Permanent: Effects on soil quality and productivity would be permanent.

Context

Localized: Affecting a single site or area of analysis.

Regional: Affecting an area beyond the area of analysis.

3.14.2.2 Proposed Action

Direct and Indirect Effects

Direct effects would include surface disturbance of 806 acres, with 2 acres of existing surface disturbance. Approximately 46 acres would be disturbed by exploration activities to support the Project. However, the exact location of exploration activity is not known at this time. Approximately 31 acres of surface disturbance would be associated with the construction of linear utilities (water pipeline and power lines) and considered short term. Approximately 85 acres of permanent disturbance would result from the construction of the unreclaimed open pit, resulting in moderate, permanent, and localized effects. Soils and suitable growth media would still be salvaged from permanent disturbance areas and utilized for reclamation. The Proposed Action would potentially affect soils by modifying their biological, chemical, or physical properties.

Direct effects on soil quality associated with soil handling and storage would be minor, short term, and localized for linear-type disturbances associated with the water pipelines and power lines. During these disturbances, soils would be side-cast bermed and not require transport and long-term stockpile storage, allowing for immediate reclamation following initial Project construction. Effects on soil quality would be moderate, long term, and localized for all other disturbances in the Project area.

Compaction can occur anytime soils are subjected to overland travel by vehicles and equipment or handled, particularly when soils are wet. Soils associated with the Proposed Action have a high to moderate susceptibility to compaction. Implementation of BMPs and EPMs, such as avoiding overland travel by vehicles and equipment or handling of soils when near saturation, are typically sufficient to avoid extensive soil compaction. Furthermore, if localized instances of compaction do occur, additional soil manipulation during the reclamation process can alleviate minor to moderate degrees of compaction. Direct effects associated with soil compaction from overland travel and handling would be minor, short term, and localized.

Indirect effects on soil resources during Project activities could include the loss of soils from wind and/or water erosion. Soils in the Project area have a high potential to generate runoff, but are only slightly to moderately susceptible to wind and water erosion. Soils would be most susceptible to erosion during initial salvage and immediately following placement prior to revegetation establishment. BMPs and EPMs would be implemented for growth media stockpiles, interim revegetation areas, and final reclamation areas to minimize soil erosion, particularly when soils are exposed during salvage, and prior to revegetation establishment.

Applicant-committed EPMs as described in SER 1: Proposed Action and Project Alternatives (BLM 2021a) and BMPs would be implemented to minimize erosion, trap sediment, and control stormwater from the effects of wind, precipitation, and stormwater runoff from Project facilities and on surface disturbance areas during construction, operation, and initial stages of reclamation. Numerous reclamation practices would be employed where necessary to control erosion including contour furrowing, slope breaks, waddles, mulches, and other BMPs.

Impacts on soil would be reduced by NVV's commitment to reclaim Project facilities and successfully restore lands to pre-mining productivity and land uses. These objectives would be attained through implementation of BMPs and Applicant-committed EPMs and implementation of the agency-approved Reclamation Plan, which would restore areas within the Project area to a beneficial post-mining land use, prevent unnecessary degradation of the environment, and reclaim disturbed areas to ensure visual and functional compatibility with surrounding areas.

Reclamation would occur both concurrently during the Project operation and following completion of all mining operations. Reclamation activities would include recontouring the disturbed area, incorporating amendments and seedbed preparation, and reseeding, among other activities. For reclamation activities concurrent with the Project operation, revegetation would occur in areas where activities are no longer conducted or in areas that have been designated as inactive by Project management. Final reclamation in the Project area would occur at the end the Project, beginning with areas within the mine designated as inactive and no longer in use, although every effort would be made to identify concurrent reclamation opportunities during the life of the operation. Reclamation activities would be coordinated with the BLM and BMRR, as necessary.

Reclaimed surfaces would be revegetated to control runoff, reduce erosion, and provide forage for wildlife and livestock. Revegetation of disturbed areas would reduce the potential for wind and water erosion and allow establishment of productive vegetation communities. Revegetation concurrent with construction activities would be maximized to the extent practicable to accelerate revegetation of newly disturbed areas or interim reclamation areas. Upon reaching final grades or where construction activities have temporarily ceased, disturbed areas such as cut-and-fill embankments and growth media and overburden stockpiles would be seeded, as soon as practicable and safe. Overall slope gradients would be graded to a slope of 3:1 horizontal to vertical or flatter to ensure revegetation of the slopes and reduce the potential for surface erosion. The seed mix utilized in Project reclamation would be appropriate for the edaphic and climatic conditions of the Project area, capable of facilitating the post-mining land uses of livestock grazing and wildlife habitat, while also tailored to provide maximum erosion protection.

Mitigation Measures

No mitigation measures are recommended for soil resources.

Residual Effects

After completion of construction, mining, and reclamation activities associated with the Project, impacts on soil resources would cease. Permanent loss of soil productivity on 85 acres of land associated with the unreclaimed open pit would occur.

3.14.2.3 South Access Road Alternative

The South Access Road Alternative would result in approximately 38 additional acres of surface disturbance as compared to the Proposed Action. Total Project surface disturbance for this alternative would include 844 acres of public land. Disturbances associated with the access road would only affect soil horizons at depths closer to the soil surface. Due to the longer length of the access road, the amount of fugitive dust could be greater than under the Proposed Action. The access road would be fully reclaimed at the end of the Project because an existing county road provides access to the area. Similar to those of the Proposed Action, the impacts from the South Access Road Alternative would be minor to moderate, long term, and localized. The difference in impacts between the Proposed Action and South Access Road Alternative would be negligible.

3.14.2.4 Renewable Energy Alternative

The Renewable Energy Alternative would result in approximately 33 additional acres of permanent surface disturbance as compared to the Proposed Action, for a total surface disturbance of 839 acres of public land. Disturbances associated with this alternative would affect subsurface soil layers, due to laying and operating the underground medium-voltage cables connecting the solar electric PV system transformers. The 33-acre site would not be reclaimed at the end of the Project because it would remain as a long-term power source servicing the remote electrical needs of southern Eureka County and northern Nye County. Similar to those of the

Proposed Action, the impacts from the Renewable Energy Alternative would be minor to moderate, long term, and localized.

3.14.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts on soils in the Project area would not occur.

3.14.3 Cumulative Effects

The CESA for soil impacts is within Basin 155A. The CESA is based on the potential extent of cumulative impacts on soil resources. The total area of the CESA encompasses 371,477 acres, which includes Eureka County and portions of Nye and White Pine Counties. Most of the BLM-administered land in the CESA is managed under the Shoshone-Eureka RMP, and a portion is managed under the Ely RMP.

3.14.3.1 Proposed Action

Approval of the Project would increase surface disturbance within the CESA by 806 acres in addition to surface disturbance associated with past and present actions and RFFAs (34,316 acres) for a total disturbance and eventual reclamation of 35,122 acres, which is approximately 9.5 percent of the CESA. Overall, this would be a small increment of the acreage of public land in the Project area and would have minimal effect on soil resources affected by past and present actions and RFFAs in the CESA. The cumulative unreclaimed disturbance area that would remain after completion of the interrelated actions, including the Project, would be a small percentage of the total land area in the CESA and would have a negligible, long-term cumulative effect on soil resources.

3.14.3.2 South Access Road Alternative

Cumulative impacts on soil resources associated with construction, operation, and reclamation of the South Access Road Alternative would be slightly greater than those of the Proposed Action because this alternative would result in an additional 38 acres of surface disturbance. This additional surface disturbance would primarily increase the cumulative impact on soil resources and would have a negligible, long-term cumulative effect on soil resources, similar to the Proposed Action.

3.14.3.3 Renewable Energy Alternative

Cumulative impacts on soil resources associated with the construction and operation of the Renewable Energy Alternative would be slightly greater than those of the Proposed Action because this alternative would result in an additional 33 acres of surface disturbance from the solar field, which would not be reclaimed. This additional surface disturbance would primarily increase the cumulative impact on soil resources and would have a negligible, long-term cumulative effect on soil resources, similar to the Proposed Action.

3.14.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed and no changes to the existing soil resources would occur. Under the No Action Alternative, no impacts on soil resources would result from the Project; therefore, there would be no contribution to cumulative impacts.

3.15 TRANSPORTATION AND ACCESS

The transportation system in the vicinity of the Project area consists of a network of roads that are maintained by Eureka County, the Nevada Department of Transportation (NDOT), and the BLM, or are existing roads on public land providing public access that are not actively maintained by Eureka County. Many of these are designated public roads through Nevada Revised Statute (NRS) 405. All public land in the Project area is in an open status. As required by the FLPMA, public land under BLM jurisdiction is managed "...on the basis of multiple use and sustained yield unless otherwise specified by law" (43 U.S.C. 1701(a)(7)). Under the FLPMA, access to public land generally is considered open, unless the BLM RMP has designated otherwise. The Final SER 13: Transportation and Access (BLM 2021h) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.15.1 Affected Environment

The Project area is accessed from Eureka, Nevada by traveling approximately 10 miles south on U.S. Highway 50 and turning south on County Road M-103 (Duckwater Road) for approximately 8 miles, turning southwest on Fish Creek Ranch Road for approximately 7 miles, then turning west on the road that accesses the Project area. The Project area would be accessed using existing county, BLM, and modified access roads. Given the central Nevada location of the Project area, access to the site and shipments of materials and products could be gained from multiple directions depending on the sources or destinations. However, the primary arteries would remain essentially the same. The primary access routes are as follows:

- From the west: Access and transportation is via I-80 to SR 278 south at Carlin to U.S. Highway 50 east. Upon passing through Eureka, the route turns south on County Road M-103 (Duckwater Road). At the Fish Creek Ranch, the route turns to the right (west) onto County Road M-104 for approximately 5 miles, where the primary mine access road is encountered.
- From the south: Traveling north from Las Vegas via U.S. Highway 93 to U.S. Highway 50 at Ely and then west along U.S. Highway 50 to County Road M-103 (Duckwater Road) and south to the Fish Creek Ranch. At the Fish Creek Ranch, the route turns to the right (west) onto County Road M-104 for approximately 5 miles, where the primary mine access road is encountered.

- From the east: Access and transportation from the Salt Lake City area is via I-80 to Carlin and then south on SR 278 to U.S. Highway 50. Upon passing through Eureka, the route turns south on County Road M-103 (Duckwater Road). At the Fish Creek Ranch, the route turns to the right (west) onto County Road M-104 for approximately 5 miles, where the primary mine access road is encountered.

NVV proposes to use existing county roads to access the Project area and has identified up to 6 miles of road within and adjacent to the Project area that would require new construction or upgrading and maintenance. Additionally, there would be at least one public road in the Project area temporarily closed to the public. In accordance with BLM recommended operating procedures, NVV is proposing access that is the most direct and safe route with the least amount of new disturbance.

County Road M-103 (Duckwater Road) is a two-lane, paved, arterial road maintained by Eureka County. The road begins at U.S. Highway 50 and heads south, ending with a connection onto U.S. Highway 6. U.S. Highway 50 is a two-lane, paved, arterial highway maintained by the NDOT. On U.S. Highway 50, the 10-year average annual average daily traffic (AADT) volumes between Eureka and Ruth were between 595 and 644 vehicles per day. Estimated AADT on County Road M-103 (Duckwater Road) is approximately 51 vehicles per day. Similar traffic volumes were recorded on SR 278 approaching Eureka, and larger traffic volumes occur between Ruth and Ely, Nevada.

Car accident crash data are available from NDOT for the years 2015 and 2017 (NDOT 2020). During this time period, a total of 65 traffic crashes occurred on U.S. Highway 50 between Eureka and Ruth. The AADT during this time period was 636 vehicles per day. Relatively few crashes occurred along SR 278 and between Ruth and Ely, Nevada. The crash rate along these segments of road was calculated to be less than 0.1 percent, well below statewide averages for major rural roads (NDOT 2018).

3.15.2 Environmental Effects

The area of analysis for transportation includes the Project area, County Road M-103 (Duckwater Road), and the U.S. Highway 50 corridor from the SR 278 intersection north of Eureka to the U.S. Highway 93 intersection in Ely. Effects on transportation and access resulting from the Project construction or operation were evaluated by determining the potential for:

- Project-related increases in traffic accidents from an increase in Project-related traffic, especially from large, slow-moving vehicles during construction; and
- Project-related increases in traffic on U.S. Highway 50 or County Road M-103 (Duckwater Road) and intersecting local roads in excess of road capacity determined by level of service (LOS).

3.15.2.1 Effects Level Definitions

Effects on transportation and access are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Effects on traffic conditions and access in the Project vicinity would either not occur or would be so slight as to not be noticeable by most motorists. No access restrictions to existing, authorized land uses would occur. There would not be a perceptible impact from traffic generation on current traffic conditions.

Minor: Effects on traffic flows and access would be measurable and may be noticeable to typical motorists but would be small and would not adversely affect traffic conditions. Access to existing land uses would be maintained. There would be a measurable or perceptible effect on traffic generation and current conditions; however, AADT increases on roadways in the Project vicinity would be small and would not adversely affect LOS on Highway 379. Applicant-committed EPMs would effectively minimize impacts on Project area transportation.

Moderate: Effects on traffic flows and access would be measurable and readily apparent to typical motorists but would not exceed State standards for LOS on Highway 379. There would be a readily apparent, measurable traffic increase on the surrounding transportation system, and the AADT increase on roadways would be relatively high, causing degradation in LOS on Highway 379. Substantial Applicant-committed EPMs may be required to minimize adverse effects on transportation, but such measures likely would be successful.

Major: Effects on traffic flows and access would be measurable and would be readily apparent to all motorists. There would be a substantial increase in AADT on Highway 379 and/or local roadways. LOS on Highway 379 would degrade. Substantial Applicant-committed EPMs may be required to minimize impacts on transportation, and such measures would have to be monitored to determine their effectiveness.

Duration

Temporary: Effects would occur during construction activities or during maintenance activities.

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last after active mining for the Project is completed.

Permanent: Effects on facilities would be permanent.

Context

Localized: Effects on traffic generation would be limited to the Project area.

Regional: Effects on traffic safety and traffic generation would extend beyond the Project area.

3.15.2.2 Proposed Action

Traffic generated by the Project would include NVV employee and new contract worker commuter traffic, material deliveries, and product transport off site. Construction traffic is expected to be comparable to traffic during operation. The number of workers would be roughly the same and deliveries for construction would routinely occur. However, construction activities are anticipated during the daytime only. Approximately 7,381 vehicles per year would travel to and from the Project area, resulting in an estimated AADT of 40.5 vehicles per year, based on the following transportation needs:

- Workforce: 4,056 vehicles per year;
- Materials to Project area: 3,194 vehicles per year; and
- Product and waste from Project area: 131 vehicles per year.

Methods from the Highway Capacity Manual (Transportation Research Board 2000) were used to evaluate the current operations and LOS of the intersections near the Project area. The standard measure of traffic flow from the Highway Capacity Manual is LOS for a given intersection or segment of roadway. LOS is a method of qualitatively measuring the operational conditions of traffic flows on roadways and the perception of those conditions by motorists and passengers (Transportation Research Board 2000). A road's LOS is determined based on the ratio of traffic flow volumes to estimated capacity using several variables, including speed, travel time, vehicular delays, traffic interruptions, and the freedom to maneuver in traffic. LOS is rated A through F; A generally represents free-flowing conditions with few restrictions, and F represents a "forced or break-down" flow condition with queues forming and traffic volume exceeding the theoretical capacity of the roadway, such that mitigation may be necessary (Transportation Research Board 2000). Generally, LOS E represents a traffic volume condition at the theoretical capacity of the roadway.

Direct and Indirect Effects

Traffic generated by the Project would include NVV employee and new contract worker commuter traffic, material deliveries, and product transport off site. The Project would add an estimated 41 AADT to U.S. Highway 50 during the life of the Project. It was assumed that approximately half of the traffic would turn west from County Road M-103 (Duckwater Road) onto U.S. Highway 50 and continue onto SR 278 from Eureka, while the other half of the traffic would turn east from County Road M-103 (Duckwater Road) onto U.S. Highway 50 and continue to Ely. Although worker vans would stop near the town of Eureka, additional personal cars may be driven from parking lots to houses in Eureka and along SR 278.

Estimated increases in traffic volumes would be heaviest on County Road M-103 (Duckwater Road), increasing AADT by an estimated 44 percent. Along U.S. Highway 50 immediately east and west of the Project area and on SR 278 to Eureka, AADT would increase approximately 6 percent due to the Project. Relatively smaller increases in traffic volume would occur along U.S.

Highway 50 between Ruth and Ely. Estimated crash levels would be assumed to rise in correspondence with increased traffic levels. However, few crashes have been reported relative to the total amount of traffic, resulting in a crash rate less than 0.01 percent in the area of analysis. As such, any increase in the risk of traffic accidents would be negligible and proportional to the overall increase in traffic.

There would be no change in the LOS as a result of the Proposed Action. The performance of each intersection in the immediate Project area was determined using the Highway Capacity Manual procedures. The results of the LOS analysis indicate that the existing intersections on U.S. Highway 50 were all operating at LOS A for the analysis period. The detailed analysis was conducted for 2011 traffic levels (NDOT 2011). Extrapolating for the modestly greater 2020 traffic volumes, however, LOS would remain at A levels for all intersections in the Project area.

Overall, the impacts of the Project on transportation and access would be localized, long term, and minor.

Mitigation Measures

No mitigation measures are recommended for transportation and access.

Residual Effects

Upon completion of construction, mining, and reclamation activities associated with the Project, impacts on transportation and access would cease.

3.15.2.3 South Access Road Alternative

Under the South Access Road Alternative, the overall Project footprint would be the same as under the Proposed Action, but the south access road would be in a different location and would include an additional 7 miles of linear disturbance, resulting in approximately 38 additional acres of surface disturbance. Impacts on transportation and access under the South Access Road Alternative would be the same as under the Proposed Action.

3.15.2.4 Renewable Energy Alternative

Under the Renewable Energy Alternative, the overall Project would be the same as the Proposed Action, but developing the solar energy generating site would require delivering solar panel, battery storage, and additional power line materials and equipment to the site, mostly in one-off deliveries during the first year of construction. Equipment would be transported on highway-certified, flatbed semi-tractor trailers and/or pickup trucks. Impacts on transportation and access under the Renewable Energy Alternative would be the same as under the Proposed Action.

3.15.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts on transportation and access would not occur. Existing traffic levels would continue as they are currently. Under the No Action Alternative, no new pipelines or roadway modifications would be required.

3.15.3 Cumulative Effects

The CESA for transportation includes the Project area, County Road M-103 (Duckwater Road), and the U.S. Highway 50 corridor from the SR 278 intersection north of Eureka to the U.S. Highway 93 intersection in Ely. The Project area's central Nevada location provides access and shipments of materials and products to the site from multiple directions, depending on the sources or destinations, but all shipments to and from the site would use U.S. Highway 50 and County Road M-103 (Duckwater Road) as primary access routes.

3.15.3.1 Proposed Action

There would be few, if any, cumulative effects on access or traffic conditions from the Project area and other interrelated past and present actions and RFFAs because they are all relatively small traffic generators and most of their access points are widely distributed throughout the CESA.

3.15.3.2 South Access Road Alternative

Under the South Access Road Alternative, the cumulative impacts on transportation and access would be the same as described for the Proposed Action.

3.15.3.3 Renewable Energy Alternative

Under the Renewable Energy Alternative, the cumulative impacts on transportation and access would be the same as described for the Proposed Action.

3.15.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be constructed. There would be no cumulative Project-related impacts on traffic volumes or public transportation infrastructure.

3.16 TRIBAL RESOURCES

3.16.1 Affected Environment

The BLM is mandated to consult with Native American tribes concerning the identification of cultural values, religious beliefs, and traditional practices of Native American people that may be affected by actions on Federal lands. The BLM should also learn and understand tribal treaties, Indian Trust Assets,[2] and treaty-based rights and/or responsibilities; if these exist in the Project area, then the BLM should include analysis of the Project's effects on them. The BLM has developed several sets of guidelines for consulting with Native American groups and evaluating cultural resources, with an emphasis on traditional use values. BLM Manual 1780, Tribal Relations (BLM 2016c), and BLM Handbook H-1780-1, Improving and Sustaining BLM–Tribal

[2] Indian Trust Assets are legal interests in property, physical assets, or intangible property rights held in trust by the U.S. Government for Indian tribes or individual Indians, including any rights identified in tribal treaties. Note, the BLM Nevada does not manage any Indian Trust Assets.

Relations (BLM 2016d), provide consultation requirements and procedural guidance to ensure that the consultation record demonstrates "that the decision maker made a good faith effort to obtain and weigh tribal input in decision making" (BLM 2003). BLM Handbook H-8110, Identifying and Evaluating Cultural Resources (BLM 2004), offers guidelines for determining authorized uses of a cultural resource, including considerations for traditional use values.

Historically, the Project area and surrounding landscape were occupied by the Numic-speaking Fish Springs Valley group of Western Shoshone, who, prior to the arrival of Euroamericans into their aboriginal lands, occupied a large territory that included much of present-day northeastern and central Nevada (Bengston 2003:12–14). "Western Shoshone Indians are the descendants of an ancient widespread people whose name is 'Newe' meaning 'The People.' The traditional Western Shoshone territory covered southern Idaho, the central part of Nevada, portions of northwestern Utah, and the Death Valley region of southern California. This vast land of mountains, valleys, deserts, rivers, and lakes offered an abundance of wildlife and plants for the Shoshone to hunt, fish, and gather" (Te-Moak Tribe of Western Shoshone 2020). Currently, the Project area is not contiguous with any tribal lands and no Indian trust assets have been identified by tribes, although there are several small reservations and colonies throughout Nevada, California, and Utah (Te-Moak Tribe of Western Shoshone 2020).

Portions of the Project Area are within lands covered by the Treaty of Ruby Valley, ratified by Congress in 1863, which gave the U.S. limited access to Shoshone land and granted land use to the U.S. for specific purposes, one of which included allowing exploration and mining for gold, silver, and other minerals (Treaty of Ruby Valley of 1863, Article 4). "According to the terms of the Treaty, the Shoshone ceded no land" (McDonald 2009:753–754).

The BLM has invited the Battle Mountain Band of the Te-Moak Tribe of Western Shoshone, Duckwater Shoshone Tribe, Ely Shoshone Tribe, Te-Moak Tribe of Western Shoshone, and Shoshone Tribe to become cooperating agencies during the NEPA process. On April 17, 2012, and March 12, 2013, the BLM sent coordination letters to the tribes regarding the Project. The BLM conducted a site visit with the Duckwater Shoshone Tribe and Ely Shoshone Tribe on August 12, 2020. The BLM invited these tribes to the public meetings held by NVV in August 2020 and the BLM virtual public scoping meetings held on September 2 and 3, 2020. A field visit took place in September 2020 at the project site with the Duckwater Shoshone Tribal Historic Preservation Officer and Ely Shoshone Tribe Cultural Specialist. During the field visit, participants toured the Project's proposed footprint and discussed designs and anticipated effects. Direct effects to cultural resources were discussed and Historic Properties were visited at which treatment options were discussed. No additional cultural resources of spiritual or cultural significance were identified during consultation; however, concerns regarding archaeological treatment of cultural materials was documented and will be incorporated into the Historic Properties Treatment Plan in additional coordination with all concerned Tribes.

In September 2021, the BLM met with the Yomba Shoshone Tribe, Timbisha Shoshone Tribe, Battle Mountain Band of the Te-Moak Tribe of Western Shoshone, Elko Band Colony of the Te-Moak Tribe of Western Shoshone, and the Duckwater Shoshone Tribe. The Duckwater Shoshone Tribe and Ely Shoshone Tribe have requested that the BLM continue to coordinate with the tribes regarding the Project and EIS process. The BLM Battle Mountain District intends to present at each tribal council meeting for the five tribes in the area. To date, the BLM and tribes have not entered into any programmatic agreements, memoranda of understanding to become a cooperating agency, or joint plans.

Through ongoing consultation and coordination via letters, phone calls, and onsite visits, the BLM will continue to work with tribes to identify traditional cultural properties, sacred/religious sites, and special use areas to develop an understanding of the tribes' perspective regarding effects that may result from the Project. The BLM perspective of managing significant cultural resources as distinct properties under the National Historic Preservation Act differs from that of traditional tribal leaders who view cultural resources as part of a larger heritage setting. Tribal interests and perspective may include the legal, social, scientific, and religious points of view attached to cultural resources on public lands as well as the effects on their culture and heritage; each of these perspectives should be considered, in good faith, in the environmental impact analysis. During consultation and coordination, the Tribes have noted concerns with the mining and handling of the uranium secondary product from the Project and the cultural resources discovered during Class III surveys of the Project area.

3.16.2 Environmental Effects

This section addresses potential effects from all Project actions, including direct, indirect, and cumulative impacts from all alternatives, on Native American tribal resources; interests, specifically any identified Indian Trust Assets or treaty-based rights as described in the Treaty of Ruby Valley of 1863; and cultural, social, and spiritual heritage points of view.

The BLM conducted government-to-government tribal consultations with Federally recognized Native American tribes who have expressed interest in the Project and have tribal interests and treaty rights (including the Treaty of Ruby Valley) in the Project area, and these consultations are continuing. All laws, regulations, and policies pertinent to determining effects on tribal interests were considered and included in impact criteria. This known information was overlain with the actions found under each alternative in Chapter 2 and conclusions below were drawn based on an understanding of how these types of actions could affect tribal interests and resources.

For tribal interests and resources, a significant adverse impact would be the permanent loss of those interests and/or resources. At present, the tribes have not identified sacred/religious sites, special use areas, Indian trust assets, or treaty-based rights that would need to be considered in the analysis. Although the tribes have not identified issues or concerns related to tribal assets and resources to date, they have expressed concerns related to uranium mining, handling, and transport. Their concerns are like those previously described above in the geology and minerals Section 3.6.2. As noted there, concerns result from risks associated with normal transport operations and accidents that could expose people to radiation who travel, work, or live near these transportation routes. Indirectly, there may be perception-based impacts of anxiety and perceived loss of resource values. The BLM is continuing consultation with the tribes, which may help identify tribal resources and interests to be analyzed in the future as well as provide additional insight into the tribes' concerns with uranium mining. The ongoing consultation will provide input on mitigation measures that will be outlined in the HPTP and Discovery Plan developed for the Project under Section 106 consultation regarding historic properties.

Under all alternatives, the BLM will continue to maintain government-to-government consultation with the tribes and will consult with tribes during future implementation of the Project for resources and discoveries of Native American concern.

3.17 VEGETATION (INCLUDING WETLANDS AND RIPARIAN ZONES)

The Project is in the southeastern portion of Eureka County, Nevada, at the southern end of the Fish Creek Range. The utility corridor and portions of the Project area extend into Fish Creek Valley, to the east of Fish Creek Range. Little Smoky Valley is to the east and south of the Project area and Antelope Valley is west of the Project area. Vegetation community, plant species, and ecological site description data were collected for the Project between 2010 and 2013. The Final SER 14: Vegetation (including Wetlands and Riparian Zones) (BLM 2021i) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.17.1 Affected Environment

The Project area is in the U.S. Department of Agriculture, Forest Service Central Great Basin Mountains Section of the Nevada-Utah Mountains Desert-Coniferous Forest-Alpine Meadow Province (Bailey 1994). The dominant landforms are north-/south-trending mountains separated by broad, sediment-filled valleys, many of which have internal drainages. Four dominant vegetation communities were identified within the Project area: big sagebrush steppe, salt desert scrub, black sagebrush steppe, and pinyon-juniper woodland.

Of the BLM special status plant species potentially present in Eureka County, six plant species were determined to have a high potential to be present within the Project area. Of these six species, only sand cholla was observed during field investigations. The field investigation area occurred in potential habitat areas in the Project area and vicinity; the majority of sand cholla was observed outside the Project area. Sand cholla prefers mostly sandy soils, and sometimes gravelly or rocky soils, of valley floors and gentle slopes in the shadscale, mixed shrub, sagebrush, and lower pinyon-juniper zones (Nevada Natural Heritage Program 2019).

Based on review of the National Wetlands Inventory mapping, no wetland areas occur in the Project area. National Hydrography Dataset mapping in the Project area indicated linear drainage features throughout the Project area, but no other water features, such as lakes, ponds, canals, or dams, were observed.

No riparian features were identified in the Project area. Most riparian area features within Basin 155A are southwest of the Project area within the northern portion of the Antelope Range, and north of the Project area in the Fish Creek Range. Riparian vegetation was observed in the Fish Creek Ranch area, adjacent to the Project area.

3.17.2 Environmental Effects

Potential impacts on vegetation resources from the Project could include direct removal of vegetation communities or special status species due to surface disturbance; indirect effects on vegetation communities or special status species due to dust generation, changes in surface water runoff or availability, or habitat fragmentation; increased likelihood for introduction or spread of noxious weeds or nonnative invasive plant species, thereby degrading native vegetation communities; and changes in access to or availability of existing fuel wood cutting or pine nut harvest areas.

3.17.2.1 Effects Level Definitions

Effects on vegetation resources are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Effects on vegetation would be so small they would not be measurable or perceptible. Plant communities would not be extensively altered and there would be no effect on the biological value or distribution of plant communities.

Minor: Effects on vegetation would be detectable, measurable, and perceptible, but would occur within the area of analysis and would not affect the overall biological value or distribution of plant communities. Effects would be minimized with implementation of Applicant-committed EPMs, BMPs, and reclamation of the Project.

Moderate: Effects on vegetation would be readily apparent, measurable, large, and of consequence, but would occur within the area of analysis. Effects may occur on the overall biological value or distribution of plant communities. Substantial Applicant-committed EPMs and BMPs may be necessary, but these measures would most likely be effective.

Major: Effects on vegetation would occur and would substantially change the biological value or distribution of plant communities. Substantial Applicant-committed EPMs and BMPs may be necessary, and these measures would need to be monitored to determine their effectiveness.

Duration

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last until 25 years following mine closure (the estimated time for mature shrubs to become re-established in the area of analysis).

Permanent: Effects on vegetation productivity would be permanent.

Context

Localized: Affecting the area of analysis.

Regional: Affecting an area beyond the area of analysis.

3.17.2.2 Proposed Action

Direct and Indirect Effects

Direct removal of vegetation would occur on 806 acres from clearing of vegetation during exploration activities and mining operations. Loss of vegetation would result from construction of exploration roads and pads, process facilities, ponds, buildings, pit excavation and HLP construction, growth media stockpiling, and road improvements. Vegetation communities found within the Project area are common to this region, but some of the vegetation communities that would be removed include pinyon-juniper woodlands, which would reduce opportunities for pine nut harvest or fuel wood cutting or gathering. Removal of high-density pinyon-juniper woodlands could reduce the potential for large wildfires by reducing fuel loading, increase grass and forb species diversity, and improve forage and habitat quality for wildlife after reclamation has been completed (Bombaci and Pejchar 2016). Direct effects of removing vegetation would include loss of forage for wildlife, wild horses, and livestock, and potential for increased erosion.

In areas that would be disturbed by the Project but later reclaimed, the loss of shrub- or tree-dominated communities would represent a long-term change in habitat composition (i.e., shrub-dominated communities to grass/forb-dominated communities) because it would take approximately 25 years for mature shrubs to become re-established in these communities. Dust generation from mining or exploration activities, including use of unpaved roads, could affect the health or growth of vegetation. Permanent loss of 85 acres of vegetation communities would occur as a result of the unreclaimed open pit.

The introduction or increased spread of noxious weeds or nonnative invasive plant species could occur from activities throughout the Project area. Opportunities for weed establishment could occur during initial reclamation efforts, when competition from established, desirable perennial species is low. Additionally, certain Project components (e.g., roads and laydown yards) may experience short-term, localized weed establishment from annual nonnative invasive species (e.g., cheatgrass, halogeton, Russian thistle), especially if currently present within the Project area. Introduction of noxious and invasive species could lower the resilience of native plant communities to stresses such as wildfire or drought, thus increasing the susceptibility of those plant communities to transition to a less desirable vegetative state and making restoration of the invaded communities more difficult.

Overall, the Project impacts on vegetation would be minor, long term, and localized, except for the 85 acres of permanent loss as a result of the unreclaimed open pit, which would experience moderate, permanent, and localized impacts on vegetation.

Project-related impacts on the sensitive sand cholla found within the Project area would be moderate, long term, and localized because the facilities have been redesigned to avoid as much habitat as possible within the Project area and NVV has committed to conducting pre-construction surveys for special status species. As a result, populations may experience small to moderate declines under the Proposed Action but would be expected to rebound with implementation of avoidance and protection measures.

Project-related impacts on wetland or riparian resources would be negligible because there are no wetlands or riparian areas that occur in the Project area. Riparian vegetation was observed in the Fish Creek Ranch and in areas where perennial seeps and springs were noted, south and north of the Project area. Because there are no dewatering activities associated with the Project, wetland and riparian impacts would be negligible, short term, and localized.

Mitigation Measures

No mitigation measures are recommended for vegetation, including wetlands and riparian areas.

Residual Effects

After completion of construction, mining, and reclamation activities associated with the Project, impacts on vegetation would cease. Permanent loss of vegetation communities on 85 acres would occur, associated with the unreclaimed open pit.

3.17.2.3 South Access Road Alternative

The South Access Road Alternative would result in approximately 38 additional acres of surface disturbance as compared to the Proposed Action. Total Project surface disturbance for this alternative would include 844 acres of public land. This access road would be fully reclaimed at the end of the Project because an existing county road provides access to the area. In areas that would be disturbed by the Project but later reclaimed, the loss of shrub- or tree-dominated communities within these areas would represent a long-term change in habitat composition (i.e., shrub-dominated communities to grass/forb-dominated communities) because it would take approximately 25 years for mature shrubs to become re-established in these communities. The impacts from this alternative on vegetation would be minor, long term, and localized. The impacts on special status species and wetlands and riparian resources would be the same as those of the Proposed Action.

3.17.2.4 Renewable Energy Alternative

The Renewable Energy Alternative would result in approximately 33 additional acres of permanent surface disturbance as compared to the Proposed Action. Total Project surface disturbance for this alternative would include 839 acres of public land. The solar field would not be reclaimed at the end of the Project because it would remain as a long-term power source servicing the remote electrical needs of southern Eureka County and northern Nye County. The impacts from this alternative would be minor, long term, and localized, similar to those of the

Proposed Action. The impacts on special status species and wetlands would be the same as those of the Proposed Action.

3.17.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts in the Project area would not occur.

3.17.3 Cumulative Effects

The CESA for vegetation is Basin 155A. The CESA is based on the potential extent of cumulative impacts on vegetation. The total area of the CESA encompasses 371,477 acres, which includes portions of Eureka, Nye, and White Pine Counties. Most of the BLM-administered land in the CESA is managed under the Shoshone-Eureka RMP, and a portion is managed under the Ely RMP.

3.17.3.1 Proposed Action

Approval of the Project would increase surface disturbance within the CESA by 806 acres in addition to surface disturbance associated with past and present actions and RFFAs (34,315 acres) for a total disturbance and eventual reclamation of 35,121 acres, which is 9.5 percent of the CESA. Overall, this would be a small increment of the acreage of public land in the Project area and would have minimal effect on vegetation affected by past and present actions and RFFAs in the CESA. The cumulative unreclaimed disturbance area that would remain after completion of the interrelated actions, including the Project, would be a small percentage of the total land area in the CESA and would have a negligible, long-term cumulative effect on vegetation resources.

3.17.3.2 South Access Road Alternative

Cumulative impacts on vegetation associated with the construction, operation, and reclamation of the South Access Road Alternative would be slightly greater than those of the Proposed Action because this alternative would result in an additional 38 acres of surface disturbance. This additional surface disturbance would increase the Project’s cumulative impact on vegetation by a small percentage compared to the Proposed Action. The cumulative impacts from the South Access Road Alternative would be similar to those of the Proposed Action, negligible and long-term.

3.17.3.3 Renewable Energy Alternative

Cumulative impacts on vegetation associated with the construction and operation of the Renewable Energy Alternative would be slightly greater than those of the Proposed Action because this alternative would result in an additional 33 acres of surface disturbance from the solar field, which would not be reclaimed. This additional surface disturbance would increase the Project’s cumulative impact on vegetation by a small percentage compared to the Proposed

Action. The cumulative impacts from the Renewable Energy Alternative would be negligible and long term, similar to those of the Proposed Action.

3.17.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed and no changes to the existing vegetation would occur. Under the No Action Alternative, no impacts on vegetation would result from the Project; therefore, no contribution to cumulative impacts would occur.

3.18 VISUAL RESOURCES

The area of analysis for visual resources encompasses an area within 15 miles of the Project area (including the proposed mine facilities, access roads, and utility corridor) from which the Project facilities could contribute a notable feature in the viewer's landscape. This geographic region was selected as the area of analysis because beyond 15 miles, the Project facilities would either not be visible or would be considered as a minor element in the visual landscape. The Final SER 15: Visual Resources (BLM 2021j) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.18.1 Affected Environment

The term "visual resources" refers to the composite of basic terrain, geological, and hydrologic features; vegetative patterns; and built features that influence the visual appeal of a landscape. The BLM uses the Visual Resource Management (VRM) System to classify and manage visual resources on land under its jurisdiction. The VRM System involves inventorying scenic values, establishing management objectives for those values through the resource management planning process, and then evaluating proposed activities to determine whether they conform to the management objectives (BLM 1984). The BLM's VRM System incorporates scenic quality, viewer sensitivity, and distance zones to identify visual resource inventory classes. These classes represent the relative value of the existing visual landscape, as well as the visual resource baseline from which to measure impacts that a proposed project may have on these values. In its planning process, the BLM weighs visual and competing resource values and designates the VRM classes, with associated management class objectives for a given area's visual setting.

The Mount Lewis Field Office within the Battle Mountain District Office does not have VRM class management objectives assigned through the current 1986 Shoshone-Eureka RMP (BLM 1986a). Management of visual resources and determination of VRM class objectives are determined by implementing interim VRM class objectives, which "provide a surrogate process to bring existing land use plans that are not in compliance with VRM policy into interim compliance on a project-by-project basis until such time that the land use plan is revised or amended to include planning area-wide VRM class objectives" (BLM 2019a). After reviewing the current visual resource inventory—which includes evaluating scenic quality, viewer sensitivity, and distance between viewers and a proposed modification to the landscape, completing visual simulations, and conducting an evaluation of Project contrast using BLM

Form 8400-4 Visual Contrast Rating Worksheet—the BLM determined that the interim VRM class for the Project area would be VRM Class IV.

The VRM Class IV objective is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These 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.

3.18.2 Environmental Effects

The primary issue of concern regarding visual resources is the potential for impacts in the visual contrast of form, line, color, and texture created between a project with new land and waterbodies, vegetation, and structures as compared to the existing, characteristic landscape. **Appendix D** includes the visual contrast rating worksheets, photos of the existing condition of the landscape, and visual simulations that illustrate the Proposed Action.

Each of the alternatives considered was analyzed for its potential to affect visual resources. Visual impacts were analyzed using the methodology outlined in BLM Handbook H8431-1, Visual Contrast Rating (BLM 1986b), which analyzes the levels of visual contrast created between a project and the existing, characteristic landscape. The management standards and allowable contrasts for the visual rehabilitation area are those of the area-wide VRM class objectives. The BLM considered the following indicators when analyzing the potential impacts that each alternative would have on visual resources:

- Degree of consistency or conflicts with established BLM VRM class objectives; and
- Change in the scenic quality of the existing characteristic landscape from Key Observation Points (KOPs) due to the visibility of components of the Proposed Action or alternatives.

3.18.2.1 Effects Level Definitions

Effects on visual resources are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Effects would not result in any perceptible changes to existing viewsheds or the scenic quality of the existing characteristic landscape. Modifications to the scenic quality of the existing landscape would be consistent with VRM class objectives.

Minor: Effects would result in changes to the viewshed and the scenic quality of the existing characteristic landscape, but these impacts would not result in a significant degree of contrast with the existing landscape. Modifications to the scenic quality of the existing landscape would be consistent with VRM class objectives. Effects would be minimized with implementation of Applicant-committed EPMs and BMPs.

Moderate: Changes to the viewshed and the scenic quality of the existing characteristic landscape would be readily apparent, which would result in a noticeable degree of contrast with the existing landscape. Visual impacts may not be consistent with VRM class objectives. Substantial Applicant-committed EPMs and BMPs may be necessary, but these measures most likely would be effective.

Major: The Project would result in significant impacts on the viewshed and the scenic quality of the existing characteristic landscape, and it would introduce a strong degree of contrast with the existing landscape. Visual impacts would not be consistent with VRM class objectives. Substantial Applicant-committed EPMs and BMPs may be recommended to reduce adverse impacts, and these measures would need to be monitored to determine their effectiveness.

Duration

Temporary: Effects would occur during construction activities or during maintenance activities.

Short-term: Effects would last for the duration of the Project.

Long-term: Effects would last after active mining for the Project is completed.

Permanent: The Project would affect the viewshed permanently.

Context

Localized: Activities would affect the viewshed within the area of analysis but would not be visible outside of the area of analysis.

Regional: Activities would affect the viewshed within the area of analysis, as well as outside of the area of analysis.

3.18.2.2 Proposed Action

Direct and Indirect Effects

Overall, the introduction of structural elements, modifications in landform, and exposure of contrasting material would have predominantly moderate to high impacts on scenic quality in the existing landscape. The Project components would introduce form, line, colors, and textures not common on the landscape. As a result, the Project components would be visually prominent in areas of the viewshed where they are visible and discernible to the viewer.

The Project would be consistent with BLM plans and policies that designate land use within the Project area as open for mineral exploration and development, as described in the Shoshone-Eureka RMP (BLM 1986a). Mining-related activities would be consistent with the Eureka County Master Plan (Eureka County 2010) and Eureka County Code (Eureka County 2018), with implementation of applicable mitigation. The Project is not in conflict with the goals and policies described in the FLPMA and would be considered reasonably incident under the BLM's occupancy regulations at 43 CFR 3715. The Project would comply with adopted plans and policies of potentially affected governmental entities. The Project would not conflict with any active or pending land use authorizations in the Project area.

Dark Sky Resources

Lighting-related Applicant-committed EPMs are outlined in SER 1: Proposed Action and Project Alternatives (BLM 2021a) and include applying lighting mitigation measures that follow "Dark Sky" lighting practices throughout the life of the Project. The Proposed Action would result in a minor increase in the number of haul trucks or other equipment with headlights due to nighttime construction and operation. With the implementation of the Proposed Action, including EPMs, impacts on dark skies are anticipated to be short term, localized, and minor.

Mitigation Measures

To protect visual resources, NVV would apply lighting mitigation measures that follow "Dark Sky" lighting practices throughout the life of the Project. Light fixtures would be placed at the lowest practical height and would be directed to the ground and/or work areas to avoid being cast skyward or over long distances. Mitigation measures identified in the visual contrasting worksheets (see **Appendix D**) were incorporated into the Plan of Operations (NVV 2020).

Residual Effects

Residual adverse visual effects would result from long-term changes in landform and color contrast associated with the Proposed Action. The color contrast would be minimized by reclamation activities and the visual effects would diminish gradually over time as natural vegetation patterns develop, thereby helping to mask the landform and color contrasts. However, the landform modifications would result in long-term, permanent visual effects.

3.18.2.3 South Access Road Alternative

Under the South Access Road Alternative, the overall Project would be the same as the Proposed Action, except the access road would be to the south adjacent to the main power line and would include an additional 38 acres of surface disturbance. Therefore, direct impacts on visual resources would be greater under this alternative when compared to the Proposed Action.

3.18.2.4 Renewable Energy Alternative

Under the Renewable Energy Alternative, the overall Project would be the same as the Proposed Action except there would be an additional 33 acres of permanent surface disturbance for the solar field. The color and contrast of the solar facilities would be similar to those of other mine facilities in the Proposed Action. From the KOPs, the casual observer would not be able to discern differences in vegetation and exposed soil color from the Renewable Energy Alternative. The solar panels would be less than 20 feet tall and would not be visible from any of the KOPs. Potential impacts from reflectivity are anticipated to be negligible. Solar PV modules are designed to reduce reflection because reflected light cannot be converted into electricity (Cedar Creek 2021a). Similar to the Proposed Action, the Renewable Energy Alternative would conform to Interim VRM Class IV Objectives, which allow for a high level of modification to the existing characteristic landscape. **Appendix D** includes visual simulations that illustrate the Renewable Energy Alternative.

3.18.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts on visual resources would not occur. Existing land uses including other mining, grazing, and agriculture would continue as they are currently. Because the Project would not be approved under this alternative, no reclamation would occur including areas of previous surface disturbance.

3.18.3 Cumulative Effects

The CESA boundary for visual resources encompasses an area within 15 miles from which the Project facilities would be visible. Beyond 15 miles, the Project facilities would either not be visible or would be considered as a minor element in the visual landscape. A viewshed analysis was conducted within the CESA boundary to document which Project facilities would be visible from locations within the CESA boundary. Prominent existing features within the CESA include the Fish Creek Ranch and U.S. Highway 50 to the north and County Road M-103 (Duckwater Road) to the east. The total area of the CESA encompasses 735,853 acres, which includes Eureka County and portions of Nye and White Pine Counties. Most of the BLM-administered land in the CESA is managed under the Shoshone-Eureka RMP (BLM 1986a), and a portion is managed under the Ely RMP (BLM 2008).

Of the 735,853 acres covered by the CESA, 9,955 acres of disturbance are associated with past and present actions and RFFAs, which is a disturbance of approximately 1.3 percent of the CESA.

3.18.3.1 Proposed Action

Approval of the Project would increase surface disturbance within the CESA by 806 acres in addition to surface disturbance associated with past and present actions and RFFAs (9,955 acres) for a total disturbance of 10,761 acres, which is approximately 1.5 percent of the CESA. Cumulative effects on visual resources in the CESA from the Project in combination with past and present actions and RFFAs would include changes in line, form, color, and texture elements that would contrast with the existing landscape. The Proposed Action would increase the direct effects of contrast (i.e., moderate color contrast and moderate line and form contrast) with the existing landscape by increasing visual impacts in the CESA with the construction of open pit, RDA, and HLP, and resulting change in topography. This increase would blend with the existing historical disturbance and have a moderate additional impact on visual resources. Reclamation activities would reduce the visual impacts of the Project from grading of the RDA and HLP to simulate natural slopes in the surrounding areas. However, reclaimed and remaining features from the Project in combination with the other past and present actions and RFFAs within the

CESA would continue to have long-term cumulative impacts on visual resources in the CESA but would be moderate and blend into the existing landscape.

3.18.3.2 South Access Road Alternative

Under the South Access Road Alternative, the Project would be the same as the Proposed Action, except the access road would be in a different location and require an additional 38 acres of surface disturbance. Overall, this increase in surface disturbance would have minimal effect on visual resources within the CESA. The cumulative unreclaimed surface disturbance that would remain after completion of the interrelated actions, including the Project, would represent less than 1 percent of the total land area in the CESA and would have a negligible, long-term cumulative effect on visual resources.

3.18.3.3 Renewable Energy Alternative

The Renewable Energy Alternative would result in 33 acres of additional permanent surface disturbance to public lands and would have a similar effect on visual resources within the CESA as the Proposed Action. The solar field would have similar changes in line, form, color, and texture elements as the Proposed Action that would contrast with the existing landscape; however, it would not be visible from any of the KOPs. The solar field would not be reclaimed at the end of the Project and would have a minor, long-term cumulative effect on visual resources.

3.18.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed, and there would be no additional impacts on visual resources. No reclamation of past actions would occur and those past actions would remain moderately visible for color. Overall effects in the CESA would be less than those of the alternatives and mining development would still be visible.

3.19 WATER RESOURCES AND GEOCHEMISTRY

The Final SER 16: Water Resources and Geochemistry (BLM 2022f) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.19.1 Affected Environment

The area of analysis for water resources and geochemistry includes Basin 155A, which encompasses 591 square miles (378,240 acres) in Nye, Eureka, and White Pine Counties. The following sections summarize the existing surface water quality, groundwater quality, and geochemical characterization in the area of analysis.

3.19.1.1 Surface Water Resources

Streams within the area of analysis are mostly ephemeral with the exception of a few perennial and intermittent streams that are north and south of the Project area. The closest perennial stream to the Project is Fish Creek, which flows east from its source at Fish Creek Springs about 4.5 miles north of the planned mine. Fish Creek Springs are the primary surface water resource within the basin with a total average discharge of about 6,100 acre-feet per year (ac-ft/yr) (8.4 cubic feet per second [cfs]). Most of the water from Fish Creek Springs is diverted and used for agricultural irrigation by the Fish Creek Ranch. The Fish Creek Ranch owns certificated water rights for Fish Creek Springs of 5,730 ac-ft/yr (7.9 cfs). Undiverted water from the springs flows downstream in Fish Creek and infiltrates before reaching County Road M-103 (Duckwater Road). There are no downstream surface water users on Fish Creek, and water below the point of diversion is a mixture of spring flow and agricultural return flow. Fish Creek and Fish Creek Springs are undesignated waterbodies without assigned beneficial uses. Applicable surface water quality standards for the springs and stream include municipal and domestic water supply, irrigation, and livestock watering.

Water quality data for Fish Creek Springs are available from 10 samples collected for the Updated Surface Water and Groundwater Baseline Report (Schlumberger 2014). Based on these samples, water from Fish Creek Springs has calcium-bicarbonate composition with near-neutral to moderately alkaline pH (7.40 to 8.17 s.u.) and moderate concentrations of total dissolved solids (TDS) (290 to 400 milligrams per liter [mg/L]). Metal concentrations in the sampled spring water are generally near or below analytical detection limits and below Nevada Profile I reference values. These results are consistent with historical monitoring data for Fish Creek that were collected by the USGS between 1967 and 1981 (NewFields 2019d). All drainages in the Project area are ephemeral and flow infrequently in response to precipitation and snow melt. The direction of flow is generally east away from alluvial fans on the eastern slopes of the Fish Creek Range, but some drainages within the transmission line corridor flow north and northwest. Infrequent surface water flows quickly infiltrate into basin sediments and water quality data are not available for any of the ephemeral drainages. In 2014, the U.S. Army Corps of Engineers issued a jurisdictional determination that all drainages within the Project area (35 channels totaling 240,668 linear feet) are intrastate isolated waters with no apparent interstate or foreign commerce connection (i.e., non-jurisdictional waters of the U.S.). This determination was reverified in a letter from the U.S. Army Corps of Engineers to NVV on January 8, 2020.

3.19.1.2 Groundwater Resources

3.19.1.3 Regional

Groundwater in the area of analysis occurs in unconsolidated deposits and bedrock. Unconsolidated deposits include colluvial and alluvial fans (alluvium) that extend from the flanks of the mountain ranges surrounding the basin and thicken toward the center of Little Smoky Valley. Alluvium is also present in Project area drainages. Bedrock is composed of Paleozoic sedimentary rocks of Ordovician to Mississippian age that include shale, sandstone, chert, quartzite, limestone, and dolomite. Groundwater recharge in the basin occurs by the infiltration of precipitation on topographically high areas and flows toward the center of the valley in alluvium before flowing northeast toward the divide between the northern part of Little Smoky Valley and Newark Valley.

Groundwater recharge in the northern part of Little Smoky Valley exceeds discharge. The USGS estimates that recharge to groundwater in the basin is about 8,400 ac-ft/yr, and discharge is about 6,800 ac-ft/yr (Heilweil and Brooks 2011). Recharge consists of direct infiltration of precipitation (7,500 ac-ft/yr), infiltration of runoff (160 ac-ft/yr), and recharge from irrigation return flows (720 ac-ft/yr). Discharge includes flow from springs (6,100 ac-ft/yr) and well withdrawals for irrigation minus return flows (700 ac-ft/yr). The majority of spring discharge in the basin is from Fish Creek Springs.

Groundwater elevation data for the northern part of the Little Smoky Valley are available from the National Water Information System database and from wells that were installed or monitored for the Project (Schlumberger 2014; NewFields 2019d). Groundwater in the area of analysis flows from the edges of the basin toward the center of Little Smoky Valley before flowing northeast toward Newark Valley under a relatively flat hydraulic gradient of 0.001 foot per foot (Schlumberger 2014). Groundwater in the Fish Creek Range near the northwestern edge the basin occurs in bedrock at elevations of up to about 7,500 feet above mean sea level and flows southeast under an apparent hydraulic gradient of 0.04 foot per foot (NewFields 2019d). In the southeastern portion of the basin near Duckwater Peak, the flow is northwest in alluvial fan deposits under a hydraulic gradient of 0.01 foot per foot (Schlumberger 2014). Groundwater elevations near the Project have been stable for the period of record, varying by approximately 1.4 feet at the 8-mile well between 1945 and 2012. The 8-mile well is approximately 1 mile south of the Project boundary. The observed annual water level fluctuation in Project area monitoring wells is generally less than 2.3 feet.

3.19.1.4 Project Area

Groundwater data for the Project area are available from 11 monitoring wells and two test wells that were installed for the Project. Boring logs and completion details for the wells are provided in the Enhanced Baseline Report for Water, Geologic, and Paleontological Resources (NewFields 2019d).

Hydrologic testing data indicate that the hydraulic conductivity (permeability) of alluvium at the site is relatively low, with values ranging from 0.02 to 0.28 foot per day for two tests that were performed by Schlumberger (2014). The hydraulic conductivity of bedrock near the pit area is estimated to be about 0.06 foot per day from two tests performed in monitoring well GHM-7 (Schlumberger 2014). Perched groundwater in bedrock (Chainman Formation) below the pit area is compartmentalized by faults and shear zones that result in limited hydraulic connection with groundwater in alluvium to the east. The overlying Woodruff Formation is unsaturated. Groundwater elevations in bedrock below the proposed pit are projected to range from about 6,630 to 6,716 feet based on monitoring data from GHM-6 and GHM-7. These elevations are 24 to 110 feet below the lowest elevation of the pit floor (6,740 feet), and 562 to 648 feet higher than the groundwater elevation at well GHM-4 near the proposed HLP. Groundwater elevations between adjacent bedrock compartments in the pit area may differ by more than 100 feet, with some compartments having confined heads and other compartments being unconfined (Schlumberger 2014).

Groundwater in alluvium below the HLP area and processing facilities flows east-northeast at a hydraulic gradient of 0.006 foot per foot. The depth to groundwater below the HLP area and processing facilities ranges from about 275 to 400 feet below ground surface becoming shallower to the east. The depth to groundwater below the planned RDA has not been documented, but it is estimated to be similar to that observed in the HLP area (about 300 to 400 feet).

Baseline monitoring data from wells GHM-6 and GHM-7 (7 samples total) indicate that groundwater in bedrock below the pit area has mixed calcium-magnesium sulfate composition with near-neutral to alkaline pH (6.58 to 8.01 s.u.) and elevated concentrations of TDS (1,100 to 1,700 mg/L). Several constituents in bedrock groundwater below the proposed open pit exceed Nevada Profile I reference values including TDS (seven of seven samples), sulfate (six of seven samples), total nitrogen (one of seven samples) antimony (three of seven samples), arsenic (three of seven samples), iron (five of seven samples), manganese (seven of five samples) and selenium (one of seven samples).

Baseline monitoring data from well GHM-2A (14 samples total) indicate that groundwater in the Chainman Formation near the proposed processing plant and office complex has mixed calcium-sodium bicarbonate composition with weakly alkaline pH (7.52 to 8.07 s.u.) and low to moderate concentrations of TDS (230 to 440 mg/L). With the exception of thallium for one sample (0.0051 mg/L), concentrations for all constituents in the sampled water have been below Nevada Profile I reference values. Reported thallium concentrations for all other samples (13 of 14 samples) ranged from 0.001 to 0.0050 mg/L and were below the detection limit.

Monitoring data from wells GPW-1, GPWM-1, GPWM-2, GPW-3, GPWM-3, and GHM-3 (49 samples total) indicate that alluvial groundwater in the Project area has mixed calcium-sodium bicarbonate composition with alkaline pH (7.45 to 8.09 s.u.) and low to moderate concentrations of TDS (190 to 450 mg/L). Metal concentrations in alluvial groundwater are typically below Nevada Profile I reference values with the exceptions of iron and manganese in water from well GHM-3 and arsenic in water from GPWM-2. GHM-3 is near the southwestern corner of the proposed HLP and has iron and manganese concentrations that average 2.1 and 1.2 mg/L, respectively. The Nevada Profile I reference value for iron is 0.6 mg/L. The reference value for manganese is 0.1 mg/L. GPWM-2 is in the proposed access road corridor and sampled water from the well has an average arsenic concentration of 0.0083 mg/L, which is lower than the reference value of 0.010 mg/L, but six out of 13 samples from the well were equal to or exceeded the reference value, with concentrations ranging from 0.01 to 0.014 mg/L.

Baseline monitoring data from well GHM-4 (four samples total) indicate that mixed alluvial-bedrock groundwater at the water table near the southwest corner of the proposed HLP has mixed calcium-magnesium-sodium sulfate composition with weakly alkaline pH (7.59 to 7.79 s.u.) and moderately elevated concentrations of TDS (730 to 970 mg/L). With the exception of selenium in three of four samples from the well, concentrations for all monitored constituents have been below Nevada Profile I reference values. The average selenium concentration in water samples from the well is 0.055 mg/L compared to the reference value of 0.05 mg/L.

3.19.1.5 Geochemical Characterization of Ore and Waste Rock

Standard geochemical tests consisting of multi-element analyses, static acid base accounting (ABA) tests, net acid-generating tests, and meteoric water mobility procedure (MWMP) tests required by the NDEP were completed on all material types. ABA tests revealed that most samples were not acid generating, exhibiting NNP values greater than zero. A limited number of samples from the Primary and Transition ore zones were classified as PAG, with NNP values less than zero. Oxide zone samples were generally alkaline. Of the waste samples, 16 percent were PAG and 84 percent were non-PAG. Most samples from the pit were classified as ore. The Project is anticipated to produce 24 million tons of ore and 2 million tons of waste rock.

The ABA test data were found to correlate well to estimates of acid-neutralizing potential and acid-generating potential based on calcium, magnesium, and sulfur chemical assays. Additionally, 740 estimates of acid-neutralizing potential and acid-generating potential from assay data supplement the conventional ABA analyses. The geochemical characterization indicated that an NNP value of zero and pyritic sulfur greater than 0.2 percent is appropriate for discriminating between PAG waste rock (values below zero and pyritic sulfur greater than 0.2 percent) and non-PAG (values greater than zero) for the site materials. The proposed classification criterion of NNP values below zero tons of calcium carbonate ($CaCO_3$) per kiloton for discriminating PAG materials differs from the general guidance of the NDEP (neutralization potential ratio of less than 1.2) and the BLM (neutralization potential ratio of less than 3.0 or NNP less than 20 tons of $CaCO_3$ per kiloton), but it is supported by the site data.

The vanadium content and NNP values would be used to discriminate ore from waste rock. All PAG waste rock would be placed within the lined, zero-discharge HLP rather than in the RDA. Conversely, all of the neutralizing rock that is mined would be placed in the RDA, regardless of vanadium grade (due to high acid consumption that reduces vanadium recovery). All samples with NNP values greater than 100 tons of $CaCO_3$ per kiloton are classified as waste, regardless of their vanadium content.

The average measure radium-226 concentration in the ore body is 3.0 picocuries per gram (pCi/g). The radium-226 concentration is below the NAC Section 459.184(1)(b) exemption level of 5 pCi/g of radium-226 and is not subject to licensing or regulation as radioactive material. The thorium concentrations in the ore and waste rock are less, with an average concentration of 4.4 milligrams per kilogram, equating to a thorium-232 concentration of 0.5 pCi/g. As with uranium and radium-226, radium-228 can conservatively be assumed to be in equilibrium with thorium-232. A radium-228 concentration of 0.5 pCi/g is typical of background concentrations in the State of Nevada. Radium-226 background concentrations are typically about 1 pCi/g.

Commitments have been made to periodically measure radium-226 concentrations in the ore to confirm that radiological concentrations remain less than regulatory limits.

The concentrations of soluble metals varied widely in MWMP tests and humidity cell tests (HCTs). Metals that were elevated in at least some samples included aluminum, iron, arsenic, antimony, cadmium, copper, nickel, selenium, vanadium, and zinc. Metal levels were generally highest at low pH except for selenium, nickel, vanadium, and zinc, which also had high concentrations in some alkaline pH samples. Elevated levels of aluminum and iron in some circumneutral MWMP tests were likely the result of migration of soil particles from the test apparatus. This would have led to an erroneous overestimation of the solubility of aluminum and iron, which are immobile at circumneutral pH values. The radioactivity of leachate was assessed using measurements of alpha and beta radiation, radium, and uranium from MWMP tests. All but a few samples were lower than the applicable water quality criteria for alpha and beta radiation, radium, and uranium, and the average values were lower than the regulatory drinking water values for each of these constituents, overall indicating that radioactive constituents do not leach at levels of concern.

HCTs were run on each of the material types associated with the deposit. Two additional samples of leached ore were also evaluated using HCTs. HCTs with NNP values less than zero with pyritic sulfur greater than 0.2 percent were found to become acidic during the tests, whereas samples with higher NNP values remained non-acid and produced smaller amounts of sulfate and metals. The HCTs support the use of an NNP value of zero and pyritic sulfur greater than 0.2 percent to discriminate between PAG and non-PAG material. Also, the HCTs provided useful information about metal mobility, which paralleled the findings of the MWMP tests. The PAG materials tended to produce acidic leachate with high metal concentrations. Although the non-PAG materials leached metals at lower concentrations than the PAG materials, some of the non-PAG leachate did exceed NDEP Profile I reference values for a variety of metals.

3.19.2 Environmental Effects

Impacts on surface water or groundwater resources that could occur from development of the Proposed Action or alternatives include (1) changes in surface water and groundwater availability (quantity) for current users by consumptive use of water from Fish Creek Springs for mine water supply; (2) changes in surface or groundwater quality by runoff or infiltration of precipitation from mine facilities including the open pit, RDA, HLP, haul roads, and other mining-disturbed areas; and (3) impacts on surface or groundwater quality by spills or leaks of fuel, hazardous chemicals, or process solution from the HLP, processing ponds, plant, and shop/maintenance facilities.

3.19.2.1 Effects Level Definitions

Effects on water resources and geochemistry are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Effects on water resources could occur, but they would be so slight as to not be measurable or distinguishable from natural fluctuations.

Minor: Effects on water resources would occur, but would be small and just measurable using normal methods. Effects are unlikely to affect beneficial uses of the receiving water.

Moderate: Effects on water resources would occur and would be readily detectable and could affect the beneficial uses of the surface or groundwater resources.

Major: Effects on water resources would be large, measurable, and easily detected and would substantially change beneficial uses of surface or groundwater resources, or hydrologic regime over the area.

Duration

Short-term: One year or less.

Long-term: Greater than 1 year.

Context

Localized: Effects would occur at specific site(s) or within the Project boundary.

Regional: Effects would extend beyond the Project area.

3.19.2.2 Proposed Action

Direct and Indirect Effects

Water Quantity Impacts from Mine Water Use

NVV has entered an agreement with the Fish Creek Ranch to lease water rights to meet the water supply requirements of the Project for a period of 10 years. Specifically, NVV would lease 1,046.5 ac-ft/yr (1.44 cfs) of water that has been historically diverted from Fish Creek Springs and used for irrigation. The Project would use 805 ac-ft/yr (1.11 cfs) of the leased water to meet the mine water supply and processing requirements. The leased water would be piped from the current point of diversion at the springs to the Project area and stored in a tank prior to use. The majority of the diverted water would be used to process ore and would be recycled or lost to evaporation in a closed loop system that includes the HLP, process ponds, lined drainage channels, and associated piping. A smaller fraction of the water would be used for dust suppression, construction and other uses. The remaining 241.5 ac-ft/yr (0.33 cfs) of leased water would be left in Fish Creek and allowed to flow downstream and infiltrate to groundwater. The unused portion of the leased water is equal to the return flow that would occur if the total volume of leased water was used for center-pivot irrigation. Based on the agreement with NVV, the Fish Creek Ranch would remove 818 acres of alfalfa from production during the term of the lease to compensate for the 1,046.5 ac-ft/yr (1.44 cfs) that would otherwise be used for irrigation.

Development of the Project would not alter the groundwater recharge component (i.e., irrigation return) of existing water use by the Fish Creek Ranch and would not increase water withdrawals in the basin or affect water availability in Fish Creek. However, the Proposed Action would change the location of groundwater recharge from below the irrigated alfalfa fields to the stream channel for Fish Creek. Impacts on surface water and groundwater quantity from the lease of Fish Creek Ranch water rights for mine water supply would be negligible, long term, and localized.

Impacts on Water Resources from the Rock Disposal Area

Impacts on water resources from stormwater runoff and seepage to groundwater from the RDA are expected to be minimal during operation and after closure because of arid climatic conditions in the Project area. The average annual precipitation in the Project area is estimated to be 8 inches per year, with precipitation during December, January, and February falling mainly as snow (Schafer et al. 2012). Potential evapotranspiration exceeds precipitation by a factor of 20.8 and is estimated to be 166 inches per year (ASI 2021c).

The RDA footprint would include 29.1 acres and contain up to 2.5 million tons of non-PAG waste rock. Because of its small size, the facility would not be reclaimed concurrently during construction to allow adequate room for the operation of heavy mining equipment. At the end of mining, the RDA would be regraded to a stable configuration with a maximum of slope of 3:1 horizontal to vertical and a 1-foot-thick (minimum) soil cover would be installed at the surface. The purpose of the soil cover would be to support the establishment of vegetation and minimize waste rock contact with meteoric water. Waste rock that would report to the RDA is friable in nature and has high moisture-retention capacity. A portion of it may be salvaged at the end of mining to construct the evaporative cover for the HLP.

Although only non-PAG waste rock would be placed in the RDA, geochemical testing indicates that the material has the potential to release metals and other constituents of potential concern (COPCs) in runoff and seepage from the facility. The COPCs that could be mobilized at levels that exceed NDEP Profile I reference values include antimony, arsenic, cadmium, copper, molybdenum, nickel, selenium, sulfate, TDS, vanadium, and zinc (Schafer 2014; Schafer et al. 2012). The COPC concentrations in seepage from the RDA (with the exceptions of arsenic and zinc) are expected to be significantly attenuated in the unsaturated zone before reaching groundwater.

Precipitation falling on the RDA would either runoff, infiltrate, or be lost to evapotranspiration. Runoff from the RDA during operation would be directed to an unlined sediment pond east of the facility where it would evaporate, infiltrate, or be discharged to the natural drainage for infiltration into alluvium. This would allow for monitoring of stormwater from the RDA in accordance with the Adaptive Waste Rock Management Plan (NVV 2020). Berms and/or channels would also be constructed around the perimeter of the RDA to divert upslope stormwater runoff to the natural drainage below the sediment pond. The sediment pond and stormwater diversions would be left in place after closure.

Precipitation that infiltrates into the RDA would either seep into groundwater or be lost to evapotranspiration. It is expected that truck traffic during construction of the facility would result in substantial disaggregation and compaction of material on the working surface, which would promote runoff from the pile over infiltration. Given the high moisture-retention capacity of non-PAG waste rock, most of the precipitation that infiltrates would be stored near the surface of the RDA where it would be lost to evaporation. Infiltration that percolates downward through the pile would have to pass through 300 to 400 feet (estimated) of unsaturated alluvium and bedrock before reaching groundwater. Based on the results of geochemical testing, metals and other COPC concentrations in seepage from the RDA with the exceptions of arsenic and zinc are expected to be significantly attenuated in the unsaturated zone before reaching groundwater. Reclamation and installation of the vegetated soil cover for closure is expected to limit infiltration of precipitation through the RDA to about 0.0002 inch per year (Schafer et al. 2012).

Potential impacts on surface water and groundwater quality from the RDA during operation and closure are expected to be negligible to minor, long term, and localized. The potential volumes of runoff and seepage from the facility would be relatively small because of the low precipitation and high evapotranspiration potential at the site. Runoff from the facility would report to a detention pond to control sediment transport and would ultimately be allowed to evaporate or infiltrate 300 to 400 feet (estimated) through unsaturated alluvium to groundwater. Infiltration of runoff may occur from the sediment pond or in the natural drainage a short distance below the RDA. The drainage below the RDA does not have a connection to waters of the U.S. Long-term infiltration and seepage from the RDA would be expected to be limited to about 21 cubic feet per year based on cover modeling performed by Schafer (2014). Seepage from the facility would also have to percolate 300 to 400 feet (estimated) through the unsaturated zone before reaching groundwater. Prior to entering groundwater, significant attenuation COPC concentrations in seepage and infiltrated runoff is expected to occur. Construction of the RDA is projected to have negligible impacts on surface water or groundwater quantities that are available to users, livestock, or wildlife in the area of analysis.

Impacts on Water Resources from the Open Pit

The open pit would be at the top of Gibellini Ridge and would have a relatively small upstream catchment. The minimum elevation of the pit would be approximately 24 to 110 feet above the groundwater level in bedrock, and the pit would not require dewatering to permit mining (Schlumberger 2014). At the end of mining, the pit would remain open and the floor would be graded to drain southwest so that stormwater does not accumulate in the pit. A slot-drain with a riprap-filled energy dissipation structure would be installed at the pit outfall to allow runoff to flow into natural drainage after being retained to reduce suspended sediment. Temporary ponding of stormwater may occur in the pit during operation, but ponding is expected to be infrequent because of the low precipitation and high evaporation rates at the site. The residence time of stormwater collected in pit sumps during operation would be minimized by using the water for dust suppression.

The average annual surface discharge from the pit after closure based on the disturbance footprint of 84.8 acres and the assumption that runoff from the pit walls would be equal to 30 to 70 percent of average annual precipitation is calculated to be between 17.0 and 39.6 ac-ft/yr. Water discharged from the pit is expected to flow a short distance to the natural drainage below the slot-drain before infiltrating into alluvium.

Geochemical characterization data indicate that rocks exposed in the pit walls and floor would have the potential to release COPCs including antimony, arsenic, cadmium, copper, molybdenum, nickel, selenium, sulfate, TDS, vanadium, and zinc in runoff at levels that exceed NDEP Profile I reference values (Schafer 2014; Schafer et al. 2012). Geochemical testing indicates that the majority of COPCs may be partially attenuated in the unsaturated zone before infiltrating to groundwater. Resonance or attenuation time of meteoric water on the pit wall would limit the transport of metals.

Potential impacts on surface water and groundwater quality from the open pit during operation are expected to be negligible and localized because stormwater that accumulates in the pit would be used for dust suppression and would not be discharged. Impacts on groundwater from the pit after closure including increased recharge to alluvium in the natural drainage below the slot-drain and changes in alluvial groundwater quality caused by loading of COPCs in pit runoff would be major, long term, and localized. Impacts on bedrock water quality would be minor, long term, and localized because the quality of runoff from the pit walls that infiltrates before being discharged from the slot-drain is expected to be similar to the existing water quality in the Chainman Formation below the pit. Impacts on surface water in the drainage below the slot-drain after closure are expected to be negligible to minor and localized because runoff from pit would flow a short distance before infiltrating, and the drainage does not have a connection to waters of the U.S.

Impacts on Water Resources from the Heap Leach Pad

The HLP would be a zero-discharge facility that incorporates liners and leak detection systems to prevent leakage during operations. Closure of the HLP would be concurrent with operations through phased development of the leach pad. Once a phase of the pad is fully leached, fresh make-up water would be used to rinse and recover acidity from the spent ore. The rinse water would then be used to leach successive phases of the HLP. After rinsing, spent ore in a cell would be regraded and covered with a high-density polyethylene (HDPE) liner to construct an E-cell that would be used to reduce process fluid inventory through forced evaporation. The active fluid reduction phase would occur until the draindown flow is less than 24 gallons per minute, at which point conversion of the process ponds to E-cells would be able to manage the remaining flow. During closure, E-cells would be covered with HDPE liners that would be welded to the underlying liners and then be covered by 3 feet of soil and vegetated. Conversion of the process and evaporation ponds to E-cells would occur during the last year of the active solution reduction phase and would be followed by an additional 30 years of semi-passive treatment and evaporation in the process pond E-cells.

Long-term drainage from the HLP would be managed in accordance with NDEP and Nevada BLM Reclamation/Closure requirements so that the facilities would not degrade waters of the State. Under standard design, operation, and monitoring requirements, passive management of leachate from the HLP would prevent solution from discharging to surface water or infiltrating to groundwater. Therefore, impacts on water resources from operation and closure of the HLP are not expected to occur.

Impacts on Water Resources from Process Ponds

Process ponds for the HLP would be connected by overflow weirs to provide for emergency containment of the solutions. The lining system for the ponds would consist of HDPE primary and secondary liners with a geonet drainage layer. Each pond would have an independent leak detection system consisting of a lined sump that would be monitored. Process solution would be routed to and from the ponds in pipelines contained in HDPE-lined channels. Because the process pond system would be designed to identify, contain, and mitigate potential leaks, impacts on water resources from operation and closure of the facility are not expected to occur.

Impacts Associated with Stormwater Management

The potential for stormwater to affect the quality of surface water or groundwater by increased sedimentation from disturbed areas during construction or mine operation is expected to be minor and short term. In general, the greatest risk of sedimentation in surface water would occur during soil salvage operations, diversion channel construction, soil stockpiling operations, and construction of surface facilities, and immediately following implementation of reclamation. Temporary sediment controls that would be used during construction are described in the stormwater management plan (NVV 2020) and include silt fences, straw bales, wattles, and temporary diversion ditches. Structural sediment controls for major mine facilities including the RDA; haul roads and secondary roads; growth media stockpiles; reagent, fuel, and explosive storage areas; open pit; landfill; and laydown yards would include diversion channels, berms, sediment retention basins, and energy dissipation structures.

Following attainment of reclamation standards, sediment ponds would be cleared of accumulated sediments and left in place to promote post-mining land uses. Stormwater diversions that were constructed during operation would be breached or backfilled and adequately protected to prevent erosion. The process plant, crusher, and administration/laboratory building areas, along with the conveyor and road corridors, would be graded to blend into the surrounding topography and to reestablish existing drainage patterns. In addition, there are no perennial or intermittent surface waters within the Project area, and the depth to groundwater and attenuation capacities of the unsaturated zone in the Project area would limit the potential migration of solutes.

The stormwater control system for the Project consists of diversion channels and berms, inlet channels, and sediment basins to protect process and non-process facilities from storm runoff. Process components would be isolated from stormwater flow in natural drainage areas via diversion channels to minimize the potential for local impacts on watershed areas. It is anticipated that during the life of the Project, the limited runoff that presently occurs would be somewhat reduced in the ephemeral drainages. However, successful reclamation and closure in accordance with NDEP/BLM reclamation requirements minimize disturbance to the ephemeral drainages. Overall impacts from stormwater management on the ephemeral watershed areas associated with the construction, operation, and closure of the mine are expected to be minor, localized, and long term.

Impacts from Spills/Leaks of Hazardous Chemicals or Process Solution

The potential for groundwater or surface water quality to be affected by leaks or spills associated with the use or production of hazardous materials and wastes during construction and operation is anticipated to be negligible because of the containment design for all chemicals. In addition, an SCP has been developed for the Project that includes standard operating procedures and best practices for spill prevention and spill containment. In the event that a spill occurs, the procedures outlined in the SCP would be implemented to avoid or minimize any potential impacts.

The reagent tanks within the process facility would be designed and constructed on a sealed, cement slab with secondary containment and a steel building cover supported by a steel frame. The secondary containment would be designed to contain 110 percent of the volume of the largest tank or container within the area of containment (in accordance with NDEP regulations at NRS 445A.350–447). Each containment area would be sized based on this criterion.

Fuel and oil for diesel- and gas-powered equipment would be stored in aboveground, sealed tanks generally within the processing facilities area. The tanks would be installed in lined or concrete containments. The storage area would be surrounded by berms or containment walls designed to provide a secondary containment capacity of 110 percent of the largest vessel. Surface piping would lead from each tank to the fuel dispensing area within secondary containment. The refueling hoses would be equipped with overflow prevention devices and secondary containment.

Hazardous wastes would be managed in the designated 90-Day Storage Facility prior to shipment off site to a licensed disposal facility (per State and Federal Resource Conservation and Recovery Act regulations). These materials may include waste paints and thinners. Spent cleaning solvents and used oils would be returned to recycling facilities. Used oil, lubricants, and solvents would be collected and transported off site for recycling. A detailed description of waste management activities is presented in SER 6: Hazardous Materials and Solid Waste (BLM 2021d).

Potential impacts on water resources related to spills or leaks of hazardous chemicals, fuel, or process solution are expected to be negligible, short term, and localized.

Impacts from Vanadium and Uranium Production

Vanadium recovery and final product storage would all be conducted within the containment of the processing plant. The final products to be produced include ammonium metavanadate, V_2O_5, and high-purity V_2O_5. These products would be stored and shipped in solid form. Storage of the final solid vanadium products would be in super sacs in the product storage area on the north side of the process building.

The uranium extraction process would occur in a single dedicated room isolated within the processing plant. The uranium extraction room would be equipped with a sump that pumps collected fluids back to the filter press for recovery of the uranium. The sump would not have an exterior discharge and all associated equipment would be above the sealed concrete floor to facilitate decontamination and eventual decommissioning. Uranium would be placed into transport containers and stored in the uranium room until shipped off site. The frequency of uranium shipments would be approximately every 2 months to minimize onsite storage.

All production and storage of products would occur within the processing plant that would be constructed and operated in accordance with NDEP regulations at NRS 445A.350-447 and subject to management under the Water Pollution Control Permit. The potential for impacts on surface water or groundwater quality from product spills would be negligible, short term, and localized because all product storage would be fully within the facility containment and any spills would be cleaned up in accordance with provisions included in the Water Pollution Control Permit. Radiation surveys and monitoring will be conducted in operational areas of the facility and routine surveys for contamination will be conducted in the restricted area and in areas frequented by personnel working in the restricted area.

Mitigation Measures

No mitigation measures are recommended for water resources and geochemistry.

Residual Effects

After mining operations have concluded, surface disturbances would be reclaimed, including seeding to promote vegetative cover that would significantly reduce infiltration into the HLP and RDA. After reclamation is complete, most disturbed areas would develop vegetative cover, and soils subject to erosion would be reduced to typical levels for the area. The open pit area would not be reclaimed, which would result in increased recharge to the surface drainage below the slot-drain and impacts on alluvial groundwater quality.

Reclamation activities could result in localized, short-term impacts during construction. Successful implementation of the site closure plan would minimize or eliminate most residual adverse effects on water resources.

3.19.2.3 South Access Road Alternative

The change in location of the access road would not result in a change in the potential for impacts on surface or groundwater resources, as road lengths are very similar and both roads would cross the same alluvial fan extending out from the eastern flank of the Fish Creek Range. Both access routes would be very flat and would not cross any significant drainages that could be affected by stormwater flow. As a result, Project-related water resource impacts under the South Access Road Alternative would be identical to those of the Proposed Action.

3.19.2.4 Renewable Energy Alternative

No surface waters or drainages occur in the solar field area. Project-related water resource impacts resources under the Renewable Energy Alternative would be identical to those of the Proposed Action.

3.19.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated impacts in the Project area would not occur.

3.19.3 Cumulative Effects

The CESA boundary for water resources and geochemistry includes the Project area and Basin 155A. The CESA was defined to include the maximum geographic extent of effects from surface disturbances and water management activities associated with the Project and interrelated actions, and past and present actions and RFFAs. The total area of the CESA encompasses 376,961 acres.

Within the CESA, past and present disturbance has resulted from the following activities: mineral development and exploration projects (303 acres), utilities and infrastructure (492 acres), public roads (214 acres), dispersed recreation, and livestock grazing.

Wildland fires are another major disturbance. These can cumulatively affect surface water quality by removing the vegetation layer, increasing erosion and downstream turbidity. Storms can cause mass losses of sediment along eroded embankments, altering the course of hydrological systems. Wildland fires also can change the ecosystem, replacing shrub habitat with grasslands. Shrubs are more resistant to erosion, but grasslands are more adaptable to changing environmental conditions.

Rangeland management also is an important disturbance to, and user of, water resources in the CESA. Rangeland management relies on predictable subsurface and surface water quantity and quality to sustain activities. This source can contribute to changes in water quality through the addition of nitrogen and other constituents. Livestock also can trample vegetation around water sources, degrading surface water quality through subsequent erosion.

Mining also has the potential for cumulative impacts on water quality and quantity. Individually insignificant dewatering of numerous mine pits can cause CESA-wide changes in both groundwater and surface water quantity. Exposure of naturally occurring geochemical conditions can cause harmful constituents to enter the watershed through inadvertent release. Waste rock can pose a threat for erosion and sedimentation to the watershed. Individual mine impacts may be minor to negligible, while cumulative mining activity can pose a potential for significant impacts on water quality in the CESA.

Previous construction associated with utilities, infrastructure projects, and roads may have used water during construction, and the largest potential post-construction effect likely is related to erosion and sedimentation associated with access roads or reclaimed disturbances. All roads can present water quality impacts due to inadvertent spills or releases during vehicular accidents. Unpaved roads, such as those crossing public lands and those within recreation sites in the CESA, also can be a source of increased erosion and sedimentation. Paved roads may cause water quality issues resulting from increased stormwater runoff.

RFFAs in the CESA would include mineral development and exploration projects (4 acres), oil and gas leases (22,997 acres), and utilities and infrastructure (23,073 acres). Wildland fires in this CESA may occur in the future, as would restoration projects, livestock grazing, and dispersed recreation. These activities would lead to similar impacts as stated in past and present actions.

3.19.3.1 Proposed Action

The Proposed Action is predicted to not affect any perennial springs or seeps and, therefore, would not contribute to cumulative impacts on seeps and springs in the CESA.

The water supply for the Project would use a surface water source currently used for agricultural irrigation. This water supply for the Project would use surface water rights obtained from the Fish Creek Ranch, which would be transferred from the ranch to the mine thereby resulting in no net additional use in the basin and not contributing to cumulative impacts on water quantity.

Under the Proposed Action, impacts on surface water resources would involve surface disturbance of minor ephemeral drainages and associated contributing watershed areas. All Project disturbance, except the open pit, would be reclaimed during closure to minimize impacts within the local watershed. Therefore, Project disturbance would have a minor, localized, and long-term effect on watersheds in the CESA.

Runoff from the pit walls would affect alluvial groundwater quality in the drainage below the pit outfall after closure and contribute to existing water quality impacts from agricultural irrigation in the basin. The other mine facilities including the RDA, HLP, and processing facilities would have localized negligible to minor impacts on surface water and groundwater quality and would not result in significant cumulative impacts within the CESA.

Surface water quality impacts could result in the CESA from incidental spills, from intensive storms that overwhelm control features, and by erosion and sediment transport from disturbed areas. These isolated occurrences would affect surface water quality in their immediate locales.

Operator and agency responses, in the form of containment and spill response and cleanup, would limit the extent and severity of these incidental impacts so no cumulative effects would occur.

3.19.3.2 South Access Road Alternative

Under the South Access Road Alternative, cumulative impacts would be the same as those described for the Proposed Action, as no additional impacts are expected from the change in location of the access road. As a result, there would be no potential cumulative impacts on this area of analysis from the South Access Road Alternative.

3.19.3.3 Renewable Energy Alternative

Cumulative impacts on water resources from the Renewable Energy Alternative would be similar to those identified for the Proposed Action. Of the total acres of new disturbance that would occur under the Proposed Action, the Project surface disturbance would increase by 33 acres under the Renewable Energy Alternative. No surface waters or drainages occur in the 33-acre solar energy field area. This additional disturbance would not be reclaimed at the end of the Project and would therefore result in minimal, permanent impacts on water resources.

3.19.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed, and impacts on water resources associated with the Proposed Action would not occur. As a result, there would be no potential cumulative impacts on this analysis area from the No Action Alternative.

3.20 WILD HORSES AND BURROS

HMAs are areas identified in Land Use Planning for long term management of wild horses or burros. The Project intersects with the Fish Creek HMA, for which the Appropriate Management Level for wild horses has been determined by the BLM, guided by the RMP. Wild horse distribution and movement patterns within the Fish Creek HMA vary greatly throughout the year and are influenced by climatic factors such as precipitation and temperature, availability of forage, and availability of water. Many of the wild horses move into the higher elevations of the Fish Creek HMA in the summer months and move into the lower-elevation winterfat communities in Antelope Valley in the winter (BLM 2015b). There are no burros in the Fish Creek HMA. The Final SER 17: Wild Horses and Burros (BLM 2021k) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.20.1 Affected Environment

The current Appropriate Management Level identified for the Fish Creek HMA is a population of 107 to 180 (BLM 2020b). The BLM actively manages the Fish Creek HMA through wild horse gathers (BLM 2015b, 2020b). The most recent wild horse gather was conducted in January

2021. The current estimated HMA population is approximately 120 wild horses, with an estimated annual population increase of 16 percent to 20 percent (Distel 2021; Richardson 2020).

3.20.2 Environmental Effects

The potential issues related to wild horses include a temporary and permanent loss of foraging areas within the Fish Creek HMA, increased use area fragmentation, animal displacement, potential direct loss of wild horses, and effects associated with water management.

Potential effects on wild horses may include the short-term, long-term, and permanent reduction or loss of forage. Short-term effects arise from use area removal and disturbance from Project-related activities. Effects on wild horses would cease within the completion of linear construction activities (water line and power line), mine closure, and successful reclamation. Long-term effects consist of changes to use areas and the wild horse populations that depend on those use areas, irrespective of reclamation success. Permanent effects typically would be associated with the construction of open pits and facilities that permanently alter the vegetation, soil, and topography of the landscape.

Direct effects on wild horse populations may include limited direct mortalities from Project-related activities (e.g., vehicle collisions), forage loss or alteration, and incremental use area fragmentation. Indirect effects, such as animal displacement and reduced fecundity, could result from increased noise and additional human presence in the Project area. The degree of the effects on wild horses and their use areas would depend on factors such as the sensitivity of the individual animals, seasonal use patterns, type and timing of Project activity, and physical parameters (e.g., topography, cover, forage, and climate). Overall, it is expected wild horses would avoid the disturbance areas during construction and operation activities and increase use in other portions of the HMA, which could result in changes to usage patterns and distribution within the HMA.

3.20.2.1 Effects Level Definitions

Effects on wild horses and burros are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Effects would not result in any perceptible changes to wild horse and burro use area (e.g., foraging) or distribution.

Minor: Effects would result in minimally observable and/or measurable changes to wild horse and burro use area (e.g., foraging) or distribution. The Proposed Action could result in a temporary displacement of animals. The animal use patterns and/or their habitat is expected to recover in a short period of time (within hours to days) without human intervention.

Moderate: Effects would result in observable and/or measurable changes to wild horse and burro use area (e.g., foraging) or distribution. The Proposed Action could result in displacement of some animals. The animal use patterns and/or habitat are expected to recover within several weeks to several months.

Major: Effects would result in marked changes to wild horse and burro use area (e.g., foraging) or distribution. The Proposed Action could result in displacement of some or all of the animals. The use patterns, distribution, health, and/or use area could recover, but it likely would take a year or more with no guarantees of success.

Duration

Short-term: Less than 1 year.

Long-term: Greater than 1 year.

Permanent: Effects on wild horse and burro use area would be permanent.

Context

Localized: Limited to the area of analysis.

Regional: Affecting areas beyond the area of analysis.

3.20.2.2 Proposed Action

Direct and Indirect Effects

The Project would result in 806 acres of surface disturbance and the facility fencing would exclude wild horse access from an additional 413 acres of undisturbed lands on the 252,772-acre Fish Creek HMA, which is 0.48 percent of the HMA. The Project area does not represent important or highly used areas by wild horses; rather, wild horse use in the Project Area is infrequent and incidental. Historical inventories show little use when compared to other more highly used areas in the HMA. This low rate of use may be attributed to limited forage and water, dominant pinyon-juniper woodlands, and difficult terrain associated with the Project area. The surface disturbance associated with the Project would be reclaimed following completion of mining operations except for 85 acres in the Fish Creek HMA associated with the unreclaimed open pit. Fencing would be built during the construction phase and removed following reclamation. Therefore, direct impacts on wild horses from use area disturbance are anticipated to be minor, long term (permanent for the 85 acres associated with the unreclaimed pit), and localized. The reclaimed plant communities would initially comprise grasses and forbs while shrubs establish, which offer better forage for wild horses when compared with the pre-mining communities.

Effects on wild horses from human presence and noise could cause them to reduce or eliminate use of a larger land area than the Project area, thereby increasing use of other portions of the Fish Creek HMA over the life of the Project. The actual total extent of forage loss as a result of the avoidance response would be difficult to predict because the degree of this response varies from animal to animal. During construction it is likely that wild horses would avoid the Project area. However, over time, they are likely to become accustomed to the mining activity and begin to reoccupy areas initially avoided. The Project area is not an important foraging area for wild horses and there are no water sources nearby. Therefore, wild horse use of the area is incidental. After initial avoidance of human activity and noise-producing areas, certain individuals may acclimate to the activity and begin to reoccupy areas initially avoided. Additionally, the Applicant-committed EPMs would combine to minimize the potential effects related to increased human presence in the Project area. Therefore, impacts on wild horses are anticipated to be minor, long term, and localized.

Effects on wild horses as a result of water management activities would be the same as described in SER 18: Wildlife and Aquatic Resources (BLM 2022g) for the Project. The water line and associated power line (representing 31 acres of surface disturbance) would be immediately reclaimed following construction. The Project would not affect spring or stream flows (see SER 16: Water Resources and Geochemistry [BLM 2022f]) or the supplemental watering locations in the HMA, which are outside of the Project area. Therefore, impacts on wild horses from water management activities are anticipated to be negligible, short term, and localized.

Mitigation Measures

No mitigation measures are recommended for wild horses.

Residual Effects

Residual effects on wild horses under the Proposed Action would include the permanent loss of 85 acres of the Fish Creek HMA due to the unreclaimed open pit. In areas that would be disturbed by the Project but later reclaimed, the loss of shrub- or tree-dominated communities within these HMAs would represent a long-term change in use area composition (i.e., shrub-dominated communities to grass/forb-dominated communities) because it would take approximately 25 years for mature shrubs to become re-established in these communities.

3.20.2.3 South Access Road Alternative

Under the South Access Road Alternative, the change in location of the access road would result in 38 additional acres of surface disturbance. The South Access Road Alternative would result in 844 acres of surface disturbance, and the facility fencing would exclude wild horse access from 413 acres of the 252,772-acre Fish Creek HMA, which totals to 0.49 percent of the HMA. The surface disturbance associated with the Project would be reclaimed following completion of mining operations except for 85 acres in the Fish Creek HMA associated with the unreclaimed open pit. Aside from the increased surface disturbance acreage, the effects under this alternative would be comparable to the effects under the Proposed Action.

3.20.2.4 Renewable Energy Alternative

Under the Renewable Energy Alternative, the construction of the field of PV panels and battery storage would result in 33 additional acres of permanent surface disturbance. The Renewable Energy Alternative would result in 839 acres of surface disturbance. The fencing associated with these facilities would not overlap the Fish Creek HMA and, therefore, would not exclude wild horses from any portion of the HMA. The surface disturbance associated with the Project would be reclaimed following completion of mining operations except for 85 acres in the Fish Creek HMA associated with the unreclaimed open pit and the 33-acre solar PV field. Aside from the increased disturbance acreage, the effects under this alternative would be comparable to the effects under the Proposed Action. Therefore, wild horse impacts as a result of the Renewable Energy Alternative are anticipated to be negligible, short term, and localized.

3.20.2.5 No Action Alternative

Under the No Action Alternative, the Project would not take place and impacts on wild horses would not occur. Under the No Action Alternative, wild horses and the Fish Creek HMA would continue to be managed as they currently are. Under this alternative, there would be no surface disturbance and no permanent loss of use area in the Fish Creek HMA. Additional use area fragmentation and animal displacement would not occur, limiting the effects on wild horses to existing conditions. The level of human use would remain the same as the current levels. Therefore, impacts on wild horses from the No Action Alternative are anticipated to be negligible, short term, and localized to the Project area.

3.20.3 Cumulative Effects

The CESA for wild horses is the same as the area of analysis, encompassing the Project area and the Fish Creek HMA. The CESA consists of 250,094 acres of BLM-administered land and 2,677 acres of a mixture of private and other public lands for a total of 252,772 acres. The CESA boundary for wild horses is based on known distribution and movements of wild horses in this region of Nevada in relation to the BLM's designated Fish Creek HMA. The CESA encompasses the extent of potential effects from activities associated with the Project, and interrelated actions may result in cumulative effects when combined with potential effects from past and present actions and RFFAs.

3.20.3.1 Proposed Action

Cumulative effects on wild horses primarily would be directly related to forage loss, use area fragmentation, and animal displacement. Many of the wild horses that occur in the CESA would continue to occupy their respective ranges and breed successfully, although population numbers may decrease relative to the amount of cumulative forage loss and disturbance from incremental development.

The Project incrementally would increase disturbance to wild horse use areas by an additional 806 acres (0.32 percent of the CESA), resulting in a total cumulative surface disturbance of approximately 1,619 acres (approximately 0.64 percent of the CESA). Pending completion of successful reclamation, the incremental additional effects on wild horses as a result of the Project would be mostly temporary in nature for the majority of the Project's surface disturbance area. The 85 acres associated with the unreclaimed pit would be permanently lost from the CESA. The reclaimed areas and areas associated with use area conversion would likely provide better forage for supporting wild horse use than pre-mining communities; however, densities and distribution may change in the long term but are anticipated to be minor and localized.

Indirect effects associated with human presence and noise would incrementally increase in the CESA during the life of the Project. The contribution of the Project to these effects would be minor, long term, and localized and would cease following completion of operations and final reclamation.

The Project is not anticipated to affect the amount and extent of available surface water (e.g., seeps and springs) in the Project vicinity or associated wetland use area for wild horses within the CESA.

3.20.3.2 South Access Road Alternative

Under the South Access Road Alternative, the change in location of the access road would result in 38 additional acres of surface disturbance. The South Access Road Alternative would result in a reduction of forage resources for wild horses on 844 acres, or 0.33 percent of the 252,772-acre CESA. The effects in the CESA under this alternative would be comparable to those of the Proposed Action.

3.20.3.3 Renewable Energy Alternative

Under the Renewable Energy Alternative, the construction of the field of PV panels and battery storage would result in 33 additional acres of surface disturbance, which would not be reclaimed. However, the Renewable Energy Alternative would not result in a reduction of forage resources for wild horses as compared to the Proposed Action, and the effects in the CESA under this alternative would be comparable to those of the Proposed Action.

3.20.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be constructed, and past and present actions and RFFAs would continue in the CESA. As a result, there would be no potential for the Project to contribute to cumulative impacts on wild horses. Wild horses and the HMA would continue to be managed as they currently are. Cumulative impacts on wild horses under the No Action Alternative would be less than those under the Proposed Action but would still be anticipated to be negligible, long term, and minor.

3.21 WILDLIFE AND AQUATIC RESOURCES

Wildlife species occurring in the Project area and vicinity are typical of species found in the lower and mid-elevations of the Great Basin. Vegetation cover supporting wildlife habitat in the area includes pinyon-juniper woodlands interspersed with mahogany and sagebrush within mountainous areas, transitioning to sagebrush habitat along alluvial fans, and greasewood and shadscale along valley bottoms. Key wildlife habitat features that could support wildlife include ridges, cliffs, canyons, rock outcrops, and ephemeral drainages. Although there are no riparian areas or surface water features within the Project area, Fish Creek and Fish Creek Springs, which are about a mile north of the Project area, provide a year-round water source for wildlife. Other smaller springs and perennial streams occur within the larger hydrographic basin in which the Project area occurs, but not in the Project area itself. The Final SER 18: Wildlife and Aquatic Resources (BLM 2022g) provides detailed affected environment and environmental consequences sections and is incorporated here by reference.

3.21.1 Affected Environment

3.21.1.1 General Wildlife

Common wildlife species observed in the Project area included black-tailed jackrabbits (*Lepus californicus*), coyotes (*Canis latrans*), and several species of mice and squirrels (Enviroscientists et al. 2013). An American badger (*Taxidea taxus*) den was observed near the power line corridor (Enviroscientists et al. 2013). Rodent populations are abundant within the valley and provide a substantial prey base for local predators including mammals, raptors, and reptiles (Cedar Creek 2019a).

3.21.1.2 Big Game

Two NDOW hunt units, units 145 and 164 (corresponding to NDOW Management Areas 14 and 16, respectively), overlap the Project area. Populations of mule deer and pronghorn antelope are known to occur within the Project area and 4-mile buffer area that encompasses the area of analysis for big game species. Mule deer distribution spans across the mountain ranges and foothills (**Figure 3.5**), while pronghorn distribution spans the valley floors (**Figure 3.6**). A seasonal mule deer movement corridor extends through the Project area. Mule deer migrate south to the Fish Creek Mountains in the winter and north to the Diamond Mountains in the spring. A pronghorn movement corridor with a north–south orientation along County Road M-103 (Duckwater Road) transects the eastern end of the Project access and power line corridors (NDOW 2020).

Mule deer utilize all habitats present in the area of analysis and have been observed within and nearby the Project area utilizing sagebrush habitats, pinyon-juniper encroached sagebrush habitats, and wooded habitats. There are approximately 4,739 acres of mule deer winter range in the Project area. There is no winter or crucial winter habitat in the Project area for bighorn sheep, elk, mountain goat, or pronghorn.

Pronghorn will utilize a variety of habitats, although they prefer sagebrush valleys and salt scrub basins and generally remain at low elevations year-round. Pronghorn have been observed in and near the Project area foraging in sagebrush, salt desert scrub, and pinyon-juniper encroached sagebrush habitats (Cedar Creek 2019a, 2019b).

Although elk exist within hunt units 145 and 164, use is seasonal and at extremely low densities. No bighorn sheep (*Ovis canadensis*) are known to use the Project area.

3.21.1.3 Furbearers and Small Game

Fur-bearing game species noted in the Project area or vicinity include kit fox (*Vulpes macrotis*), desert cottontails (*Sylvilagus audubonii*), and mountain cottontails (*Sylvilagus nuttallii*) (Enviroscientists et al. 2013). Bobcats (*Felis rufus*) are known to occur in higher elevations in the region, and secondary signs of this species (scat and tracks) were observed in the Project area (Enviroscientists et al. 2013). No small game water developments are present in the Project area, and game birds are generally not abundant in this area due to the lack of water sources (Enviroscientists et al. 2013). Mourning doves (*Zenaida macroura*) and chukar (*Alectoris chukar*) have been observed in the vicinity of the Project area (Enviroscientists et al. 2013).

3.21.1.4 Migratory Birds

Thirty-four migratory bird species (excluding raptors) have been recorded in the Project area and vicinity (Enviroscientists 2012; Enviroscientists et al. 2013; Cedar Creek 2019a, 2019b). Generalist avian species and species associated with open sagebrush were commonly encountered in the Project area (Enviroscientists 2012; Enviroscientists et al. 2013; Cedar Creek 2019a; 2019b). Six of the total species observed in the vicinity of the Project area are listed as USFWS Birds of Conservation Concern, and 10 are listed as sensitive by the BLM, which are discussed in Section 3.21.1.9.

3.21.1.5 Raptors

Raptors can use cliffs, trees, and artificial structures to roost and nest, all of which are present within the Project area. In 2019, there were 10 ferruginous hawk (*Buteo regalis*) nests documented within a 2-mile radius of the Project area. All of the nests were inactive in 2019. There were also three inactive golden eagle (*Aquila chrysaetos*) nests as of 2019 within 2 miles of the Project area (Cedar Creek 2019a). Other raptors observed in the survey area, either by aerial raptor surveys or ground-based observations, included red-tailed hawk (*Buteo jamaicensis*), Swainson’s hawk (*Buteo swainsoni*), prairie falcon (*Falco mexicanus*), American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), and turkey vulture (*Cathartes aura*) (Enviroscientists 2012; Enviroscientists et al. 2013; Cedar Creek 2019a, 2019b, 2020).

3.21.1.6 Amphibians and Reptiles

Amphibians require surface water sources for at least part of their life cycle. The general lack of surface water resources in the Project area implies that amphibians would generally be absent from this area. Populations would be expected to occur in Fish Creek and Fish Creek Springs. The Water Management Plan (Appendix L of the Plan of Operations [NVV 2020]) describes how NVV would use the water rights allotted to the Fish Creek Ranch for the Project. Additional information regarding water resources can be found in SER 16: Water Resources and Geochemistry (BLM 2022f).

Snakes and lizards are common in the region and occur in almost every habitat type. Species commonly observed in the Project area during field investigations included sagebrush lizard

(*Sceloporus graciosus*) and western fence lizard (*Sceloporus occidentalis*) (Enviroscientists 2012; Enviroscientists et al. 2013; Cedar Creek 2019a, 2019b). Special status reptile species are discussed in Section 3.21.1.9, Special Status Species.

Figure 3.5. Mule Deer Seasonal Range, Daily and Migration Corridors, and Hunt Units

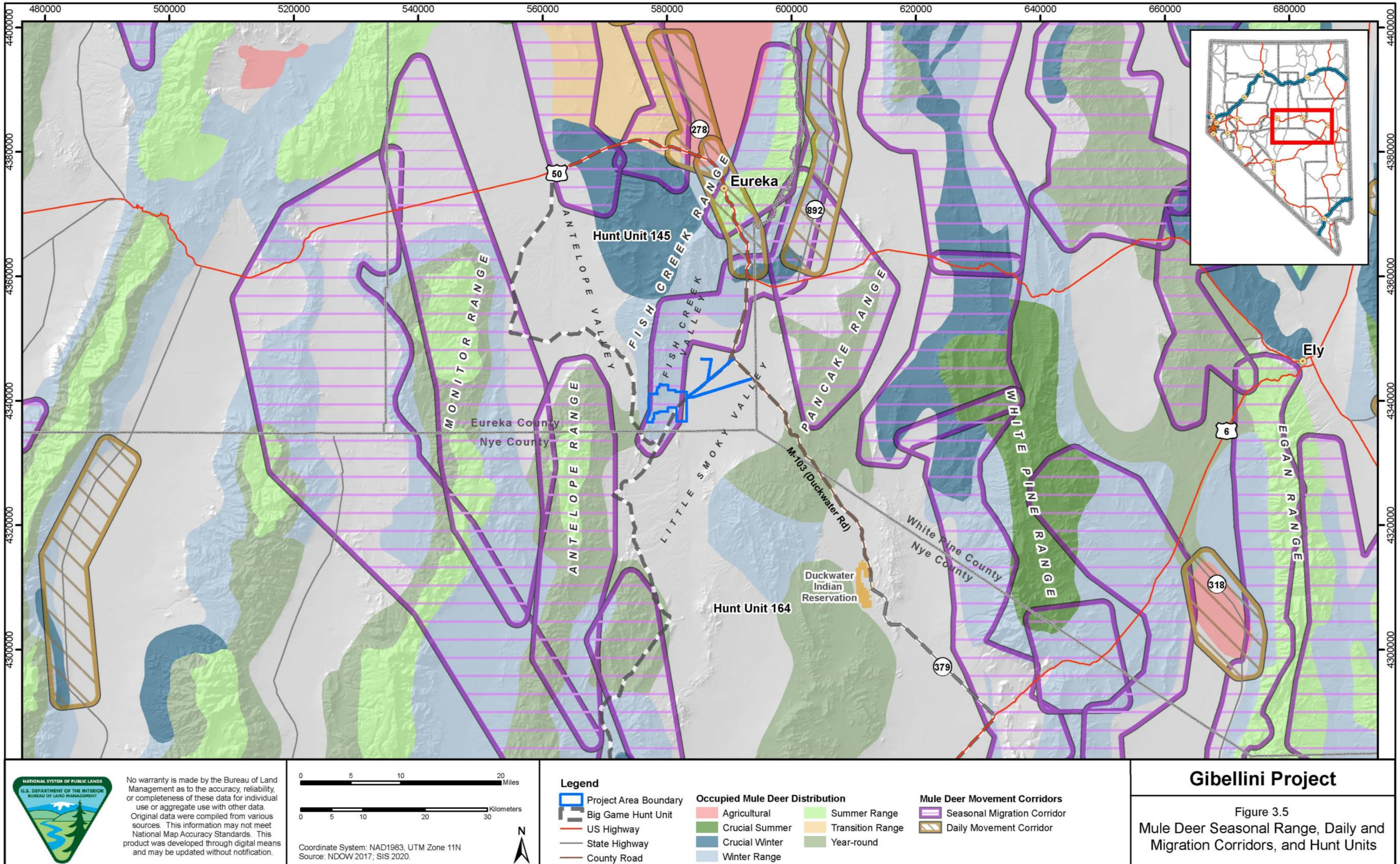
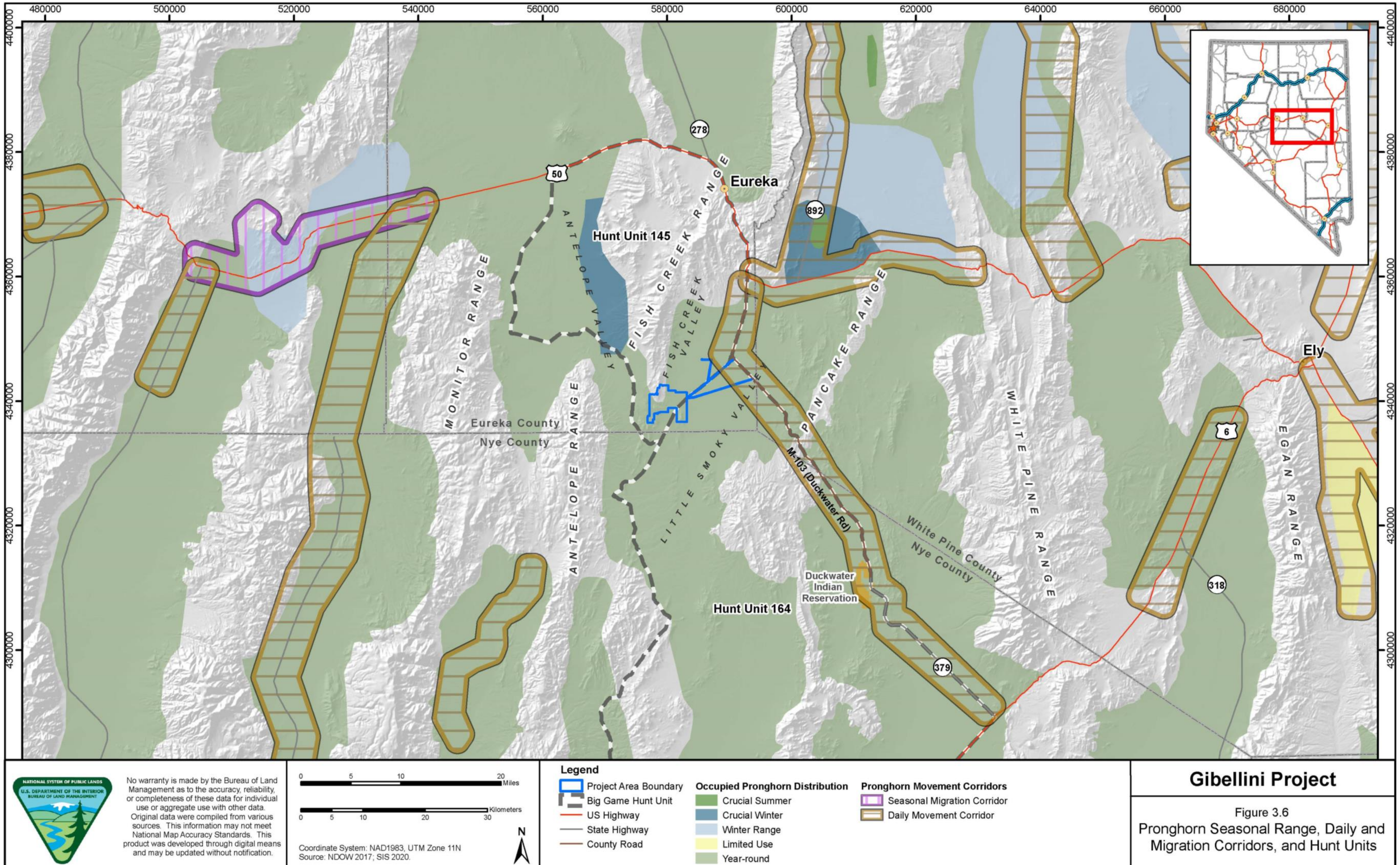


Figure 3.6. Pronghorn Seasonal Range, Daily and Migration Corridors, and Hunt Units



3.21.1.7 Terrestrial Invertebrates

Terrestrial invertebrates occur in almost every habitat type. Common terrestrial invertebrates observed in the Project area included western white butterfly (*Pontia occidentalis*), common checkered skipper (*Pyrgus albescens*), Queen Alexandra's sulphur butterfly (*Colias alexandra*), and tiger moth (*Lophocampa* sp.) (Enviroscientists 2012; Enviroscientists et al. 2013; Cedar Creek 2019a, 2019b).

3.21.1.8 Aquatic Species

The Project area contains only ephemeral drainages that generally flow in a southeasterly direction from the alluvial fan formed by the foothills of the Fish Creek Range to the north. No seep, spring, riparian, or stock pond features are within the Project area. The closest perennial drainage is Fish Creek, less than 1 mile north of the power line corridor. Fish Creek is fed by Fish Creek Springs that provide irrigation water to the Fish Creek Ranch and is proposed as the water source for the Project. Additional information regarding water resources can be found in SER 16: Water Resources and Geochemistry (BLM 2022f). The Water Management Plan (Appendix L of the Plan of Operations [NVV 2020]) describes how NVV would use the water rights allotted to the Fish Creek Ranch for the Project.

Aquatic invertebrates would not occur in the Project area due to the lack of perennial water sources. Aquatic species observed in Fish Creek and the Fish Creek Springs complex include gastropod species (springsnails, pond snails, and gyros) and fingernail clams (NDOW 2009, 2018; Cedar Creek 2019b). Dragonflies were commonly observed throughout the complex while damselflies, mayflies, and midges were noted sporadically. Additionally, two separate species of non-indigenous aquatic snails were identified (NDOW 2009).

3.21.1.9 Special Status Species

No wildlife species or critical habitat listed under the Endangered Species Act are known to occur in the Project area. Suitable habitat for threatened or endangered wildlife species does not occur in the Project area. The sections below address non-listed special status wildlife species.

Bats

Bats roost in a variety of habitats, including rocky outcrops and rock crevices, historical mining structures, caves, buildings and bridges, and tree snags (Bradley et al. 2006). Three species of bats were positively identified in the Project area during 2012 acoustic monitoring surveys: big brown bat (*Eptesicus fuscus*), long-eared myotis (*Myotis evotis*), and small-footed myotis (*Myotis ciliolabrum*) (Enviroscientists 2012). Two species of bats were confirmed during 2019 surveys: small-footed myotis and Townsend's big-eared bat (*Corynorhinus townsendii*). Four other species were determined to be possible (long-eared myotis and California myotis [*Myotis californicus*]) or likely (long-legged myotis [*Myotis volans*] and little brown bat [*Myotis lucifugus*]) (Cedar Creek 2019a).

Burrowing Owls and Pygmy Rabbits

Burrowing owl (*Athene cunicularia*), a BLM sensitive species, nests and roosts in burrows created by other terrestrial species. Suitable habitat for breeding burrowing owls includes patches of sparse, low-growing sagebrush or grassland vegetation. The majority of burrowing owl breeding populations in northern Nevada are known to migrate to the southern U.S. and northern Mexico during the winter months. Burrows have been observed throughout Fish Creek Valley, which encompasses the power line corridor (Enviroscientists 2012; Cedar Creek 2019a). One active burrowing owl nest was observed along the power line corridor in 2019 (Cedar Creek 2019b).

The pygmy rabbit (*Brachylagus idahoensis*) is a game species and is also a BLM sensitive species. Potential pygmy rabbit habitat was observed in portions of the Project area; however, systematic surveys revealed that no pygmy rabbits or their sign were found. Quality pygmy rabbit habitat is dense sagebrush that provides suitable hiding cover. In the remainder of the Project area, sagebrush was not sufficiently dense or tall to provide ideal pygmy rabbit habitat (Cedar Creek 2019a, 2019b).

Greater Sage-grouse

Consistent with the National Greater Sage-Grouse Planning Strategy (BLM 2011), the BLM as the lead agency, together with the U.S. Forest Service as a cooperating agency, prepared amendments and revisions to their land management plans in 2015 and again in 2019. The 2015 ARMPA (BLM 2015a) provides guidance on measures to avoid and minimize potential impacts resulting from proposed projects in addition to providing appropriate measures to compensate for impacts that are unavoidable on Greater sage-grouse habitat resulting from development projects. These documents provide a set of management alternatives focused on specific conservation measures across the range of the Greater sage-grouse (BLM 2019b). The BLM's use of the 2019 ARMPA was enjoined, so the BLM uses the 2015 ARMPA.

In the 2015 ARMPA, Greater sage-grouse habitat on BLM-administered and National Forest System lands in the decision area consists of lands allocated as Priority Habitat Management Area (PHMA), General Habitat Management Area (GHMA), and Other Habitat Management Area (OHMA). PHMA is defined as lands identified as having the highest value to maintaining sustainable Greater sage-grouse populations. GHMA is defined as Greater sage-grouse habitat that is occupied seasonally or year-round and is outside of PHMAs. OHMA is defined as unmapped habitat that is within the planning area and contains seasonal or connectivity habitat areas. In 2021, the BLM prepared updated Greater sage-grouse habitat mapping (BLM 2022h).

The State of Nevada, under the advisement of the Sagebrush Ecosystem Council, began development of a State-endorsed mitigation program. This program was developed by a scientific arm of the Sagebrush Ecosystem Council called the SETT. In 2015, the SETT began to develop and adopt a conservation habitat exchange program called the CCS in hopes of influencing the 2015 USFWS listing decision. The CCS is a habitat exchange program specifically designed to address a net conservation gain for Greater sage-grouse habitat in Nevada. In 2016, the CCS was opened for enrollment to be used by the BLM in land use planning as a mitigation alternative. In 2013, the State of Nevada approved NRS 232.162, which provides authority for the Sagebrush Ecosystem Council to adopt regulations specific to the management of sagebrush ecosystems and the establishment and oversight of a mitigation program to offset certain disturbances to Greater sage-grouse habitat. NRS 321.592 and NRS 321.594 provide the Division of State Lands adopt regulations for the oversight and administration of a program to mitigate damage to sagebrush ecosystems, including compensatory mitigation. Nevada State Regulation NAC 232.400–232.480 establishes compensatory mitigation as a State requirement for anthropogenic disturbances proposed within Greater sage-grouse habitat using the CCS to analyze and mitigate for direct and indirect impacts.

Using the 2021 maps (BLM 2022h), Greater sage-grouse habitat management areas are present in the Project area and include 31 acres of GHMA and 1,571 acres of OHMA (**Figure 3.7**).

Greater sage-grouse has been recorded by NDOW using Fish Creek as a water source and brood-rearing habitat, although there are no active leks in that area. The only active lek within 4 miles of the Project area is the Fenstermaker Wash lek, approximately 3.8 miles west of the Project area. This lek was active as of 2019 (Cedar Creek 2019b).

Golden Eagles

Golden eagles typically nest on rock ledges of cliffs or occasionally in large trees. Pairs typically construct multiple nests within their territory, commonly maintaining two nests and infrequently building as many as six or more nests (Pagel et al. 2010). Golden eagle nests have been observed on rocky outcrops and cliffs in the vicinity of the Project area (Cedar Creek 2020).

In 2019, there were three inactive golden eagle nests within 2 miles of the Project area (nests GOEA-12, GOEA-19, and GOEA-20). These nests were recorded as inactive during ground-based and aerial surveys in 2019 (Cedar Creek 2019b). In April 2020, these nests were surveyed by ground to assess activity levels. No golden eagle activity was observed associated with the nests. One of the nest sites (GOEA-12) was observed to be occupied by a ferruginous hawk. Additionally, two nest sites were observed at GOEA-19, but neither nest appeared active and there was no activity observed around the nest. Nests at GOEA-19 and GOEA-20 are on cliffsides and the nests are not in the line of sight of the Project area (Cedar Creek 2020). Additional data collected in 2020 and 2021 confirm no new raptor nests have been built in the Project area (Cedar Creek 2021b). There has been no evidence of nesting activity in or around these nests since annual monitoring began for the Project in 2019, and a survey in 2013 did not record any golden eagle nests in this area (Enviroscientists et al. 2013). Therefore, any territories associated with these nests are inactive.

Ferruginous Hawks

Ferruginous hawk nesting habitat includes open country, sagebrush, saltbush-greasewood shrubland, and the periphery of pinyon-juniper communities. Ferruginous hawk preferred nesting sites include lone or small clumps of juniper trees that are isolated in open sagebrush/scrub habitats. They are also known to nest on rock outcrops and sometimes on power line towers (White and Thurow 1985). Cliff and power line tower nest sites represent only a small percentage of ferruginous hawk nest sites.

In 2019, 10 ferruginous hawk nests were observed within 2 miles of the Project area; none of the known nests would be removed due to the Project. All of the nests were inactive during the 2019 surveys. Spring weather conditions in 2019 were colder, with higher precipitation levels, than in normal years; as such, many raptor nests observed in the region in 2019 did not exhibit normal activity levels (Cedar Creek 2019b). In 2020, nest number GOEA-12 was observed to be occupied by a ferruginous hawk. This nest is approximately 0.25 mile from the Project area (Cedar Creek 2020). Additional data collected in 2020 and 2021 confirm no new raptor nests have been built in the Project area (Cedar Creek 2021b).

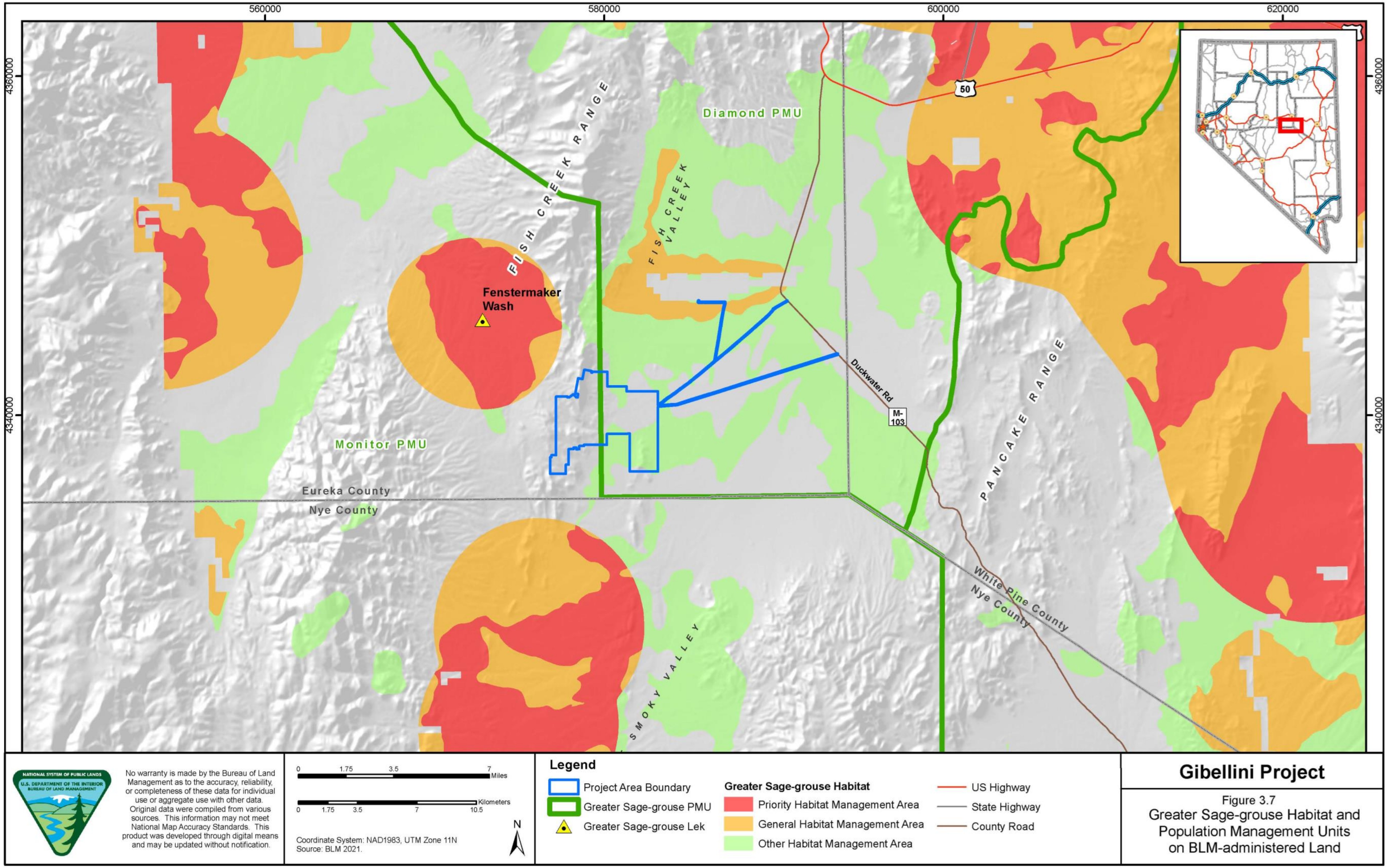
Swainson's Hawks

Swainson's hawks favor open habitats for foraging, including hay and alfalfa fields, pastures, grain, and row crops. One Swainson's hawk nest has been recorded in the 10-mile buffer of the Project area. This nest was determined inactive in 2019 (Cedar Creek 2019b).

Tui Chub

A population of Fish Creek Springs tui chub (*Gila bicolor euchila*) is known to occur at Fish Creek Springs, approximately 4 miles north of the Project area and less than 1 mile north of the power line corridor. The species is a unique subspecies of the tui chub and is only known to occur in the Fish Creek Springs system. NDOW surveys from 1987 to 2019 determined that the population was stable and thriving (NDOW 2009, 2019).

Figure 3.7. Greater Sage-grouse Habitat and Population Management Units on BLM-administered Land



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Special Status Migratory Bird Species

Migratory birds currently listed as BLM special status species have been observed in or near the Project area. These species include Brewer's sparrow (*Spizella breweri*), loggerhead shrike (*Lanius ludovicianus*), pinyon jay (*Gymnorhinus cyanocephalus*), sage thrasher (*Oreoscoptes montanus*), and Lewis's woodpecker (*Melanerpes lewis*) (Enviroscientists 2012; Enviroscientists et al. 2013; Cedar Creek 2019a, 2019b). Other special status migratory bird species with a potential to occur in the Project area include black rosy-finch *(Leucosticte atrata*) and gray-crowned rosy-finch (*Leucosticte tephrocots*). However, neither of these species were observed during migratory bird surveys for the Project area.

Special Status Reptiles

Three special status reptile species were observed in the Project area: desert horned lizard (*Phrynosoma platyrhinos*), greater short-horned lizard (*Phrynosoma hernandesi*), and long-nosed leopard lizard (*Gambelia wislizenii*) (Enviroscientists 2012; Enviroscientists et al. 2013; Cedar Creek 2019a; 2019b). Their habitat preferences and ecology, based on information from Nevada Natural Heritage Program and the BLM (2017), include the following.

Desert horned lizard: Found on sandy flats and alluvial fans, along washes, and at the edges of dunes. Sometimes found on hardpan or among rocks, but patches of sand are generally present. Associated with sagebrush, saltbush, and greasewood in the Great Basin. This species is an ant specialist and is often found near ant hills.

Greater short-horned lizard: Ranges from semiarid plains to high mountains (2,000–10,500 feet above mean sea level). Occupies a variety of habitats including sagebrush and open pinion juniper, pine-spruce, and spruce-fir forests. Substrate may be stony, sandy, or firm but some fine, loose soils are usually present.

Long-nosed leopard lizard: Found in sandy and gravelly desert and semidesert areas with scattered shrubs or other low plants (e.g., bunch grass, alkali bush, sagebrush), especially areas with abundant rodent burrows. Occurs from sea level to approximately 6,000 feet above mean sea level.

3.21.2 Environmental Effects

The area of analysis for direct effects on wildlife is the Project area, including the power line corridor and access roads. Indirect effects on wildlife were assessed using the following buffers around the Project area, power line corridor, and access roads, based on regulatory guidance:

- Greater sage-grouse: 4 miles based on the SETT guidelines for the CCS (Nevada Natural Heritage Program and SETT 2020);
- Game species: 4 miles (NDOW recommendations); and
- Raptors and other special status species: Up to a 2-mile buffer around the Project area.

Indirect effects for wildlife also considered effects within NDOW hunt units that overlap the Project area and power line options and, for Greater sage-grouse, the Population Management Units (PMUs) within 10 miles of the Project area. The PMUs that overlap the Project area include the Monitor and Diamond PMUs (SETT 2015). The hunt units that overlap the Project area are units 145 and 164 (NDOW 2020).

3.21.2.1 Effects Level Definitions

Effects on wildlife and aquatic resources are discussed in terms of intensity, duration, and context, based on the following definitions.

Intensity

Negligible: Wildlife would not be affected, or effects would not result in a loss of individuals or habitat.

Minor: Effects on wildlife would be measurable or perceptible and local; however, the overall viability of the population or subpopulation would not be affected and without further adverse effects the population would recover. Effects on wildlife, such as displacement of nests or dens or obstruction of corridors, would be detectable. If Applicant-committed EPMs are needed to reduce or rectify adverse effects, they would be relatively simple to implement.

Moderate: Effects would be sufficient to cause a change in the population or subpopulation (e.g., abundance, distribution, quantity, or viability); however, the effect would remain local. The change would be measurable and perceptible, but the negative effects could be reversed. Applicant-committed EPMs probably would be necessary to reduce or rectify adverse effects.

Major: Effects would be substantial and highly noticeable, and could be permanent in their effect on population or subpopulation survival without active management. Extensive Applicant-committed EPMs likely would be necessary to reduce or rectify adverse effects, and their success could not be guaranteed.

Duration

Short-term: One year or less for individual or habitat; 5 years or less for a population.

Long-term: Greater than 1 year for individual or habitat; greater than 5 years for a population.

Permanent: Effects on wildlife habitat would be permanent.

Context

Localized: Effects are confined to a small part of the population, habitat, or range.

Regional: Effects would affect a widespread area of suitable habitat or the range of the population or species.

3.21.2.2 Proposed Action

Direct and Indirect Effects

Direct and indirect effects analysis considered factors such as the quality of habitat being affected along with potential impacts on migration and daily use corridors. Habitat loss, disturbance from increased light pollution, increased vehicle traffic, elevated noise levels, and increased human presence can contribute to impacts on wildlife. The analysis reviewed the facility design and Applicant-committed EPMs in determining the intensity of impacts.

Habitat Loss and Fragmentation

The Project would result in 806 acres of new surface disturbance from exploration activities, mine construction, and operation. A total of 760 acres of disturbance would occur due to mining operations. An additional 46 acres of disturbance would occur from exploration. This total also includes 18 acres associated with existing disturbances and barren, unvegetated lands. Wildlife habitat directly lost from these disturbances would largely include pinyon-juniper woodlands and sagebrush communities. Habitat loss or alteration would result in direct losses of smaller, less-mobile species of wildlife, such as small mammals and reptiles, and the displacement of more-mobile species into adjacent habitats. In areas where habitats are at or near carrying capacity, animal displacement could result in some unquantifiable reductions in local wildlife populations. Surface disturbance also would result in an incremental increase in habitat fragmentation in the study area until reclamation has been completed and vegetation has been successfully re-established.

Most habitat loss would be long term, lasting the duration of mining operations (more than 1 year). Permanent loss of 85 acres of habitat would occur, associated with the open pit, which would not be reclaimed upon mine closure. Habitats permanently lost would include 3 acres of big sagebrush, 66 acres of pinyon-juniper woodland, and 16 acres of barren land. Reclaimed areas are anticipated to support post-mining land uses including wildlife habitat.

Direct effects of habitat loss during construction and operations would result in wildlife displacement and avoidance, loss of vegetative cover, and potential mortalities of low-mobility or immobile species. Habitat loss could also result in the inadvertent loss of nests or young due to nest abandonment, but Applicant-committed EPMs would include surveys for burrows and nests (e.g., golden eagles) and establishment of avoidance buffers when necessary to prevent the loss of nests and young.

Wildlife displacement and avoidance would be temporary to long term (depending on the species) as wildlife adjust to changes in habitat availability and access. This displacement could result in the indirect effect of increased inter- and intraspecies competition for resources and increased predation. Increased resource competition due to displacement would be short to long term, regional, and minor.

The types of existing vegetation and wildlife habitats that would be removed are typical and common to the region. Reductions in wildlife populations are therefore estimated to be proportional to the loss of habitat. Loss of habitat during proposed operations would reflect approximately 0.7 percent reduction within NDOW hunt unit 14, and less than 0.01 percent reduction within NDOW hunt unit 16. The intensity of impacts of mule deer and pronghorn habitat loss would be minor, long term, and localized.

Habitat fragmentation can affect wildlife use of the area by reducing landscape size for species that require large breeding or foraging ranges, increasing barriers to migration or movement, changing abiotic and biotic factors making the habitat less suitable, and reducing access to resources and potential mates. Impacts due to habitat fragmentation would be minor, long term, and regional.

Vehicle and Equipment Collisions and Power Line Mortalities

Vehicle collisions with wildlife could occur during construction, operation, and reclamation, resulting in wildlife injury or mortality. Collisions could be more frequent during migration or breeding seasons, which would vary depending on the species. Wildlife could collide with or become entangled in fences or other mine structures or could be crushed by equipment. To minimize impacts, fences would be constructed to BLM and NDOW standards, which incorporate wildlife-friendly design features (see **Appendix B**, Applicant-committed Environmental Protection Measures).

Traffic due to the Project along U.S. Highway 50 and local Project access roads would increase vehicle counts by about 6 percent, from an AADT estimate of 637 vehicles to an AADT of 677 vehicles (BLM 2021h). This would amount to one or two additional crashes annually along U.S. Highway 50, which would result in a negligible increase in animal-related collisions. To minimize impacts, Applicant-committed EPMs regarding signage for speed limits on local Project access roads and training for employees regarding wildlife protection measures would be implemented (see **Appendix B**, Applicant-committed Environmental Protection Measures).

Birds may also experience mortality from electrocution or collision with power lines. The Project would incorporate Avian Power Line Interaction Committee design guidelines for reducing risk of electrocution or collision with birds (Avian Power Line Interaction Committee 2012). Deterrence measures would include installing raptor anti-perch devices on the proposed new power poles. Anti-perch devices would also be installed on tall structures (where appropriate) within the mine facilities. These deterrence measures would help prevent attraction of birds to the mine site and associated infrastructure, thereby reducing risk of electrocution or mortalities due to interactions with Project infrastructure. As a result, the potential for injury to avian species from interactions with power lines would be a long-term but negligible and localized risk.

Impacts Due to Chemical Exposure

Exposure to chemicals used in mine processing could result in mortalities due to an acute lethal dose, or significant effects on growth, reproduction, or behavior due to toxicology of chemicals ingested or through contact with chemicals.

All artificial bodies of water that contain any chemical in solution at levels lethal to wildlife (e.g., barren and pregnant solution ponds) would be covered or contained in a manner that would prevent access by birds and bats in accordance with the NDOW Industrial Artificial Pond Permit (NDOW 2017). The buildings and process facilities, including the HLP and ponds, would be fenced to specifications outlined in BLM Handbook 1741-1, as applicable. Freshwater pond liners would be single-sided, textured geomembrane with the textured side up to facilitate wildlife egress. Bird balls would also be used on the ponds to protect wildlife, where required. A Solid and Hazardous Waste Management Plan would be developed for the Project that outlines proper storage, handling, and disposal methods that include preventing exposure of substances to wildlife and the environment. Any spills associated with wastes or chemicals would be managed under the Spill Contingency Plan (NVV 2020) to minimize exposure to wildlife and the environment.

With these measures in place, the likelihood of wildlife risks due to chemical exposure are low and therefore impacts would be negligible, long term, and localized.

Impacts on Big Game

Direct impacts on big game species could occur through increased chance of vehicle collisions, habitat loss, and habitat fragmentation. As noted above, the impact of increased incidence of vehicle collisions to wildlife would be negligible.

The acres of mule deer habitat that would be removed by surface disturbance associated with construction and operation of the Project would include 624 acres (609 acres in hunt unit 145 and 14 acres in hunt unit 164), constituting 0.7 percent of mule deer habitat within hunt unit 145 and 0.4 percent of mule deer habitat in hunt unit 164. There would be 643 acres of surface disturbance in pronghorn antelope habitat (508 acres in hunt unit 145, and 135 acres in hunt unit 164), constituting 0.35 percent of pronghorn habitat within hunt unit 145 and 0.02 percent of pronghorn habitat within hunt unit 164. Therefore, the regional impact on these game species' habitat would be negligible. Localized impacts would vary by species, as the quality of wildlife habitat is not homogeneous and all habitats do not experience the same indirect impacts or use by wildlife across each acre. Overall, impacts would be long term and minor. An additional 46 acres of habitat would be removed in the short term due to exploration activities. The phased, concurrent reclamation that would occur with exploration activities would minimize effects on habitat use by pronghorn antelope.

The Proposed Action would affect the mule deer and pronghorn movement corridors mapped through and adjacent to the Project area. Effects on the mule deer corridor would primarily include avoidance of areas near proposed disturbance. Pronghorn antelope movement corridors are primarily east of the Project area, tracking along U.S. Highway 50. The primary effect of the Proposed Action would be increased collisions with pronghorn antelope along this access road. Direct effects of habitat and movement corridor loss would be long term, regional, and moderate to major.

Indirect impacts could involve avoidance of the area surrounding the Project due to increased noise levels. It is possible that big game would acclimate to Project activities over time (Ward 1976), and the impacts of noise would be long term, localized, and minor.

Impacts on Furbearers and Small Game

Direct impacts on furbearers and small game species resulting from the Project would include the loss of approximately 683 acres of vegetated habitat. These acres represent short- to long-term loss of potentially suitable habitat until successfully reclaimed. Additionally, there would be a permanent loss of 69 acres of pinyon-juniper woodland and big sagebrush steppe habitat that would not be reclaimed. Impacts on small game species also would include displacement from the proposed disturbance areas and increased habitat fragmentation, until vegetation is reestablished. In most instances, suitable habitat adjacent to disturbance areas would be available for use by these species. However, displacement would increase competition and could result in some local reductions in wildlife populations if adjacent habitats are at carrying capacity. Potential impacts could also include nest and burrow abandonment or loss of young. The context of effects for small game species would be localized, minor, and both short term and long term in duration depending on the type of habitat affected and the timing of concurrent reclamation.

Impacts on Migratory Birds

Potential effects on migratory birds (excluding raptors) resulting from the Project could include mortalities or injuries due to collision, electrocution, or exposure to chemicals; interference with breeding, feeding, or sheltering behavior due to indirect disturbances to the species themselves or their habitat; and nest destruction or abandonment. Total surface disturbance for the Project would be 806 acres. NVV would implement Applicant-committed EPMs (**Appendix B**), including avoidance and monitoring methods throughout construction, operation, and reclamation, which would reduce potential impacts to minor, long-term, and localized impacts.

Impacts on Raptors

Total surface disturbance for the Project would be 806 acres. Potential effects on raptor species resulting from the Project include mortalities or injuries due to collision, electrocution, or exposure to chemicals; interference with breeding, feeding, or sheltering behavior due to indirect disturbances to the species themselves or their habitat; and nest destruction or abandonment. NVV would implement Applicant-committed EPMs, including avoidance and monitoring methods throughout construction, operation, and reclamation, which would reduce potential impacts to negligible, long-term, and localized impacts. Monitoring of Project components would focus on the constructed transmission lines and power distribution infrastructure, communication infrastructure, and managed ponds. Raptor nest identification and monitoring around the Project area (up to 2 miles from facilities) would occur annually during Project construction and operations. The purpose of such monitoring would be to identify active nests and any new nests and, if possible, demonstrate whether there has been a successful breeding attempt (Cedar Creek 2021c).

Impacts on Amphibians and Reptiles

No amphibians have been observed within the Project area. Given the general lack of water, it is unlikely that suitable habitat is available within the Project area. For this reason, no impacts on amphibians as a result of the Project, including exploration activities, are expected. The Water Management Plan (Appendix L of the Plan of Operations [NVV 2020]) describes how NVV would use the water rights allotted to the Fish Creek Ranch for the Project. SER 16: Water Resources and Geochemistry (BLM 2022f) describes impacts on water resources.

Direct impacts on reptile species from the Project would include the loss of approximately 683 acres of vegetated habitat. These acres represent short- to long-term loss of potentially suitable habitat until successfully reclaimed. Additionally, there would be a permanent loss of 69 acres of pinyon-juniper woodland and big sagebrush steppe habitat. Impacts on reptile species would include displacement from the proposed disturbance areas and increased habitat fragmentation, until vegetation is reestablished. In most instances, suitable habitat adjacent to disturbance areas would be available for use by these species. However, displacement would increase competition and could result in some local reductions in wildlife populations if adjacent habitats are at carrying capacity. Potential impacts could also include loss of eggs or young. The context of effects for reptiles would be localized, minor, and both short term and long term in duration depending on the type of habitat affected and the timing of concurrent reclamation.

Impacts on Terrestrial Invertebrates

Direct impacts on terrestrial invertebrate species the Project would include the loss of approximately 683 acres of vegetated habitat. These acres represent short- to long-term loss of potentially suitable habitat until successfully reclaimed. Additionally, there would be a permanent loss of 69 acres of pinyon-juniper woodland and big sagebrush steppe habitat that would not be reclaimed. Impacts on terrestrial invertebrate species also would include displacement from the proposed disturbance areas and increased habitat fragmentation, until vegetation is reestablished. In most instances, suitable habitat adjacent to disturbance areas would be available for use by these species. However, displacement would increase competition and could result in some local reductions in wildlife populations if adjacent habitats are at carrying capacity. The context of effects for terrestrial invertebrates would be localized, minor, and both short term and long term in duration depending on the type of habitat affected and the timing of concurrent reclamation.

Impacts on Aquatic Species

There is no suitable habitat for aquatic species within the Project area. Additionally, the hydrology of Fish Creek Springs is not expected to change as a result of the Project (see Section

3.19, Water Resources and Geochemistry). Water would be obtained from the existing irrigation canal and pumped via a screened intake pipe to prevent aquatic species from being affected. Therefore, no impacts on aquatic species as a result of the Project are expected. The Water Management Plan (Appendix L of the Plan of Operations [NVV 2020]) describes how NVV would use the water rights allotted to the Fish Creek Ranch for the Project. SER 16: Water Resources and Geochemistry (BLM 2022f) describes impacts on water resources.

Impacts on Special Status Wildlife Species

Bats

Bats could be affected by the Project through the loss of foraging or roosting habitat or by displacement from immediately adjacent areas due to noise or human activity. Development of Project facilities would result in the long-term reduction of 423 acres of potentially suitable sagebrush habitat (basin big sagebrush or black sagebrush steppe habitats) due to mining operations, including the permanent loss of 3 acres that would not be reclaimed. This impact would be considered minor based on the limited availability of suitable habitat adjacent to the Project area. Other impacts on bats could include increased incidence of injury or mortality due to equipment or vehicle collision. Impacts could be minor or moderate, depending on the use of the mine area by bats and vehicle/equipment use in the Project area. Chemical exposure to bats would be prevented by implementation of Applicant-committed EPMs (**Appendix B**).

Burrowing Owls and Pygmy Rabbits

Development of the Project would result in the long-term reduction of 85 acres of potentially suitable sagebrush habitat (basin big sagebrush dominated habitats) for burrowing owls or pygmy rabbits due to the permanent loss of habitat in the pit area. This impact would be considered minor based on the availability of suitable habitat adjacent to the Project area. Project construction would not likely result in the direct mortalities of individuals given that no pygmy rabbits and only one active burrowing owl nest have been found in the Project area to date (Cedar Creek 2019b). In the event that additional active nests are found during preconstruction surveys, NVV would consult with the BLM and NDOW to determine the appropriate avoidance buffer during construction. If removal of the burrow/colony is required, NVV would coordinate with the BLM and NDOW to determine the appropriate monitoring and management measures and mitigation.

Greater Sage-grouse

NVV is working with the SETT to use the CCS to offset effects of the Project's surface disturbance to Greater sage-grouse and sagebrush habitat. Mitigation developed under the CCS is intended to meet regulatory requirements under State of Nevada NRS 232.162 and is administered solely by the SETT. The BLM does not administer the development of credits or debits under the CCS and is not responsible for enforcement of program requirements. Mitigation pursued by the applicant through the CCS program is used to offset impacts on Greater sage-grouse and sagebrush habitat only and is not intended to offset effects on other resources. The Proposed Action would generate 1,932 term debits and 0 permanent debits (numbers subject to change pending SETT review).

Using the 2021 maps (BLM 2022h), direct impacts on Greater sage-grouse would primarily include loss of 3 acres of GHMA and 132 acres of OHMA habitat. The percent loss of habitat within the PMU resulting from the total acres in the Project area would be less than 1 percent regionally. The closest active lek would not be affected directly or indirectly due to noise level changes. NVV would conduct lek attendance monitoring, following NDOW monitoring protocols, for the Fenstermaker Wash lek during all active phases of the Project from construction through final reclamation.

Individual Greater sage-grouses have been recorded by the NDOW using Fish Creek as a water source, although there are no leks in that area. Only one of the Fish Creek Ranch center pivot irrigation fields would have the irrigation water diverted for mine use. This field would be planted with a seed mix beneficial to Greater sage-grouse to both provide feed and cover as well protect the pasture from weed invasion. Increased traffic along County Road M-103 (Duckwater Road) may result in an unintentional barrier to movement or direct mortalities of Greater sage-grouse from vehicle collisions. The effect of increased collisions on Greater sage-grouse populations in general would be negligible. Construction of an underground power line would occur near Fish Creek Springs and potentially result in Greater sage-grouse avoidance of that area until construction ceases. For all construction, NVV would implement applicable Resource Design Features found in Appendix C of the Nevada and Northeastern California Greater Sage-Grouse ARMPA (BLM 2015a).

Golden Eagles, Ferruginous Hawks, and Swainson's Hawks

There are three inactive golden eagle nests within 2 miles of the Project area (Cedar Creek 2020). NVV has developed Applicant-committed EPMs to protect golden eagles and other raptors and is developing an Eagle Conservation Plan (ECP) to support eagle protection and conservation measures related to the Project and avoid golden eagle take regulated by the USFWS under the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668–668d) and its regulations (50 CFR 22). The ECP considers the multiple exposure pathways that the Project could affect golden eagles and identifies a number of avoidance, minimization, monitoring, and management methods to reduce risks to this species and the potential for take. Among methods considered, NVV would incorporate Nevada Mining Association industry standards for avian protection into the mine plan. The protection measures would minimize or eliminate exposure to potential sources of mortality or injury risks to birds and their nests, reduce risks associated with perch creation, and avoid visual, noise, and overall population impacts. NVV would implement the ECP throughout mining operations. Through implementation of the ECP, impacts on golden eagles would be reduced or avoided.

Impacts on ferruginous hawks and Swainson's hawks would be comparable to those discussed for non-special status raptor species.

Tui Chub

There is no aquatic habitat within the Project area. Additionally, the hydrology of Fish Creek Springs is not expected to change as a result of the Project (see Section 3.19, Water Resources and Geochemistry). Therefore, no effects on tui chub are expected. The Water Management Plan (Appendix L of the Plan of Operations [NVV 2020]) describes how NVV would use the water rights allotted to the Fish Creek Ranch for the Project. SER 16: Water Resources and Geochemistry (BLM 2022f) describes impacts on water resources.

Special Status Migratory Birds

Impacts on special status migratory bird species would be comparable to those discussed for non-special status migratory bird species.

Special Status Reptiles

Impacts on special status reptile species would be comparable to those discussed for non-special status reptile species.

Mitigation Measures

Certain unavoidable impacts on wildlife and special status species would be addressed through voluntary mitigation offered by NVV or through State of Nevada mitigation programs. Mitigation to offset impacts on Greater sage-grouse as required by the State of Nevada (NAC 232.400–232.480) would be developed through the use of the Nevada CCS; NVV is working with the CCS SETT to develop the appropriate mitigation credits.

Residual Effects

Residual effects on wildlife and aquatic resources under the Proposed Action would include the long-term loss of 760 acres due to mining operations, which would include pinyon-juniper woodlands, sagebrush communities, and barren and unvegetated land. There would be a permanent loss of 85 acres of wildlife habitat associated with the open pit. Habitats permanently lost would include 3 acres of big sagebrush, 66 acres of pinyon-juniper woodland, and 16 acres of barren land. In areas that are disturbed by the Project but later reclaimed, the loss of shrub- and woodland-dominated communities would represent a long-term change in wildlife habitat because it would take a number of years after reclamation for mature shrubs to become established in these communities.

Reclamation and vegetation recovery to pre-disturbance conditions is expected to occur at varying rates based on factors such as noxious weed invasion, fire regimes, and climatic and other environmental variations. It is anticipated that the reestablishment of an early-seral vegetation community comprising annual and perennial grasses and forbs would take between 2 and 5 years. Successful reestablishment of early-seral native vegetation may take a longer time than anticipated as a result of potential noxious and invasive weed occurrences. It is estimated that, overall, herbaceous-dominated plant communities would require a minimum of 3 to 5 years to establish adequate ground cover to prevent erosion and provide forage for wildlife species and livestock grazing. Woody-dominated plant communities would require between 2 and 10 years to establish and at least 10 to 50 years to successfully recolonize the area.

3.21.2.3 South Access Road Alternative

The South Access Road Alternative would result in 38 additional acres of surface disturbance and therefore more habitat loss compared to the Proposed Action. For Greater sage-grouse, using the CCS program, the South Access Road Alternative would generate 1,863 term debits and 0 permanent debits. The overall effect of the difference in acres of disturbance on wildlife habitats would be similar for birds, bats, and mammals compared to the Proposed Action.

3.21.2.4 Renewable Energy Alternative

The Renewable Energy Alternative would result in 33 additional acres of permanent surface disturbance and therefore more wildlife habitat loss as compared to the Proposed Action. For Greater sage-grouse, using the CCS program, the Renewable Energy Alternative would generate 1,961 term debits and 0 permanent debits. The additional loss of wildlife habitat would be similar for birds, bats, and mammals as compared to the Proposed Action. The additional impacts under the Renewable Energy Alternative would be permanent due to the solar field remaining after mine closure to provide a sustainable long-term power source servicing the remote electrical needs of southern Eureka County and northern Nye County.

3.21.2.5 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated effects on wildlife and aquatic resources would not occur. Under the No Action Alternative, wildlife habitat would not be disturbed or lost and animal displacement would not occur, limiting the effects on wildlife resources to existing conditions.

3.21.3 Cumulative Effects

The CESA boundary for wildlife and aquatic resources includes a 10-mile radius around the Project area. The total area of the CESA encompasses 397,816 acres. Within the CESA, past and present disturbance has resulted from mineral development and exploration projects; utilities and infrastructure; public purpose activities; oil, gas, and geothermal development; land sales; and roads. Acres of disturbance of these activities total 21,523 acres. Additional disturbances caused by wildland fires and uses by dispersed recreation and livestock grazing also occur within the CESA.

3.21.3.1 Proposed Action

Cumulative effects on wildlife resources would primarily be related to habitat loss by vegetation type and fragmentation and animal displacement. The Proposed Action would incrementally increase long-term habitat disturbance and habitat-related wildlife impacts in the CESA by 760 acres, which is 0.2 percent of the CESA. The Proposed Action, in combination with past, present, and future mineral development and exploration; roads; utilities and infrastructure; and public purpose sites, would result in a total cumulative disturbance of approximately 6,026 acres (1.5 percent of the CESA). Implementation of Applicant-committed EPMs would avoid impacts on migratory bird or raptor nests from the Proposed Action.

A portion of the cumulative disturbance area has been, or would be, reclaimed or has recovered materially (for example, from wildfire areas). The reclaimed areas and areas associated with habitat conversion would be capable of supporting wildlife use; however, species composition and densities would change.

Indirect impacts associated with human presence and noise incrementally would increase in the CESA during the life of the Project. The contribution of the Proposed Action to these impacts would be short term and temporary and would cease following completion of operations and final reclamation.

3.21.3.2 South Access Road Alternative

Cumulative impacts under the South Access Road Alternative would be the same as those described for the Proposed Action. Under this alternative, the Project's contribution to cumulative disturbance-related impacts would be approximately 798 acres, approximately 38 more acres than under the Proposed Action. The cumulative impact on wildlife habitat-related impacts in the CESA, in combination with past, present, and future development, would be 6,064 acres, which is 1.6 percent of the CESA.

3.21.3.3 Renewable Energy Alternative

Cumulative impacts under the Renewable Energy Alternative would be the same as those described for the Proposed Action. Under the Renewable Energy Alternative, the cumulative surface disturbance-related impacts would be approximately 793 acres, approximately 33 more permanent acres than under the Proposed Action. The cumulative impact on wildlife habitat-related impacts in the CESA, in combination with past, present, and future development, would be 6,059 acres, which is 1.5 percent of the CESA.

3.21.3.4 No Action Alternative

Under the No Action Alternative, the Project would not be developed, and there would be no additional impacts on wildlife and associated habitat. Previously permitted mining activities would occur as outlined in authorized permits and reclamation and closure plans as well as other past and present actions and RFFAs. Overall, effects in the CESA would be less than those of the Proposed Action because no additional surface disturbance would occur from the Project. Therefore, cumulative impacts on wildlife are expected to be negligible, long term, and localized.

CHAPTER 4. CONSULTATION AND COORDINATION

This chapter summarizes agency and public consultation and coordination that occurred prior to and during preparation of this Environmental Impact Statement (EIS).

4.1 PUBLIC INVOLVEMENT

This EIS was prepared in consultation and coordination with various Federal, State, and local agencies, organizations, and individuals. Agency consultation and public participation have been accomplished through a variety of formal and informal methods, including scoping meetings and responses to emails. This section summarizes these activities.

Public involvement in the EIS process includes 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 long-term impacts that could result from the projects; and (3) ensuring that public needs are understood by the agencies.

Public participation in the EIS process is required by the National Environmental Policy Act (NEPA) at four specific points: the scoping period, review of the Draft EIS, review of the Final EIS, and receipt of the Record of Decision.

- Scoping: The public is provided a 30-day scoping period to disclose potential issues and concerns associated with the Proposed Action. Information obtained by the agencies during public scoping is combined with issues identified by the agencies, and this forms the scope of the EIS.
- Draft EIS Comment Period: A 45-day Draft EIS comment period is initiated by publication of a Notice of Availability for the Draft EIS in the *Federal Register*. A virtual public meeting will be held during the 45-day comment period.
- Final EIS Availability Period: A 30-day Final EIS review period is initiated by publication of a Notice of Availability for the Final EIS in the *Federal Register*.
- Record of Decision: Subsequent to the 30-day availability period for the Final EIS, the Record of Decision would be prepared.

4.1.1 Scoping

The formal public scoping process began with publication of a Notice of Intent (NOI) in the *Federal Register* on July 14, 2020, along with a news release. The Bureau of Land Management (BLM) invited the public to submit comments during the scoping period from July 14, 2020, through August 17, 2020, which was subsequently extended through September 15, 2020. The NOI and the 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

Gibellini Vanadium Mine Project (Project). In addition, the NOI and news release indicated any scoping meetings would be announced at least 15 days in advance.

As part of the scoping process, the BLM hosted scoping meetings for the public and other interested parties to learn about and submit comments on the Project. The BLM advertised the scoping meetings through the Project website, social media, a news release published on August 17, 2020, and an email sent to the Project mailing list on August 20, 2020. The news release was published on the BLM's website and on Twitter and Facebook. It was also published in the Battle Mountain Bugle, Elko Daily Free Press, and Eureka Sentinel.

The BLM hosted two virtual scoping meetings on September 2, 2020, and September 3, 2020. The scoping meetings gave agencies, organizations, the public, and other interested parties an opportunity to learn and ask questions about the Project and to share issues and concerns with the BLM. The BLM gave a presentation regarding the NEPA process and then Nevada Vanadium Company (NVV) provided an overview of the Project. After the presentation, the BLM and NVV answered written and oral questions to encourage open and informal dialog between the public and agency representatives.

The scope of the EIS reflects input received from the public and from appropriate government agencies. The scoping comments were summarized and included in the Scoping Summary Report. Key issues identified from the scoping comments and have been provided in Section 1.7, Key Issues.

4.1.2 Public Review of the Draft EIS

The Draft EIS is available for a 45-day public review and comment period from the date the Notice of Availability was published in the *Federal Register*. Public meetings on the Draft EIS would be conducted during the 45-day review period. The BLM will post an announcement for the public meetings on the Project website.

4.2 CONSULTATION AND COORDINATION WITH FEDERAL, STATE, AND LOCAL AGENCIES, AND TRIBES

Memoranda of Agreement were developed between the cooperating agencies and the BLM. Cooperating agencies were invited to participate in the NEPA process including review of analyses, contribution of technical expertise, and assistance in responses to public comments as required by their jurisdiction or regulatory authority.

As part of the Federal review process in response to NVV's Project, the BLM sent letters to several Federal and State agencies and Eureka County inviting them to participate as cooperating agencies for the NEPA process and EIS documentation. The United States (U.S.) Environmental Protection Agency, U.S. Fish and Wildlife Service, Nevada Department of Wildlife, Nevada

Department of Conservation and Natural Resources, and Eureka County agreed to be cooperating agencies and participated in the preparation and review of the EIS.

The BLM chose to consult with the Nevada State Historic Preservation Office (SHPO) in accordance with the State Protocol Agreement between the Bureau of Land Management and the Nevada State Historic Preservation Officer for Implementing the National Historic Preservation Act (the Protocol), which provides an alternative process for consultation under Section 106 of the National Historic Preservation Act and is conducted formally through letter correspondence, separate from the NEPA process. Table 4.1 summarizes BLM-SHPO correspondence relating to development of the Project.

Table 4.1. Summary of BLM Correspondence with the Nevada State Historic Preservation Office Regarding the Project

Previous Eligibility Consultation	
BLM: May 1, 2012	SHPO: June 6, 2012
BLM: July 11, 2013	SHPO: August 30, 2013
BLM: January 30, 2015 and April 14, 2015	SHPO: May 22, 2015
Eligibility Consultation under Nevada Vanadium Application	
BLM: December 22, 2020	SHPO: January 28, 2021 and May 27, 2021
BLM: October 29, 2021	SHPO: December 8, 2021
Consultation on Effect to Historic Properties	
BLM: December 22, 2020	--
BLM: October 29, 2021	SHPO: December 8, 2021

Consultation with the Nevada SHPO on Areas of Potential Effect (APEs) was conducted through the CRINA process outlined in the Protocol. The CRINA and subsequent Amendments to APEs resulting from Project design changes were submitted via electronic mail for SHPO review on the following dates: November 14, 2018, February 15, 2019, May 28, 2019, June 14, 2019, August 29, 2019, September 25, 2019, February 27, 2020, March 14, 2020, August 25, 2020, and November 8, 2021. The Nevada SHPO concurred with all APE determinations.

The BLM is in consultation with the SHPO on a Memorandum of Agreement to implement an Historic Properties Treatment Plan. The Historic Properties Treatment Plan is under development by the third-party cultural resources contractor in collaboration with the BLM and cultural resources representatives from the Duckwater and Ely Tribes to address specific tribal concerns relating to the treatment of adverse effects on historic properties.

The BLM invited the Battle Mountain Band of the Te-Moak Tribe of Western Shoshone, Duckwater Shoshone Tribe, Ely Shoshone Tribe, Te-Moak Tribe of Western Shoshone, Yomba Shoshone Tribe, and the Timbisha Shoshone Tribe to become cooperating agencies during the NEPA process. On April 17, 2012, and March 12, 2013, the BLM sent coordination letters to the tribes regarding the Project. The BLM invited the tribes to participate in the baseline needs assessment meeting and the NEPA kick-off meeting, as well as the public meetings held by NVV in August 2020 and the BLM virtual public scoping meetings held on September 2 and 3, 2020. The BLM conducted a site visit with the Duckwater Shoshone and Ely Shoshone Tribes on August 12, 2020, and met with the Duckwater Shoshone Tribal Council on April 14, 2021, and October 4, 2021. The BLM met with the Yomba Shoshone Tribe on September 10, 2021, the Timbisha Shoshone Tribe on September 15, 2021, Battle Mountain Band of the Te-Moak Tribe of Western Shoshone on September 23, 2021, and the Elko Band Colony of the Te-Moak Tribe of Western Shoshone on September 29, 2021. The Duckwater Shoshone and Ely Shoshone Tribes have requested that the BLM continue to coordinate with the tribes regarding the Project and the EIS process. The BLM is currently working on finalizing a Memorandum of Understanding with the tribes.

4.3 LIST OF CONTACTS

Table 4.2 identifies the various Federal, State, and local agencies, elected officials, tribal organizations, newspapers, private organizations and companies, and individuals who were notified about the Project during the scoping process and the preparation of the EIS.

Table 4.2. Agencies, Organizations, and Individuals Contacted Regarding the Gibellini Project EIS

Agencies, Organizations, and Individuals Contacted	
Federal Agencies	
• U.S. Environmental Protection Agency, Region IX	• U.S. Fish & Wildlife Service
State Agencies	
• Department of Administration • Nevada Department of Wildlife • Nevada Department of Transportation • Nevada Department of Conservation and Natural Resources • Nevada State Historic Preservation Office	• Nevada Division of Environmental Protection • Nevada Division of Water Resources • Nevada Division of Minerals • Nevada State Clearinghouse • Nevada Department of Agriculture • Sagebrush Ecosystem Technical Team
Elected Officials	
• Lander County Commissioners	• Nye County Commissioner
Local Agencies	
• Eureka County • Eureka County Department of Natural Resources • Eureka County Natural Resources Advisory Commission	• Lander County Land Use Advisory Commission • Lander County Planning • Lander County Public Lands
Tribal Organizations	
• Battle Mountain Band of the Te-Moak Tribe of Western Shoshone • Elko Band Colony of the Te-Moak Tribe of Western Shoshone • Duckwater Shoshone Tribe	• Te-Moak Tribe of Western Shoshone • Yomba Shoshone Tribe • Timbisha Shoshone Tribe • Ely Shoshone Tribe

<table>
<tr><th colspan="2">Agencies, Organizations, and Individuals Contacted</th></tr>
<tr><td colspan="2">Newspapers</td></tr>
<tr><td>• Battle Mountain Bugle
• Elko Daily Free Press</td><td>• Eureka Sentinel</td></tr>
<tr><td colspan="2">Private Organizations and Companies</td></tr>
<tr><td>• American Farm Mortgage Company
• Arlemont Ranch Co. LLC
• Badger/Chiara Ranches
• Bailey Family Trust
• Barrick Cortez Inc. Ranches
• Borba Land and Cattle
• BTZA NV
• Cattle Rock Corriente, LLC
• Center for Biological Diversity
• Damele Partnership
• Ellison Ranching Company
• Eureka Livestock LLC
• Filippini Ranch
• Friends of Animals
• Gandolfo Ranch
• Goemmer Ranches
• Grass Valley Ranch LLC
• Great Basin Resource Watch
• Intermountain Range Consultants
• JWF Ranching
• L&N Livestock Legacy Construction
• N-6 Grazing Board
• Nevada Cattleman’s Association
• NightWatch Marine</td><td>• Pablo Canyon Ranch
• Paris Ranch
• Pony Express Deli
• Rand Properties
• RCI Inc.
• Reese River Valley, LCC
• Ruth Martin Ranches, LLC
• RWD Currant Creek Ranch, LLC
• Sadler Ranch
• Silver Creek Ranch, INC
• Smith’s Lodge
• Synergy Resource Solutions, Inc
• Tomera Ranches
• UNR Gund Ranch
• Western Shoshone Descendants of Big Smokey
• Western Watersheds Project
• White Sage Grazing
• Wild Horse Education
• Wild Horse Ranching Co.
• Wildlands Defense
• Wolf Ranches, II
• Young Bros.</td></tr>
<tr><td colspan="2">Individuals</td></tr>
<tr><td>• Barb Stremler
• Cathy Ceci
• Chad and Rosie Bliss
• Glenn Alexander
• Karl Brooks</td><td>• Steven Carter
• Karen Klitz
• Lorinda Whitman
• Johnny Jeppesen
• Joel Jeppesen</td></tr>
</table>

4.4 LIST OF PREPARERS

In addition to agencies called out here, **Table 4.3** identifies the preparers of this EIS.

Table 4.3. List of Preparers and Contributors

Agency or Company	Role/Responsibility
Bureau Land of Management	
Scott Distel	Project Manager
Delmetria Taylor	Technical Lead
Craig Nicholls	Air Quality Lead
Rachelle Peppers	Biology Lead
Tim Van Der Voort	Cultural Resources Lead
Wilfred Nabahe	Tribal Concerns
Scott Distel	Hazardous Materials and Solid Waste
Justin Ferris	Water Resources
Cassie Ault	Lands and Realty
Allie Bettinger	Recreation, Visual Resources, and Wilderness
Robert Burdick	Soils, Vegetation, and Rangeland
Joseph Moskiewicz	Geology, Mining, and Mine Closure
Scott Distel	Transportation
Julie Suhr Pierce	Socioeconomics and Environmental Justice
Sandra Brewer	Toxicology
Shawna Richardson	Wild Horses & Burros
Anna O'Brien	Weeds and Forestry
Brock Uhlig	Fire Management
Jess Harvey	Public Outreach
Danielle Harvey	Geographic Information Systems
Nevada Vanadium Company	
Ron Espell	Vice President, Environment and Sustainability/Project Manager
ICF	
Jon Alstad	Project Manager
Madeline Terry	Deputy Project Manager
Scott Duncan	Project Director
Alex Bartlett	Recreation and Wilderness, Transportation and Access, Visual Resources, and Wildlife and Aquatics
David Ernst	Air Quality
Carol-Anne Garrison	Cultural Resources, Land Use and Realty, Paleontology, Geology and Minerals
Peter Hardie	Noise
Meghan Heneghan	Grazing Management, Hazardous Materials and Solid Waste, Soils, Vegetation, and Wild Horses & Burros

Agency or Company	Role/Responsibility
Lissa Johnson	Geographic Information Systesm/Graphics
Claire Munaretto	Socioeconomics and Environmental Justice
Worthington Miller Environmental (ICF Subcontractor)	
Lou Miller	Uranium and Radionuclides
Whetstone and Associates, LLC (ICF Subcontractor)	
Scott Effner	Hydrology
Geochemical Solutions, LLC (ICF Subcontractor)	
Mark Williamson	Geochemistry

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APPENDIX A
EUREKA COUNTY MASTER PLAN CONSIDERATION

APPENDIX A. EUREKA COUNTY MASTER PLAN CONSIDERATION

The National Environmental Policy Act (NEPA) requires an Environmental Impact Statement (EIS) to discuss certain factors. See 42 United States Code § 4332(2) (C)(i–v). As set forth by NEPA's implementing regulations, one of these factors is potential conflicts between a proposed action and the objectives of Federal, regional, State, and local land use plans, policies and controls for the area concerned. See 40 Code of Federal Regulations (CFR) § 1502.16. Where an inconsistency exists between the proposed and any approved State or local plan or law, the EIS should describe the extent to which the agency would reconcile its proposed action with the plan or law.

Also related to State and local planning, 40 CFR § 1506.2(d) requires that the EIS "discuss any inconsistency of a proposed action with any approved state or local plan and laws," and if an inconsistency exists, describe "the extent to which the agency would reconcile its proposed action with the plan or law."

The Council on Environmental Quality (CEQ) regulations at 40 CFR 1502.16(c) require the environmental consequences section of an EIS to disclose "possible conflicts between the proposed action and the objectives of federal, regional, state, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned."

The CEQ has also provided guidance for situations where a proposed action conflicts with local plans, policies, and controls through their publication: *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations* (46 *Federal Register* 18026 (1981)). Question 23c asks, "What options are available for the decisionmaker when **conflicts with such plans** or policies are identified?" CEQ's answer states, "After identifying any potential land use conflicts, the decisionmaker must weigh the significance of the conflicts, among all the other environmental and non-environmental factors that must be considered in reaching a rational and balanced decision. Unless precluded by other law from causing or contributing to any inconsistency with the land use plans, policies or controls, the decisionmaker retains the authority to go forward with the proposal, despite the potential conflict…"

The Eureka County 1973 Master Plan, updated in 2010, contains a description of the county and its history, and articulates various goals, objectives, policies, and restrictions to seek to maintain and enhance local economic viability and development, and the rural quality of life in Eureka (Eureka County 2010). It outlines recommendations for future land use planning and includes goals and policies for economic stability, security and growth, social stability, private property rights, local and private management of resources, recreational opportunities, transportation and utility infrastructure, easements and rights-of-way, and public access to Federal and State lands (Eureka County 2010). It is divided into sections that focus on specific planning issues identified during the development of the Master Plan. Each section is referred to as an element. There are seven elements: Growth Management Element, Public Facilities and Services Element, Economic Development Element, Natural Resources and Federal or State Land Use Element, Land Use Element, Housing Element, and Water Resources Element. Titles are reserved for Transportation, Conservation, Historic Preservation, Open Space Elements, and Public Finance Elements.

The Natural Resources and Federal or State Land Use Element (referred to as the Natural Resource and Land Use Plan) was originally developed and included into the Master Plan in response to Nevada Senate Bill 40 (1983), which directs counties to develop plans and strategies for resources that occur within lands managed by Federal and State agencies. The Natural Resource and Federal or State Land Use Element is an executable policy for natural resource management and land use on Federally and State-administered lands in Eureka County (Eureka County 2010).

This appendix is referenced in the EIS and provides an overview of the relevant goals, objectives, and policies of the Eureka County Master Plan for the resources discussed in the environmental consequences sections in compliance with the CEQ regulations. The discussion of the Eureka County Master Plan goals, objectives, and policies is organized by resource type. Goals, objectives, and policies from the Eureka County Master Plan are in italics.

Air Quality

Air Quality is included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element. For Air Quality, the Eureka County Master Plan defined goal is *to prevent significant deterioration of the superior air quality found in Eureka County*. Relevant objectives to this Project associated with this goal focus on working with the State of Nevada and Federal agencies air quality permitting process for developments that could diminish air quality, and developing best management practices for limiting unnecessary emissions from existing and new point and nonpoint sources. Additionally, Eureka County supports mining that *uses the best available science and technology to ensure adequate protection of land, air, and water resources*.

Cultural Resources

Cultural Resources are included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element as a topic along with historic and paleontological resources. For these resources, the defined goal is that *in coordination with federal state and local government planning agencies, tribal leadership and interested members of the public, determine the significance of cultural resource sites according to condition, content and relevance and increase the opportunity for educational, recreational, socio-cultural, and scientific uses of cultural and Paleontological resources.*

Forest Products

Vegetation and Woodland Resources are included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element as two different topics. Vegetation is included as a primary resource with soil and watersheds. The defined goal for the primary resources of soil, vegetation, and watersheds, is *to maintain or improve the soil, vegetation and watershed resources in a manner that perpetuates and sustains a diversity of uses while fully supporting the custom, culture, economic stability, and viability of Eureka County and its individual citizens*. Relative to forest products, an objective associated with this goal is *to develop and implement an aggressive pinyon pine, juniper, and shrub abatement and control plan for all sites where invasion and/or senescence due to age of a stand is adversely affecting desirable vegetation and/or wildlife. Development of such plans will include technical references to Woodland or Rangeland Ecological Sites and other appropriate interpretations of specific soil series within a Soil Survey. Whenever possible, plans to reduce the density of pinyon or juniper will emphasize removal and use of the material for firewood, posts, or commercial products including chips for energy production. This item depends on continued access to all areas that are subject to future woodland manipulations.*

The defined goal for woodland resources is to *maintain or improve aspen and conifer tree health, vegetation diversity, wildlife and watershed values through active management of sites with the ecological potential for aspen, pinyon, or juniper woodlands and initiate thinning, removal, or other management measures*.

Geology and Minerals

For the Geology and Minerals Resource, the associated topic in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element is Locatable Minerals, Fluid Minerals, and Mineral Materials. For this topic, the defined goal is to *facilitate environmentally responsible exploration, development and reclamation of oil, gas, geothermal, locatable minerals, aggregate and similar resources on federal lands*. A relevant objective for this topic is for the County to *actively engage in NEPA analysis of environmental and community impacts related to proposed mineral, oil and gas development, including social, economic, and fiscal impacts*. Mining is the top employer in Eureka County and historically has been an important part of the county economy.

Grazing Management

Forage and Livestock Grazing is included as a topic in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element. Open space agriculture is the single greatest land use (2.4 million acres) in Eureka County, which includes livestock grazing and crops (Eureka County 2010). The defined goal for forage and livestock grazing is to *provide for landscape vegetation maintenance and improvement that will:*

1. *Support restoration of suspended animal unit months (AUMs);*
2. *Support allocation of continuously available temporary non-renewable use as active preference;*
3. *Support allocation of forage produced in excess of the original adjudicated amounts where greater amounts of forage are demonstrated to be present;*
4. *Restore livestock numbers of individual ranches to at least the full levels at the time of grazing allotment adjudications; and*
5. *Restore wildlife populations to those peak levels of the mid-1990's.*

Relevant objectives for this goal include: *identify and implement all economically and technically feasible livestock distribution, forage production enhancement, and weed control programs before seeking changes in livestock stocking rates and assure that all grazing management actions and strategies fully consider impact on property rights of inholders and adjacent private land owners and consider the potential impacts of such actions on grazing animal health and productivity*. Additionally, Eureka County supports mining that *uses the best available science and technology to ensure adequate protection of land, air, and water resources*.

Hazardous or Solid Waste

Hazardous or Solid Waste are discussed in Element 4, Public Facilities and Services. The section discusses solid waste and materials as a separate header. The defined goal for Solid Waste and Materials is *to provide solid waste and hazardous waste management to meet the needs of planned land uses, with systems that are cost-effective and environmentally sound.*

Land Use, Access, Realty, and Transportation

Land use, access, realty, and transportation are discussed in several Elements of the Eureka County Master Plan, specifically, Growth Management, Public Facilities and Services, and Economic Development Elements. Goals, objectives, and policies related to these resources seek to maintain and enhance local economic viability and rural quality of life in Eureka County.

Goals in the Growth Management Element include:

- *Encourage new development in Eureka County in a planned and orderly manner consistent with the maintenance of existing quality of life, environmental attributes, and fiscal resource limits of the County;*
- *Encourage new development in areas in or proximate to existing communities where public infrastructure can be efficiently provided and a sense of community can be established or improved;*

- *Accommodate new development at a rate which can be adequately served by available community facilities and services; and*
- *Ensure that development and use of land occurs in a manner which promotes the health, safety, and welfare of Eureka County residents.*

Goals in the Public Facilities and Services Element include:

- *To provide for the organized planning, funding, construction, and maintenance of infrastructure at locations consistent with planned land uses and with capacities which are adequate to meet the needs of these planned land uses;*
- *To build and maintain a transportation system which combines a mix of transportation modes and transportation system management techniques, and which is designed to meet the needs of the County's Land Use plan while minimizing the transportation systems' impacts on air quality, the environment, and adjacent development; and*
- *To plan, build, and maintain a system of major roadways which provides adequate service to the County's planned land uses, integrates automobile use and the other modes of transportation, and minimizes environmental impacts.*

Goals in the Economic Development Element include:

- *Retain and expand existing business and industry; and*
- *Diversify and expand the Eureka County economy.*

Policies and objectives relative to these goals and the Project include:

- *Eureka County encourages development which minimizes impacts to sensitive environmental areas;*
- *Eureka County may identify and pursue mining industry induced industrial development opportunities; and*
- *Eureka County may encourage the productivity of existing "Building Blocks" beginning with such assets of a work force and natural resources including water, minerals, livestock forage, and wildlife.*

As the Natural Resource and Federal or State Land Use Element is an executable policy for natural resource management and land use on federal and state administered lands in Eureka County, some of the goals of this element pertain to lands and realty in addition to other resources listed here. These include the following:

- *To maintain and improve the soil, vegetation and watershed resources in a manner that perpetuates and sustains a diversity of uses while fully supporting the custom, culture, and economic stability and viability of Eureka County and its individual citizens;*

- *Facilitate environmentally responsible exploration, development and reclamation of oil, gas, geothermal, locatable minerals, aggregate and similar resources on federal lands;*
- *Prevent significant deterioration of the superior air quality found in Eureka County; and*
- *Maintain, improve or mitigate wildlife impacts to habitat in order to sustain viable and harvestable populations of big game and upland game species as well a wetland/riparian habitat for waterfowl, fur bearers and a diversity of other game and non-game species.*

Primary planning guidance of the Natural Resource and Land Use Plan is found in Eureka County Code Title 9, Chapters 30, 40 and 50. Eureka County Code 9.30.060(E) states, *It is critical to the welfare of the citizens of Eureka County and the nation that mining on state and federal lands remains an open and free enterprise. Eureka County upholds the tenet that mining claims are compensable property belonging to individuals or groups of individuals* (Eureka County 2010). The primary guidance for mining activities within Chapter 30 that pertain to lands and realty includes (Eureka County 2010):

- *Retention of and compliance with the 1872 Mining Law as amended;*
- *Compliance with mine reclamation activities as per NRS Chapter 519A;*
- *Use of best available science and technology to ensure adequate protection of land, air, and water resources;*
- *Mitigation of mining activities that may impair the economic future of Eureka County citizens through bilateral or multi-lateral consultations with the Board of Eureka County Commissioners; and*
- *Disposal of mine dewatering water in a manner that returns water to the ground in the same basin it is withdrawn with minimal evaporation and transpiration loss.*

Native American Cultural Concerns

There are no goals identified for Native American Cultural Concerns in the Eureka County Master Plan; however, cultural resources are included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element as a topic along with historic and paleontological resources. For these resources, the defined goal is that *in coordination with federal state and local government planning agencies, tribal leadership and interested members of the public, determine the significance of cultural resource sites according to condition, content and relevance and increase the opportunity for educational, recreational, socio-cultural, and scientific uses of cultural and paleontological resources.*

Paleontological Resources

Paleontological resources are included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element as a topic along with historic and cultural resources. For these resources, the defined goal is that *in coordination with federal state and local government* *planning agencies, tribal leadership and interested members of the public, determine the significance of cultural resource sites according to condition, content and relevance and increase the opportunity for educational, recreational, socio-cultural, and scientific uses of cultural and paleontological resources.*

Recreation

Hunting, Fishing, and Outdoor Recreation is included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element as a topic. Outdoor recreation, along with mining and agriculture, is a key component of Eureka County's economy. The Eureka County Master Plan includes goals and policies for recreational opportunities (including hunting, fishing, and outdoor recreation), wilderness and wilderness study areas (WSAs). The primary goal relating to recreation within the Eureka County Master Plan is:

- *Provide for multiple recreation uses on Eureka County federal and state administered lands located within its boundaries for residents and visitors to the County. Provide recreational uses including high quality recreational opportunities and experiences at developed and dispersed/undeveloped recreation sites by allowing historic uses and access while maintaining existing amenities and by providing new recreation sites for public enjoyment. Pursue increased public access opportunities in both motorized and non-motorized settings through the acquisition of rights-of-way or easements across federal administered lands and private lands at the invitation of the property owner. Recognize that multiple recreation uses are mandated by the multiple use concepts and that adequate outdoor recreation resources must be provided on the federal administered areas; keeping open all existing access roads and the ability to maintain those same roads or accesses.*

The primary goal for wilderness areas and WSAs is:

- *Seek immediate Congressional designation action on all WSAs and other restrictive land classifications based on Eureka County policy to release these areas for multiple use management and in the interim prevent, minimize or mitigate impairment or degradation of such areas to the extent that Congressional actions are not pre-empted. Provide the amenities promised by wilderness designation through multiple use management that includes dispersed recreation where appropriate and opportunities for solitude.*

Social and Economic Values

Social and economic values are addressed in several elements in the Eureka Master Plan. Defined goals and objectives related to economic values are covered above under the key resources that compose the majority of Eureka County's economy: Livestock Grazing, Mining (Geology and Minerals), and Recreation, as well as Land Use, Access, Realty, and Transportation.

Housing

Defined goals and objectives related to housing as described in the Eureka Master Plan include the following:

- *Support development initiatives that would provide an appropriate mix of housing;*
- *Support efforts to improve existing housing stock in Eureka County;*
- *Support affordable housing initiatives including low and moderate income households in Eureka County;*
- *Evaluate needs for assisted living centers in Eureka County; and*
- *Facilitate development of affordable housing.*

Policies relative to these goals and this project include:

- *Suggested future development and growth should be in the areas with established infrastructure;*
- *Evaluate methods to provide incentives to developers of affordable housing projects;*
- *Communicate housing needs to state and federal agencies such as the Nevada Housing Division, Nevada Rural Housing Authority, USDA rural Development, and the Community Development Block Grant Program;*
- *Contact private and non-profit housing developers concerning the need for additional housing investment in Eureka County; and*
- *Support the availability of adequate financing for housing development and rehabilitation programs through private lending institutions.*

Soils

Soils are included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element. Soils are included as a primary resource with vegetation and watersheds. The defined goal for the primary resources of soil, vegetation, and watersheds is *to maintain or improve the soil, vegetation and watershed resources in a manner that perpetuates and sustains a diversity of uses while fully supporting the custom, culture, economic stability, and viability of Eureka County and its individual citizens*. Additionally, Eureka County supports mining that *uses the best available science and technology to ensure adequate protection of land, air, and water resources*.

Vegetation

Vegetation Resources are included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element. Vegetation is included as a primary resource with soil and watersheds. The defined goal for the primary resources of soil, vegetation, and watersheds is *to maintain or improve the soil, vegetation and watershed resources in a manner that perpetuates and sustains a diversity of uses while fully supporting the custom, culture, economic stability, and viability of Eureka County and its individual citizens*.

Specifically, objectives relative to vegetation resources for this topic is to *prevent the introduction, invasion or expansion of undesirable plants and noxious weeds into native rangelands and improve the ecological status of sites that are currently invaded by undesirable plants or noxious weeds by integrating, through consultation with the Eureka County Weed District and Eureka County Department of Natural Resources, appropriate control methods into all planning efforts. Prescriptions for control of undesirable plants and noxious weeds may include, but are not limited to burning, grazing, mechanical, manual, biological and chemical methods and include with fire line and site rehabilitation plans, identification, utility and limitations of native or exotic vegetation capable of supporting watershed function and habitat for wildlife and livestock.*

In addition, an objective associated with goals for Growth Management indicates that *Eureka County encourages development which minimizes impacts to sensitive environmental areas*. Eureka County supports mining that *uses the best available science and technology to ensure adequate protection of land, air, and water resources*.

Water Quality and Quantity

The Water Resources Element describes Eureka County's goals and planning guidance for water resources within Eureka County. Eureka County Code 9.30.060(C) states that *Eureka County would continue to work to maintain its water resources in a condition that will render it useable by future generations for the full range of beneficial uses that further a viable and stable economic and social base for its citizens* (Eureka County 2010). Defined goals include meeting *the requirements for water quality contained in the Nevada Administrative Code (NAC) Section 445, to the extent they can be met while complying with constitutional and statutory law as to vested water rights, maintain or improve riparian areas and aquatic habitat that represents a range of variability for functioning condition.* Additionally, Eureka County supports mining that *uses the best available science and technology to ensure adequate protection of land, air, and water resources*.

Eureka County Commissioners have also adopted the 2016 Eureka County Water Resources Master Plan (Eureka County 2016). The primary purpose of the Eureka County Water Resources Master Plan is to provide more details of guidance to implement the Eureka County Master Plan Water Resources Element. The goal of the Water Resource Master Plan arises from this guidance of the Water Resources Element of the Master Plan and is *tempered by input from its residents, and is, quite simply, to provide sufficient information to its residents to help them develop the County's water resources in a manner that the resource can be used in perpetuity.* The document is organized to provide detailed information of water resources related issues facing Eureka County, including water rights, groundwater resources, surface water resources, current water usage, water quality, ability for growth within Eureka County communities, and floodplain management, and provides potential management alternatives. Objectives include:

1. *Quantify the water resources available for use in the 16 hydrographic areas which comprise the County's Water Resource Master Plan planning area;*
2. *Estimate the amount of water which is currently being consumed within the planning area;*
3. *Identify areas where water use currently exceeds the supply or may someday outstrip supply if all approved water rights were to be put to beneficial use;*
4. *Estimate how much water may be available for future growth and provide insight as to where these supplies might be developed;*
5. *Identify the issues that might affect water supplies within the County and help residents recognize how these issues might affect them. These concerns may be related either to water quantity or water quality;*
6. *Raise residents' awareness of the potential threat from flooding within the County;*
7. *Ensure that water and water resource related management actions are consistent with Eureka County plans, policies, and desires through local, grass-roots planning and management of the water resources within Eureka County;*
8. *Help stakeholders identify, evaluate and implement management strategies to address water resource issues; and*
9. *Coordinate with the Nevada Division of Water Resources, other federal, state and local agencies (e.g., Eureka Conservation District), the Central Nevada Regional Water Authority, and the Humboldt River Basin Water Authority, to efficiently manage the resource to the benefit of all stakeholders in a manner consistent with County plans and policies and the letter of the applicable laws.*

Wildlife

Wildlife is included in the Eureka County Master Plan Natural Resources and Federal or State Land Use Element. The Eureka County Master Plan identifies the following goal for wildlife and wildlife habitat: *Maintain, improve or mitigate wildlife impacts to habitat in order to sustain viable and harvestable populations of big game and upland game species as well as wetland/ riparian habitat for waterfowl, fur bearers and a diversity of other game and nongame species.* A relevant objective is to *include considerations of wildlife habitat requirements in the design and reclamation of mineral development projects through approved Plan(s) of Operations*.

Wild Horses

Wild Horses are not a specific topic in the Eureka County Master Plan but are considered under livestock grazing, water quality, soils, vegetation, and wildlife and wildlife habitat topics.

Specific goals that may be relevant to this resource include: *to maintain or improve the soil, vegetation and watershed resources in a manner that perpetuates and sustains a diversity of uses while fully supporting the custom, culture, economic stability and viability of Eureka County and its individual citizens*.

Specific objectives related to wild horses include: *manage wild horse and burro populations within HMAs at levels that preclude adverse impacts to soil, water and vegetation until monitoring studies and allotment evaluations demonstrate that population adjustments are warranted by changing resource conditions; develop and implement a management plan for wild horses, livestock and wildlife to minimize surface disturbance and erosion adversely affecting riparian areas; and provide for the development and maintenance of water conveyance systems (i.e. provide for livestock watering systems, irrigation diversions, and domestic or municipal uses)*.

References

Eureka County. 2010. *Eureka County Master Plan*. April 6. Available: http://www.co.eureka.nv.us/PDF/Master_Plan_Final%20_2010.pdf. Accessed March 11, 2020.

Eureka County. 2016. *Eureka County Water Resources Master Plan*. September. Available: http://www.co.eureka.nv.us/natres/Water%20Resources%20Master%20Plan%20FINAL.pdf. Accessed October 26, 2021.

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APPENDIX B
APPLICANT-COMMITTED ENVIRONMENTAL PROTECTION MEASURES

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APPENDIX B. APPLICANT-COMMITTED ENVIRONMENTAL PROTECTION MEASURES

Nevada Vanadium Company (NVV) has committed to implement the following practices to prevent unnecessary and undue degradation during the life of the Gibellini Vanadium Mine Project (Project). These practices were derived from the general requirements established in the Bureau of Land Management's (BLM's) surface management regulations at 43 CFR § 3809 and Nevada Division of Environmental Protection-Bureau of Mining Regulation and Reclamation (NDEP-BMRR) mining reclamation regulations, as well as other water regulations and BLM guidance documents. These measures are informed by the Enhanced Baseline Reports that identified potential resource conflicts and measures that could be taken to avoid or minimize those resource conflicts and are to be considered part of the operating plan and procedures. The Applicant-committed environmental protection measures (EPMs) listed in this appendix would apply to all alternatives. General EPMs include:

- Speed limits would be posted at 35 miles per hour (mph) on haul roads and 45 mph on access roads. When road conditions are poor, drivers would be required to travel at reduced speeds (below 25 mph) to ensure safe passage to and from the mine site.
- Speed limits within the open pit and inside fenced process areas would be based on site-specific safety requirements and would be set based on factors such as ramp slopes, ramp widths, and curve radius.
- New hire and annual refresher training for all employees and contractors would include wildlife and wild horse protection training that specifically addresses the commitment of NVV to implement the protection program and the need for all employees to avoid harassment and disturbance of wildlife and wild horses, especially during breeding seasons. NVV would work with NDOW and BLM in the development of training materials.
- Site-specific training would also include internal contact numbers for reporting sick or injured animals in the Project area, as well as reporting procedures to the BLM and NDOW for any wildlife and wild horse mortalities. NDOW Industrial Artificial Pond Permit requirements would include reporting by the next business day any mortalities of wildlife species.
- Fences would be constructed to BLM and NDOW standards. Surrounding the active mine area, the process pond area would be a continuous 8-foot high woven wire fence, with no breaks, except for gates, that would be kept closed; and smooth or barbed wire would be used above the top horizontal portion of fencing to discourage perching.
- All lined ponds would be constructed with escape ramps consisting of textured liner to assist in a safe footing during egress, should any wildlife manage to gain access and inadvertently fall into one of the ponds.

- Leach lines on the HLP would be managed to preclude surface ponding on the heap surface that could attract avian or terrestrial resources to potentially toxic leach solutions.
- Hazardous material storage would include secondary containment to preclude contamination of surface or groundwater resources that animals could access.
- During all phases of the Project, all food, waste, and other trash would be placed in containers with lids or covers that can be closed to discourage scavenging by wildlife.
- NVV would prohibit employees, contractors, and sub-contractors from feeding wildlife or wild horses, or making food available for scavenging wildlife.
- All contract and full-time workers would be required to adhere to all Nevada driving laws as specified under NRS, including, but not limited to: General Traffic Laws (NRS 484A); Rules of the Road (NRS 484B); Driving Under the Influence (DUI) (NRS 484C); Equipment & Loads (NRS 484D); and Accidents (NRS 484E).
- NVV would provide vans or busses for transport of most employees to/from the site. Use of private vehicles on the mine site would be restricted. Limited senior staff of NVV may have company vehicles assigned to them.
- All orders of supplies and consumables would be made at the NVV purchasing office in Eureka. No solicitors would be permitted at the mine site. This practice would reduce the volume of vehicles to and from the mine during normal business hours.
- All shipping of petroleum products (gasoline and diesel fuels) and other hazardous chemicals to the site would be by an approved transport company on a regular schedule using a predetermined route and pilot guide vehicles (as per applicable Department of Transportation [DOT] regulations). All unloading and transfer would be by trained NVV personnel.
- Monitoring of the stability of the open pit would be performed in accordance with requirements under the Water Pollution Control Plan (WPCP) and Reclamation Permit and would include daily visual stability monitoring of the highwall and the crest area behind the highwall for any signs of movement. If any signs of instability are detected, the geotechnical engineers from AMEC (now Wood) would inspect the highwall and advise next steps that would be reported to the BLM and NDEP.
- To quantify the project specific impacts to grazing capacity, a production survey within the project area would be conducted during the peak of the growing season as much of the area of the mine is of low grazing forage value and would not result in a measurable loss of actual AUMs. NVV will conduct the production survey both prior to construction and post reclamation to assist the permittee, BLM and Eureka County in the quantification of any forage potentially lost as well as improvements in range productivity following reclamation.
- NVV will develop a compensation agreement with the permittee and Eureka County to ensure no economic impact will occur either during operations or post closure. This

compensation agreement will be based on the production survey within the fenced area precluded from grazing.

- NVV will work with Eureka County to develop uranium specific emergency response training materials and provide the training and materials to the Eureka and White Pine emergency response teams and the Nevada Highway Patrol officers. The materials will include facility drawings showing the location of all hazardous materials and the uranium product storage areas and procedures that will include notifications to the emergency response teams that will be made of the route and timing of the yellowcake shipments.

B.1 Air Quality

The Project would be operated to control both gaseous and particulate emissions and to meet all state and federal regulatory standards. Appropriate air quality permits would be obtained from the NDEP Bureau of Air Pollution Control (BAPC). Specific Air Quality EPMs include:

- A Fugitive Dust Control Plan would be implemented for all mine operations and Project access roads. In general, the fugitive dust control program would provide for water application on haul roads and other disturbed areas; chemical dust suppressant application (such as lignin sulfate or magnesium chloride) where appropriate; and other dust control measures, as per accepted and reasonable industry practice. Also, disturbed areas would be seeded with an interim seed mix to minimize fugitive dust emissions from unvegetated surfaces where appropriate.
- The dust generated from the use of roads and excavation activities would be minimized to the extent reasonable and practicable by minimizing vehicular traffic, application of approved dust suppressants on gravel roads, including Eureka County gravel access roads, and using prudent vehicle speeds.
- Fugitive emissions in the process area would be controlled at the crusher and conveyor drop points through the use of dust collectors, enclosures and/or water sprays, where necessary. Other process areas requiring dust and/or emission controls would include the SX Plant, the various ancillary screening and sizing processes, agglomerator, refinery, generators, and the laboratory. The agglomerator is expected to be permitted as a zero-emissions unit due to the inherent nature of the agglomeration process (binding of fine materials with polymer). Appropriate emission control equipment would be installed and operated in accordance with an NDEP-issued Air Quality Operating Permit.
- Equipment and machinery would be maintained in good working condition to minimize emissions.

B.2 Water Resources

In order to protect water resources, process components would be designed, constructed, and operated in accordance with NDEP regulations and include engineered liner systems. The process facilities would be zero discharge, and the heap leach facility would have an engineered liner and leak detection systems in accordance with NAC 445A design criteria. Waste rock generated from mining of the pit has been evaluated for potential to generate acid and/or mobilize deleterious constituents that could degrade Waters of the State. Based on the geochemical characterization program completed for the Project, the waste rock material would originate from the high carbonate acid neutralizing zones that would not be placed on the HLP due to their high acid consumption rate in the process. Given the oxidized nature of the ore, there is very low amount of material that is acid generating. Any acid-generating material would be directly placed on the lined HLP. The Adaptive Waste Rock Management Plan described the procedures for the identification, handling and management of Potentially Acid Generating (PAG) to minimize potential oxidation and solute generation along with monitoring and reporting procedures.

A Water Management Plan (WMP) has been developed in compliance with 43 CFR § 3809.401(b)(2)(iii). The WMP identifies more specific control measures and monitoring requirements. The actual locations and numbers of sediment controls would be determined during final design and where appropriate during operations. In either case, the controls would be developed in accordance with the site-wide stormwater management plan and engineering design documents developed as part of the NDEP-BMRR WPCP application.

A survey to identify waters of the U.S. (WOUS), or areas where waters could be discharged into WOUS, was conducted within the Project area. No WOUS [as currently defined by the Clean Water Act and 40 CFR § 230.3(s)] or areas where waters could be discharged into WOUS were identified (3 Parameters, 2014a: USACE, 2014).

Groundwater Quality EPMs include:

- Mine processing components would be designed, constructed, and operated in accordance with NDEP regulations and include engineered liner systems.
- The process facilities would be zero-discharge, and the heap leach ponds would have an engineered liner and leak detection system in accordance with NAC 445A design criteria.
- NVV would sample groundwater on a quarterly basis from monitoring wells located within the perimeter of the site's process facilities. Groundwater sampling would be conducted using NDEP and EPA approved sampling methodologies. Water purged from the well during sampling would be managed at the well head. All groundwater purged from wells within the process area would be managed within the process area.
- Water collected within sumps inside of the open pit would be restricted to be used for dust suppression only within the pit limits to minimize the potential for contaminants leached from the ore to be discharged outside of the pit.

Surface Water Quality EPMs include:

- Fish Creek Ranch owns certified water rights for Fish Creek Springs of 5,730 acre-feet per year (afy), with 805 afy of water from Fish Creek Springs to be transferred to NVV.

The point of diversion would stay the same, but the place of use would be transferred to the Project area. Fish Creek Ranch would then remove 818 acres from cultivation to offset the 805 afy used by the Project. The Project would lease, but not use, an additional 30 percent of spring water to offset loss of irrigation recharge for a total lease of 1,046.5 afy to ensure no increase to the existing use of Fish Creek Springs and no decrease in recharge to downstream users.

- The pipe inlets would continue to be screened as they are for the irrigation supply. Mine water pump intake in the Fish Creek irrigation canal would be screened to ensure aquatic species are not drawn into the pumping system.

B.3 Cultural and Paleontological Resources

Avoidance is the BLM-preferred management response for preventing impacts to historic properties [a historic property is any prehistoric or historic site eligible to the National Register of Historic Places (NRHP)] or unevaluated cultural resources. If avoidance is not possible, or is not adequate to prevent adverse effects, NVV would undertake prescribed data recovery from such sites. Development of a treatment plan, data recovery, archeological documentation, and report preparation would be based on the Secretary of the Interior's “Standards and Guidelines for Archeology and Historic Preservation,” 48 CFR § 44716 (September 29, 1983), as amended or replaced. If an unevaluated site could not be avoided, additional information would be gathered, and the site would be evaluated. If the site does not meet eligibility criteria, as defined by the Nevada State Historic Preservation Office (SHPO), no further cultural work would be performed. If a site meets eligibility criteria, a data recovery plan or appropriate mitigation would be completed.

Cultural resource EPMs include:

- A treatment plan would be developed, and mitigation activities completed and approved by the BLM and SHPO prior to construction activities in the area of any eligible cultural sites.
- If previously unidentified cultural resources are discovered or an unanticipated impact situation occurs, all Project-related activities within 100 meters (or approximately 328 feet) of the discovery/impact would cease immediately, and NVV would secure the location to prevent vandalism or other damage and would notify the BLM Authorized Officer immediately.
- Cultural monitors from the Duckwater Tribe would be notified of cultural mitigation activities and Project construction activities with sufficient advanced notice to be on-site during these activities.
- Pursuant to 43 CFR 10.4(g), NVV would notify the BLM authorized officer, by telephone, and with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR 10.2). Further pursuant to 43 CFR 10.4 (c) and (d), the operator would

immediately stop all activities in the vicinity of the discovery and not commence again for 30 days or when notified to proceed by the BLM authorized officer.

- Any cultural resource discovered by the permit holder, or any person working on their behalf, during the course of activities on federal land would be immediately reported to the authorized officer by telephone, with written confirmation. The permit holder would suspend all operations in the immediate area of such discovery and protect it until an evaluation of the discovery can be made by the authorized officer. This evaluation would determine the significance of the discovery and what mitigation measures are necessary to allow activities to proceed. The holder is responsible for the cost of evaluation and mitigation. Operations may resume only upon written authorization to proceed from the authorized officer.

B.4 Erosion and Sediment Control

Best management practices (BMPs) would be used to limit erosion and reduce sediment in precipitation runoff from Project facilities and disturbed areas during construction, operations, and initial stages of reclamation.

Because there are no waters of the U.S. in or around the Project area (USACE 2014, 2020), NVV would not be specifically required to manage stormwater discharges in accordance with provisions set forth in the NDEP Stormwater General Permit NVR300000, nor would NVV be required to submit a Stormwater Pollution Prevention Plan (SWPPP) to the NDEP. However, as general corporate environmental policy, and good environmental stewardship, NVV would adhere to the policies and guidelines set forth in NVR300000 to ensure that appropriate stormwater BMPs would be employed in the Project area. As per NVR300000, BMPs for the Project would include "erosion and sediment controls, conveyance, stormwater diversions, and treatment structures, and any procedure or facility used to minimize the exposure of pollutants to stormwater or to remove pollutants from stormwater." A Stormwater Management Plan has been developed for the Project. BMPs would include, but would not be limited to:

- Erosion and sediment control structures such as diversions (e.g., runoff interceptor trenches, check dams, or swales), siltation or filter berms, filter or silt fences, filter strips, sediment barriers, and/or sediment basins;
- Collection and conveyance structures, such as rock lined ditches and/or swales;
- Vegetative soil stabilization practices such as seeding, mulching, and/or brush layering and matting;
- Non-vegetative soil stabilization practices such as rock and gravel mulches, jute and/or synthetic netting;
- Slope stabilization practices such as slope shaping, and the use of retaining structures and riprap;
- Infiltration systems such as infiltration trenches and/or basins;

- Following construction activities, areas such as cut and fill slopes and embankments and growth media/cover stockpiles would be seeded as soon as practicable and safe; and
- Concurrent reclamation would be maximized to the extent practicable to accelerate revegetation of disturbed areas. All sediment and erosion control measures would be routinely inspected, and maintenance/repairs performed, as needed.
- The dust generated from the use of roads and excavation activities would be minimized to the extent reasonable and practicable by minimizing vehicular traffic, application of approved dust suppressants on gravel roads and using prudent vehicle speeds.

Erosion and Sediment Control EPMs include:

- The surfaces of the growth media stockpiles would be shaped after construction with overall slopes of 3H:1V to minimize erosion;
- To further minimize wind and water erosion, the growth media stockpiles would be seeded after shaping with an interim seed mix developed in coordination with the BLM;
- Diversion channels and/or berms would be constructed around the growth media stockpiles, as needed, to prevent erosion from overland runoff; and
- BMPs, such as straw wattles or staked straw bales, would be used as necessary to contain sediment during precipitation events.

B.5 Waste Rock Management

Ore and waste rock analyses have shown that some of the rock has the potential to generate acid or mobilize constituents. Therefore, NVV has developed an Adaptive Waste Rock Management Plan (AWRMP) that describes the placement of the PAG waste rock materials on the fully lined HLP and all remaining high carbonate waste rock on the Rock Disposal Area (RDA). Given the potential water holding capacity of the high carbonate waste rock, it is anticipated that some or all of this material would eventually be used as a resource to construct an evapo-transpirative cover on the HLP at closure. The AWRMP provides additional detail on methods to segregate, manage, and monitor waste rock. SER 17 - Water Resources and Geochemistry has a more complete description of the AWRMP, which was included as part of the Plan of Operations.

B.6 Noxious Weeds, Invasive and Non-native Species

NVV recognizes the economic and environmental impact that can result from the establishment of noxious weeds and has committed to a proactive approach to weed control. A Noxious Weed Monitoring and Control Plan would be implemented during construction and mining operations in consultation with the BLM and Eureka County Weed District. The plan contains management strategies, provisions for annual monitoring and treatment. The results from annual monitoring would be the basis for updating the plan and developing annual treatment programs.

B.7 Safety and Fire Protection

The Project would operate in conformance with all MSHA safety regulations (30 CFR 1-199). Site access would be restricted to employees and authorized visitors. Fire protection equipment and a Fire Protection Plan (FPP) would be established for the Project area in accordance with Mine Safety and Health Administration (MSHA), State Fire Marshal, building codes, and commercial insurance standards. The primary focus of the FPP typically include engineering and administrative controls that would be developed to reduce the risk of fire and the safety measures that would be implemented to respond to a fire in a manner that first protects the health and safety of all people working at the mine and second to protect environmental impacts and third to protect the mines physical assets.

The fire suppression tank would contain at least 145,000 gallons of water for fire emergency and would be located in the northwestern portion of the Project area near the truck shop. Water in the tank would have a separate plumbing system from the potable water tank and would be designated for fire suppression use only. Fire Suppression would also be provided by the Eureka Volunteer Fire Department.

B.8 Hazardous Materials and Solid Waste

Hazardous materials and solid waste EPMs include:

- NVV would construct, operate, and close the Class III waivered industrial landfill in accordance with NAC 444.731 through 444.737. Signs would be installed at the landfill reminding employees of appropriate disposal practices.
- A Solid and Hazardous Waste Management Plan (SHWMP) would be developed that would include employee training on the appropriate landfill disposal practices such as the allowable wastes that can be placed in the landfill, management of used oil filters, oily rags, fluorescent light bulbs, aerosol cans, and other regulated substances. Any liquid waste would be specifically banned from disposal in the on-site landfill and would be managed under the SHWMP in full compliance with Resource Recovery and Conservation Act (RCRA) and NDEP regulations.
- Hazardous materials and wastes would be transported, stored, and used in accordance with federal, state, and local regulations. Employees would be trained in the proper transportation, storage, and use of hazardous materials and the management of solid and hazardous waste per the SHWMP. The Spill Contingency Plan has been developed, which provides the information required to manage spills both inside and outside of containment areas.
- All shipping of petroleum products (i.e., gasoline and diesel fuels) and other hazardous chemicals to the site would be by an approved transport company on a regular schedule using a predetermined route and pilot guide vehicles (as per applicable DOT regulations). All unloading and transfer would be by trained NVV personnel.

- The term "hazardous materials" is defined in 49 CFR § 172.101; hazardous substances are defined in 40 CFR § 302.4 and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) Title III. Hazardous materials would be transported to the Project area by U.S. Department of Transportation (USDOT) regulated transporters and stored on site in USDOT approved containers. Spill containment structures would be provided for storage containers. Hazardous waste would be managed in accordance with regulations identified in 40 CFR § 262 Standards Applicable to Generators of Hazardous Waste.
- Hazardous materials and substances that may be transported, stored, and used by the Project in quantities less than the Threshold Planning Quantity (TPQ) designated by SARA Title III for emergency planning include blasting components, petroleum products, and small quantities of solvents for laboratory use. The only chemicals on-site that would exceed the TPQ are sulfuric acid and the vanadium product produced vanadium pentoxide. Small quantities of other hazardous materials, such as materials that are contained in commercially produced paints, office products, and automotive maintenance products, would also be managed by mine personnel.
- Blasting components, including ammonium nitrate and fuel oil (ANFO), would be stored on-site. Prill (without fuel oil) would be stored in a silo located near the truck shop. Explosive agents, boosters, and blasting caps would be stored away from the plant site within a secured explosives storage area in a small draw approximately half-way up the main haul road between the HLP and the mine. All explosive materials would be stored in compliance with MSHA, Nevada State Mine Inspector's regulations, Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) `and U.S. Department of Homeland Security requirements.
- Management of hazardous materials for the Project would comply with all applicable federal, state, and local requirements, including the inventorying and reporting requirements of Title III of CERCLA, also known as the Emergency Planning and Community Right to Know Act.
- All petroleum products and reagents would be stored in aboveground tanks within a secondary containment area capable of holding 110 percent of the volume of the largest vessel in the area. The Spill Contingency Plan (SCP) is reviewed and updated regularly and whenever major changes are made in the management of these materials. Inspections, maintenance schedules and procedures are set forth in sections of the SCP. All employees involved in the transport or use of petroleum products at the Project or involved in maintenance of petroleum storage and dispensing systems would receive training and instruction in the SCP Plan.
- Fuel and oil for diesel- and gas-powered equipment would be stored in aboveground, sealed tanks generally in the processing facilities area. The tanks would be installed in

lined or concrete containments. The storage area would be surrounded by berms or containment walls designed to provide secondary containment capacity of 110 percent of the largest vessel in the containment in case of rupture. Surface piping would lead from each tank to the fuel dispensing area. The refueling hoses would be equipped with overflow prevention devices and secondary containment.

- Hazardous wastes would be managed in the designated 90-Day Storage Facility prior to their shipment to an off-site licensed disposal facility (per state and federal RCRA regulations). These materials may include waste paints and thinners. Spent cleaning solvents and used oils would be returned to recycling facilities. Used oil and lubricants would be collected and hauled off site by a buyer/contractor for recycling. Solvents would be collected by a contractor and recycled off site.
- Onsite equipment and supplies including bagged absorbent, booms, weirs, and tools would be readily available for timely deployment by trained NVV personnel, and applicable regulations posted conspicuously regarding reporting spills and emergency procedures.
- Designated personnel would be properly instructed in the operation and maintenance of equipment to prevent and clean-up spills. NVV's Environmental Manager would also be responsible for oil spill prevention and training employees with the spill prevention and response program and procedures.

B.9 Growth Media Salvage and Storage

Growth media storage EPMs include:

- Suitable growth media would be salvaged and stockpiled during the development of the mine open pit, and during construction of the RDA, heap leach facilities, and other mine facility areas. Growth media along linear disturbances (e.g., access roads) would be stockpiled in windrows to the side of the construction area for later use during reclamation.
- Growth media would be stockpiled within proposed disturbance areas. Stockpiles would be located where they would be optimally situated for post-mining reclamation. The surfaces of the stockpiles would be shaped after construction with slopes no steeper than 3.0H:1V to reduce erosion.
- To further minimize wind and water erosion, the growth media stockpiles would be seeded with an interim seed mix.
- Diversion channels or berms would be constructed around stockpiles as needed to prevent erosion from overland runoff. BMPs such as silt fences or staked straw bales would be used as necessary to contain sediment mobilized by direct precipitation.

B.10 Wildlife and Wild Horses

Wildlife and wild horse EPMs include:

- All artificial bodies of water that contain any chemical in solution at levels lethal to wildlife (e.g., barren and pregnant solution ponds) would be covered or contained in a manner that would prevent access by birds and bats in accordance with the NDOW Industrial Artificial Pond Permit.
- Underground openings would be secured with bat gates in a manner that would allow ingress and egress by bats, but not people. NVV will work with NDOW and Nevada Division of Minerals to install bat gates. Any chemical-laden fluids that are the result of any process and that are impounded in a pond that is too large to cover or contain (e.g., mill tailings ponds) would be rendered non-lethal to wildlife. The chemical concentration would be measured at a non-lethal level at the point where the fluid flows from a pipe into the pond or open conveyance system. Chemical neutralization and dilution are among methods that could be used to reduce chemical concentration.
- Process facilities including the warehouse/shop, office, laboratory, Adsorption-Desorption-Regeneration (ADR) plant, crushing facilities, HLP, and ponds would be fenced to specifications outlined in the BLM Handbook 1741-1, as applicable. Solution ponds would be fenced, in accordance with the required NDOW Industrial Artificial Pond Permit, with 8-foot-high chain-link or field fencing.
- Primary ponds liners would be single-sided textured geomembrane with the textured side up to facilitate wildlife egress.
- Bird balls would also be used on the ponds to protect wildlife, where required.
- Operators would be trained to monitor the mining and process areas for the presence of larger wildlife, such as mule deer and pronghorn antelope. Mortality information would be collected and reported to the NDOW, as necessary.
- NVV would establish wildlife protection policies that prohibit feeding or harassment of wildlife within the Project area boundary. Harassment would include, but is not limited to, feeding, chasing, approaching, luring, calling or other actions that could result in habituating wildlife to approach human activity.
- New hire and annual refresher training for all employees and contractors would include wildlife and wild horse protection training that specifically addresses the commitment of NVV to implement the protection program and the need for all employees to avoid harassment and disturbance of wildlife and wild horses, especially during breeding seasons. NVV would work with NDOW and BLM in the development of training materials. Surface disturbance activities would follow the protection measures as described for migratory birds.
- Design features would be considered for buildings and other structures that minimize nest building by ravens.

B.11 Migratory Birds

The Migratory Bird Treaty Act provides protection of migratory birds, their nests, eggs, and young. Avian species protected under the Migratory Bird Treaty Act include species that migrate from breeding range to winter range, a list of species which includes most waterfowl and water-related birds (i.e., loons, grebes, pelicans, ducks and geese, herons, cranes, and shorebirds), raptors (i.e., falcons, hawks, vultures, and owls), doves, cuckoos, goatsuckers, swifts and hummingbirds, kingfishers, woodpeckers, and passerine birds (i.e., most “songbirds”).

- If surface disturbing activities are unavoidable during the avian breeding and nesting season (April 1st through July 31st), NVV would commission a BLM-qualified avian biologist to survey to determine if nesting activity is occurring in the area of proposed disturbance. Surveys would be limited to the footprint of the area of disturbance and an additional buffer of at least 300 feet beyond the disturbance footprint. Surveys would be conducted in accordance with BLM policy for migratory bird nest clearance surveys.

B.12 Raptors

Most raptors are protected under the Migratory Bird Treaty Act. Therefore, the surveys proposed by NVV for migratory birds would also apply to some raptors and burrowing owls. Golden and bald eagles are protected under the Bald and Golden Eagle Act that prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald or golden eagles, including their parts, nests, or eggs. Taking also includes “disturb” which means: “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." The following EPMs are based on these requirements.

Additional EPMs specific to protecting raptors, including golden eagles and bald eagles, would include:

- Annual raptor surveys would be conducted for an area inclusive of the Project area and a two-mile radius beyond the Project area boundary for all raptors, and a 10-mile radius for golden and bald eagles. The survey would be performed in accordance with the USFWS Interim Golden Eagle Technical Guidance (Pagel et al. 2010). This guidance states that a Project should be surveyed at least twice for nesting raptors during the breeding season and that surveys should be conducted at least 30 days apart. Other migratory bird surveys would also be conducted, and raptors or their nests may be discovered during these surveys and appropriately protected.
- Disturbance activities would be avoided during the migratory bird nesting season (March 1st through July 31st). The raptor nesting season is defined as March 1 - July 31 in the Battle Mountain District, although golden eagle breeding season can occur from

December through August. Raptor nest building activities or behavior of nesting raptors would be identified during annual surveys. NVV would establish a one-mile activity buffer around golden eagle and some raptor nests and coordinate with the BLM biologist and the NDOW on appropriate avoidance distances for other raptors, as determined by the species identified. The one-mile standard buffer for golden eagles may decrease, if in agreement with BLM and NDOW, if the nest is out of the line of site of the construction activities. The avoidance measures would be in place until a BLM-qualified biologist has determined the young have fledged. The start and end dates of the seasonal restriction may be based on site-specific information, such as elevation and winter weather patterns, which affect breeding chronology. Surveys would be conducted in accordance with BLM policy for migratory bird nest clearance surveys.

- Standard raptor protection designs as outlined in Suggested Practice for Avian Protection on Power Lines (Avian Power Line Interaction Committee [APLIC] 2006 and 2012) would be incorporated into the construction of powerlines.

B.13 Big Game

Additional EPMs specific to protecting mule deer and pronghorn antelope would include:

- Established mule deer and antelope trails would be identified by BLM qualified biologists, and NDOW will be consulted for identification of big game crossing points. Warning signs would be posted at appropriate locations along the haul roads to warn drivers of crossing points.
- If needed, berms constructed along haul roads would include openings at major trails to encourage road crossing at these locations where signage can warn drivers. Berms would be constructed per Mine Safety and Health Administration regulations.

B.14 Greater Sage-grouse

Greater sage-grouse EPMs include:

- NVV would conduct lek attendance monitoring, following NDOW monitoring protocols, for the Fenstermaker Wash lek, which is the closest lek to the Project area. If the lek is found to be inactive or changes to the extent that it is shown to hit a trigger (as discussed in the 2015 GRSG ARMPA) over the course of this project, mitigation measures would be implemented in consultation with the BLM and NDOW to reverse the downturn if it is determined that the change resulted from activities at the Gibellini Project. NVV would conduct lek attendance monitoring during all active phases of the Project from construction through final reclamation.
- NVV would implement the Nevada Conservation Credit System (CCS) to mitigate habitat impacts from the Gibellini Project to ensure an overall benefit for the species, while allowing for the mine development.

- NVV would implement applicable Resource Design Features (RDFs) of the Nevada and Northeastern California Greater Sage-Grouse ARMPA, 2015. The applicable RDFs include:
  - Limit all mine activities, including exploration activities, to ensure noise levels do not exceed 10 decibels above ambient sound levels, as measured with appropriate noise monitoring equipment, at least 0.25 mile from active and pending leks, from 2 hours before to 2 hours after sunrise and sunset during the breeding season. Noise monitoring will be performed for a sufficient period to demonstrate conformance with this EPM.
  - During Project construction and operation, establish and post speed limits in Greater sage-grouse habitat to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
  - Require dust abatement practices when authorizing use on roads.
  - Instruct all construction employees to avoid harassment and disturbance of wildlife, especially during the Greater sage-grouse breeding (e.g., courtship and nesting) season. In addition, pets shall not be permitted on site during construction.
  - To reduce predator perching in Greater sage-grouse habitat, limit the construction of vertical facilities and fences to the minimum number and amount needed and install anti-perch devices where applicable. Avian Power Line design guidelines will be incorporated to reduce risks of avian electrocution/collusion. Fences would be constructed with reflectors to minimize the potential of Greater sage-grouse collision.
  - Powerline poles would be fit with anti-perch devices in Greater sage-grouse habitat.
- The irrigated field on Fish Creek Ranch that would have the irrigation water diverted for mine use would be planted with a seed mix beneficial to Greater sage-grouse to provide feed and vegetative cover.

B.15 Pygmy Rabbits and Burrowing Owls

The EPM for pygmy rabbits and burrowing owls is:

> Pygmy rabbit and burrowing owl pre-construction surveys would be conducted prior to ground-disturbing activities. If occupied burrows/colonies are encountered, consultation with the BLM and NDOW to determine the appropriate avoidance buffer. If removal of the burrow/colony is required, NVV would coordinate with the BLM and NDOW to determine the appropriate monitoring and management measures and mitigation to be implemented.

B.16 Survey Monuments

The EPM for survey monuments is:

- To the extent practicable, NVV would protect all survey monuments, witness corners, reference monuments, bearing trees, and line trees against unnecessary or undue destruction, obliteration or damage. If, in the course of operations, any monuments, corners, or accessories are destroyed, NVV would immediately report the matter to the authorized officer. Prior to obliteration, destruction, or damage during surface disturbing activities, NVV would contact the BLM to develop a plan for any necessary restoration or re-establishment activity of the affected monument in accordance with Nevada Instruction Memorandum (IM) No. NV-2007-003 and the Nevada Revised Statues. NVV would bear the cost for the restoration or re-establishment activities including the fees for a Nevada Professional Land Surveyor.

B.17 Visual Resources

To protect visual resources, NVV would implement the following EPMs throughout the life of the Project:

- To protect visual resources, NVV would apply lighting mitigation measures that follow “Dark Sky” lighting practices throughout the life of the Project. Light fixtures would be placed at the lowest practical height and would be directed to the ground and/or work areas to avoid being cast skyward or over long distances;
- Berms required for haul roads may reduce vehicle lights emanating from haul roads and the pit areas that may be directed toward public roads during travel;
- All lighting, where practicable, would be located to avoid light pollution onto any adjacent land as viewed from a distance. All light fixtures would be hooded and shielded, face downward and be located within soffits and directed on to the operating site. Light fixtures would incorporate shields and/or louvers where possible and be full cut-off type;
- Buildings would be painted or stained to produce flat-toned, non-reflective surfaces and meet BLM visual resource management requirements. As per the BLM’s Standard Environmental Color Guidelines (BLM, 2008) NVV anticipates painting the buildings a “Covert Green” color;
- The use of dimmers, timers, and motion sensors would be installed where appropriate; and
- Fugitive dust would be minimized in order to reduce “sky glow,” by reducing the light reflectance from the dust particles.

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APPENDIX C
A-K RISK ASSESSMENT FOR THE GIBELLINI PROJECT

To: Ron Espell, Nevada Vanadium Company

From: Penny Hunter, Cedar Creek Associates

Date: April 22, 2021

Subject: **A-K Risk Assessment for the Gibellini Project**

This memorandum addresses risk assessment related comments from the Nevada Department of Environmental Protection (NDEP) regarding the Water Pollution Control Permit (WPCP) Application for the proposed Gibellini Project Heap Leach Pad (HLP) and Process facility. NDEP has asked for a risk assessment following NAC 445A.227(2) A-K format, regarding potential radiation exposure for HLP and open pit, as compared to existing background conditions (no action scenario). Following an executive summary, individual components of the A-K risk assessment are described below.

Executive Summary

The principal radioisotopes that would be associated with material handling during Project operations include those of thorium, uranium, and radium, and therefore are the focus of this assessment. Receptor populations that could potentially be exposed are primarily onsite outdoor workers during operations, and care and maintenance workers post closure. Under a no-action scenario, as well as post-closure, recreationalists and livestock grazers are also potential receptor populations. Off-site residents are included in this assessment, but do not represent a significant receptor, due to lack of complete exposure pathways and low media exposure conditions.

A conceptual risk model is summarized in Figure 1, summarizing the potential sources, primary and secondary routes of migration, exposure routes and media, and potential receptor populations. As shown, potential exposure pathways to human receptors are limited primarily to direct contact with surface soil, and under the no action scenario, with periodic surface water runoff. Groundwater-based exposure pathways are incomplete due to both the lack of significant transport from exposed surfaces to groundwater, and the lack of drinking water or irrigation wells in the vicinity of the project. The Project has proposed a number of measures to prevent and control sources of constituents and primary migration routes, described in subsection (h).

Baseline data indicates no elevated risk of radiological exposure to receptor populations from existing (no-action) conditions at the Project site. Soil concentrations are within typical background for Nevada and the U.S., and groundwater and Fish Creek Springs concentrations are below maximum contaminant levels (MCLs). There are no drinking water wells or in-use irrigation wells in the vicinity of the Project. Fish Creek Springs is the nearest irrigation source.

Concentrations of waste rock, ore, and pit surface materials, which represent materials that would be handled by workers during and after operations, are higher than background soil, but lower than levels that would require regulation as radioactive material by the State of Nevada, and lower than federal action levels. The Project will be regulated under the Department of Health, and Project plans will include occupational health monitoring of all workers during and after operations to ensure exposure levels are within acceptable limits. Therefore, no elevated risk of radiological exposure to receptor populations from material handling associated with the HLP and open pit during operations is expected.

During and after operations, there is minimal potential for groundwater contamination from ore and waste rock material. Leaching of radionuclides from the pit walls or bottom, as might occur after operations, shows minimal potential for releases of radionuclides at levels that would be below MCLs. Solutions associated with the HLP will be managed to prevent leaks and spills, but even in the event of a catastrophic loss of pregnant leach solution (PLS), the soil column would attenuate radionuclides to levels less than MCLs well before reaching the groundwater table due to the entire process area being underlain by limestone dominated alluvium from the surface to the ground water surface. The groundwater table is more than 200 feet below the surface of the HLP and lack of pressure would further minimize the mobility potential of leaks and spills under the liner system. Therefore, no elevated risk of groundwater exposure to human populations from operation or post-closure conditions associated with the HLP or open pit would be expected.

A-K Risk Sections

(A) The Depth of Any Groundwater

In the Project area, groundwater occurs in alluvial deposits consisting of low-permeability sediments underlain by low-permeability bedrock. Alluvial groundwater flow in the area of the HLP area is flat under a hydraulic gradient of approximately 0.006 ft/ft and flows to the east-northeast. Water level fluctuations in onsite wells from June 2011 to June 2013 were less than 2.3 feet.

Monitoring wells closest to the planned HLP include wells GHM-1, GHM-2a, GHM-3, and GHM-4. GHM-1 did not encounter groundwater, and dry conditions have been confirmed at this well five times between 2011 and 2014. Depth to water of remaining wells, measured in 2014, ranged from 274.7 feet to 438.8 feet (Table 1).

Table 1. Depth to Groundwater Near the HLP

Well Number	Screen Interval Depth (feet)		Screen Interval Elevation (feet bgs)		Depth to Water	Water Level	Date Measured
	From	To	From	To	(feet bmp)	(feet amsl)	
GHM-1	459	499	6,085.76	6,045.76	Dry	--	4/17/2019
GHM-2A	300	340	6,019.07	5,979.07	274.99	6,043.93	4/17/2019
GHM-3	333	373	6,036.76	5,996.76	324.78	6,044.77	4/17/2019
GHM-4	100	600	6,406.65	5,906.65	437.73	6,068.92	4/17/2019

Source: BLM (2020)

Bedrock water levels in the vicinity of the proposed pit are several hundred feet higher than in the vicinity of the proposed HLP. Monitoring wells established within the footprint of the proposed pit are GPT-1, GPT-2, GHM-06, and GHM-7. Table 2 shows measured water levels of these wells. Wells GPT-1 and GPT-2 were completed within mudstone of the Woodruff Formation and did not encounter groundwater. Dry conditions at GPT-1 and GPT-2 were confirmed four times between 2011 and 2013.

Bedrock water levels at GHM-7 are perched approximately 560 feet higher than alluvial water levels at GHM-4. Bedrock water levels below the pit are perched due to compartmentalization and faulting of the Woodruff Formation. Confined shear zone water levels at GHM-6 are located approximately 90 feet above the bedrock water level at nearby GHM-7. The water level measured at GHM-6 was not encountered until an elevation of 6,429 feet amsl and later rose several hundred feet as a result of confined pressure. Based on the texture of the drill cuttings from GHM-6 to depths of 605 feet bgs and the water level response during drilling, the shear zone likely acts as an impedance to lateral groundwater flow from west to east and as a confining layer for groundwater.

Table 2. Depth to Groundwater Near the Open Pit

Well Number	Screen Interval Depth (feet)		Screen Interval Elevation (feet bgs)		Depth to Water	Water Level	Date Measured
	From	To	From	To	(feet bmp)	(feet amsl)	
GPT-1	81	108	6,831.89	6,804.89	Dry	--	4/17/2019
GPT-2	46	86	6,820.70	6,780.70	Dry	--	4/17/2019
GHM-6	100	818	6,934.02	6,216.02	339	6,709.19	4/16/2019
GHM-7	100	800	6,964	6,264	441.8	6,642.17	4/16/2019

Source: BLM (2020)

(b) Distance to Irrigation Wells or Wells for Drinking Water

The State well log database, as cited by the Eureka County Water Resources Master Plan (2016), provides records for 47 water wells in the basin, of which 25 are identified as having been constructed in the Eureka County portion of the basin. Seven wells have been plugged and formally abandoned or did not encounter water, such that only 40 wells may be in use at the present. Figure 1 shows the wells nearest the project obtained from the State well log database. Well logs 20802, 2405 and 3421 indicate these wells are irrigation wells; however, NDWR confirms that these wells are not attached to any existing water rights and that no water in the area has been allocated for irrigation (M. Sanford, personal communication, 2021).

Fish Creek Springs is located approximately 4.7 miles from the Project boundary. Most of the water discharging from the Fish Creek Springs is captured and used for agricultural irrigation. Water not captured for Fish Creek Ranch irrigation flows downstream in Fish Creek and infiltrates before reaching County Road 379; there are no downstream surface water users of Fish Creek Springs.

No springs or seeps exist within the Project area.

(c) Type of Soil that is Contaminated

No soil has been contaminated. Discussion about background radioactivity levels of soils is provided in Section (f). Soils in Project area are consistently well-drained and loamy, and predominantly consist of mixed, igneous, or calcareous mineralogy, with a mesic soil temperature regime, and aridic or xeric soil moisture regime. The western portion of the Project area consists of shallow soils on hilly and mountainous landforms that are predominantly residuum and colluvium derived from shale, limestone, and dolostone, with minor components of andesite, conglomerate, and volcanic ash. Soils that occur in the eastern portion of the Project area are moderately deep to deep soils on fan piedmonts, fan skirts, and inset fans that are predominantly composed of quaternary alluvium and loess derived from mixed rocks and volcanic ash. Soils in the southeastern portion of the Project area are predominantly residuum and colluvial derived from an andesite volcanic dome feature. A stability analysis of the HLP was conducted by NewFields (2019). Geotechnical test data was collected within the footprint of the HLP. Soils under the footprint of the HLP consists of cohesionless, granular soil deposits with varying amounts of fines. The fines are typically low plasticity silts or clays. On the northwest portion of the proposed HLP, moderately weathered claystone/siltstone bedrock was encountered at depths ranging between one to 20 feet. The knoll in the northwest corner of the Phase 1 HLP is primarily made up of sandstone. Laboratory testing is presented in Appendix T of the Gibellini Plan of Operations.

(d) Annual Precipitation

Precipitation in the Project region averages approximately 8 inches per year and is distributed fairly evenly throughout the year. Historical data from the closest National Weather Service Cooperative station at Fish Creek Ranch (262860) reported an average of 5.6 inches of precipitation per year (WRCC 2020). Two years (2013-2014) of site-specific meteorological data collected at the Gibellini onsite meteorological station (coordinates 39.20964° N Latitude, 116.06083° W Longitude) indicate the majority of rainfall occurred from July through September and the least amount of rainfall occurred in June (Table 3). The area receives about 17 inches of snow per year (WRCC 2020). Table 3 provides a summary of the monthly and annual averages for the precipitation and temperature data collected at the Gibellini onsite meteorological station. The average annual precipitation recorded at the Gibellini onsite meteorological station was 6.44 inches.

Table 3. Gibellini Onsite Meteorological Data

Month	Precipitation (inches)	Temperature (degrees Fahrenheit)		
	Average	Average	Average Maximum	Average Minimum
January	0.26	27.5	50.5	5.0
February	0.24	31.9	55.1	8.0
March	0.13	41.1	68.4	16.0
April	0.62	45.9	74.3	21.2
May	0.35	55.2	84.3	29.1
June	0.05	67.9	93.9	36.3
July	1.06	73.9	95.7	53.6
August	1.40	68.4	88.9	48.1
September	1.54	61.0	86.7	33.4
October	0.13	49.2	74.4	27.1
November	0.26	37.9	66.5	13.9
December	0.41	28.2	55.1	-0.3
Annual	**6.44**	**49.0**	**96.3**	**-0.6**

(e) Type of Waste Substance that was Released

No waste substances have been released. Materials associated with the open pit would include overburden, waste rock, and ore. Three zones are identified at Gibellini including the Oxidized zone, the Transition zone, and the Primary zone (unaltered). The Primary zone is not currently considered to be ore due to poor recovery in tests to date. During mining, materials that would be mined out of the open pit and deposited on the HLP would include transition zone and oxidized zone materials. After mining is complete, the type of material that would be on the surface of the open pit would be Primary zone material. Thorium and uranium bulk concentrations were characterized for these materials, as shown in Table 4 (see next section).

Other substances associated with the HLP would include pregnant leach solution, draindown, and rinse solutions. Material properties associated with leached ore that would be deposited on HLP have also been characterized. Constituent properties associated with these materials are discussed in the next section.

(f) Extent of Contamination

No contamination has occurred. Under present conditions, the Gibellini deposit contains an elevated uranium concentration (<5 - 15 mg/kg) compared to background levels for shale of 4.5 mg/kg (Hem 1970). Background soil radioisotope levels (collected at 1 meter) are within Nevada and nationwide averages in U.S. soil (Table 4), and are well below NRC remedial action criteria (NRC 1993 and NRC 2003), below remediation goals in 10 CFR Part 40 Appendix A, I, Criterion 9(6), and below radiation levels that would require regulation of radioactivity and radiation by the state of Nevada.

Leach tests were not performed on background soil samples. Background soil samples were compared to NDEP groundwater protection Basic Comparison Levels (BCLs) for purposes of initial screening, though note that the intended use is for the BMI Complex and Common areas of Nevada. This comparison (Table 4) shows that naturally occurring radioisotope levels exceed these screening levels. However, groundwater monitoring data collected between 2011- 2014 (Schlumberger 2014) shows that all but one sample was lower than drinking water MCLs (Table 5). Fish Creek Springs data also collected in this time period indicates surface water levels below MCLs. Additional leach test analysis of pit floor samples, which would be similar in constituent concentrations as background soils, shows virtually no release of radionuclides. In sum, even though background soil exceeds some NDEP BCLs, levels are below NRC and CFR action levels and levels that would require radiation regulation by the state of Nevada. Further, groundwater levels are presently below MCLs and leach tests confirm virtually no leach potential of soil sources. Therefore, no elevated risk of radiological exposure to receptor populations from existing (no-action) conditions at the Project site.

Potential radioactivity levels associated with ore, waste rock, and surface materials in the open pit during operations are summarized in Table 4. Concentrations of waste rock, ore, and pit surface materials are higher than background, but lower than levels that would require regulation as radioactive material by the State of Nevada, and are below NRC and CFR action levels. The Project will be regulated by the Department of Health, and Project plans will include occupational health monitoring of all workers during and after operations to ensure exposure levels are within acceptable limits. Therefore, no elevated risk of radiological exposure to receptor populations from material handling associated with the HLP and open pit during operations is expected.

MWMP tests, column leaching tests, and humidity cell tests were performed for ore and waste rock samples to estimate leaching potential to groundwater, which represent sources of potential contamination from HLP and open pit sources during operations, and after operations for the HLP, if not managed. These data are summarized in Table 6. MWMP results for waste rock and ore indicated a few exceedances of MCLs for individual samples, with median results all below applicable MCLs. Humidity cell tests results for uranium and radium isotopes were all less than applicable MCLs. Column tests to simulate potential release of radionuclides from the pit wall and floor and transport through 200 feet of foundation material shows minimal release of radionuclides from pit floor materials at concentrations less than MCLs. The unsaturated zone in the pit area has a chemical attenuative capacity (Schafer 2012). These results indicate a low potential for groundwater contamination from ore and waste rock materials associated with the open pit and HLP, even if these facilities were not managed according to plans and procedures outlined in the Gibellini Plan of Operations.

Additional leaching tests were performed on leached ore that would be placed on the HLP, and expected radioactivity levels were determined for draindown solution, pregnant leach solution (PLS), and rinse solution associated with the HLP (Table 6). Column leaching tests for vanadium recovery from heap leached ore showed that uranium is mobilized during vanadium recovery while radium and thorium are not liberated. Uranium was the only constituent that was clearly elevated in PLS. Column tests were also performed to simulate potential contamination under the HLP resulting from a catastrophic loss of process solution. Results showed small effects from PLS release in the upper 20 feet of unsaturated material but acidic PLS solution was fully neutralized at greater depths. Radionuclide transport was minimal, with concentrations of radium isotopes less than MCLs. After operations, draindown fluids and rinse solution would be unlikely to result in elevated risk of groundwater contamination (Table 6).

Additionally, column tests were performed to represent the unlikely event of a catastrophic failure of the leach pad underliner after closure. Results showed a small pulse of uranium from rinse solution but at less than the MCL. Radium leaching was minimal and below MCLs. Deep radionuclide transport was minimal (Schafer 2014).

In sum, there is minimal potential for groundwater contamination from ore and waste rock material during and after operations. Solutions associated with the HLP will be managed to prevent leaks and spills, but even in the event of a catastrophic loss of PLS, the soil column would attenuate radionuclides to levels less than MCLs well before reaching the groundwater table. Therefore, <u>no elevated risk of groundwater exposure to human populations from operation or post-closure conditions associated with the HLP or open pit would be expected</u>.

Table 4. Background Soil and Mine Material Data Summary

ituent	Units	Groundwater Protection Level [soil] [a]	Nevada and (Nationwide) soils, (U.S.) [b]	Background soil [c]	Ore material [d]	Waste Rock material [d]
Ra-226	pCi/g	0.12	1.55 ± 0.14 (1.1)	0.50 (0.1 - 4.1)	1.9 (1.7 - 4.4)	0.6 (0.3 - 1.3)
Ra-228	pCi/g	0.12	ns	0.50 (<0.3 - 1.5)	0.2 (<0.4 - 0.6)	0.35 (<0.4 - 0.8)
Th-228	pCi/g	0.055	ns	--	--	--
Th-230	pCi/g	0.02	ns	--	--	--
Th-232	pCi/g	0.07	1.4 ± 0.18 (0.98)	0.44 (0.2 - 0.88)	0.33 (0.22 - 0.44)	0.55 (0.44 - 0.66)
U-234	pCi/g		ns	ns	ns	ns
U-235	pCi/g		ns	ns	ns	ns
U-238	pCi/g		1.3 ± 0.07 (1.0)	0.74 (<0.33 - 2.0)	3.8 (<0.75 - 5.03)	ND (<1.7)
Uranium	mg/kg	270	ns	2.2 (<1 - 6)	11.4 (<4.5 - 15)	ND (<5.1)

Notes

pCi/g = picocuries per gram

mg/kg = milligram per kilogram

ns = no sample.

-- = no value shown. Isotope not present in appreciable amounts at equilibrium.

[a] NDEP (2015) Risk-based groundwater protection levels for soil, applicable to BMI Complex and Henderson sites. Dilution attenuation factor of 20 applied.

[b] Nevada median levels from Myrick et al. (1981); nationwide averages shown in parentheses from Myrick et al.

[c] Radiological Baseline Survey (Foxfire 2019), Appendix A. Median levels shown, with min and maximum range in parantheses. One half the detection limit was used to compute medians. Total thorium activity shown in A-1, and is shown for Th-232, as the majority of activity associated with total Th is expected to be reflected as Th-232.

[d] Combined datasets from Foxfire plus NDOH analysis for U-238 and total U (mg/kg). Median levels shown with min and maximum range in parantheses. One half the detection limit was used to compute medians for. Ore samples are PT-74, PT-75, PT-76. Transition zone are PT-77, -78, -79, -80.

Table 5. Groundwater Baseline Compared to Groundwater Protection Levels

ituent	Units	NDEP Groundwater MCL [a]	Fish Creek Springs	GPWM-3	GHM-2A	GHM-3	GHM-4*	GHM-6	GHM-7
Radium	pCi/L	5	1.3 ± 0.1	<0.8	0.6 ± 0.1	0.9 ± 0.2	3.2 ± 0.6	1.0 ± 0.1	1.0 ± 0.1
Gross Alpha	pCi/L	15	5.1 ± 1.1	7.9 ± 1.9	5.4 ± 1.5	8.8 ± 2.1	67.0 ± 16.0*	6.0 ± 1.4	2.8 ± 0.8
Uranium	pCi/L	20	1.7 ± 0.3	7.3 ± 0.7	6.0 ± 0.6	7.2 ± 0.7	6.0 ± 0.6	17 ± 0.4	<0.4

Source: Schlumberger (2012).

*subsequent samples for gross alpha (n = 2) were 4.3 +- 1.0 and 3.6 +- 1.0

Table 6. Material Leach Test Results Compared to Groundwater Protection Levels

			Ore and waste rock MWMP results [c]			Residual Ore MWMP [d]		Leached ore deposited on HLP	Pregnant Leach Solution [e]			HLP Solutions	
nt	Units	NDEP Groundwater MCL [a]	Oxide	Transition	Primary	AC-7	AC-9	Sludge	Column test AC-5	Column Test AC-6	Column Test AC-8	Draindown solution	Rinse solution
Ra-226	pCi/L	5	<0.4 - 0.6 ±0.1	<0.7 - 1.3±0.2	<0.5	0.218±0.14	0.355±0.15		<0.6	<0.5	1.2 +- 0.2		
Ra-228	pCi/L	5	<0.5	<0.5	<0.5	0.303±0.25	0.473±0.28	0.00022 (0.00049)	<0.7	<0.7	<1		
U-234	pCi/L	ns	2.8 (5.5 ±1.4)	2.33 (3.6±1.1)	<2.1	ns	ns	ns	72.1 ± 4.3	71.5 ± 4.3	26197 ± 755.6		
U-235	pCi/L	ns	2.8 (5.5 ±1.4)	2.33 (3.6±1.1)	<2.1	ns	ns	ns	3.19 ± 0.029	3.16 ± 0.029	1164.77 ± 5.125		
U-238	pCi/L	ns	2.8 (5.5 ±1.4)	2.33 (3.6±1.1)	<2.1	ns	ns	ns	68.5 ± 4.1	67.8 ± 4.1	25009 ± 721.9		
Gross alpha	pCi/L	15	9.66 (14.8±2.8)	10.68 (18.3±3.0)	4.66 (7.8±1.8)			0.034 (0.141)	<147	<130	66116 ± 1469		
Uranium	mg/L	0.03				0.0149	0.000249	0.128 (0.496)	<0.7	<0.7	1.2 ± 0.2	0.02 - 0.03	0.01

ns = no standard / no sample

[a] MCLs in NDEP (2015). MCLs reflect total radium (Ra-226+ Ra-228)

[c] Schafer 2012 Table 3.2, reprinted from Schlumberger 2012

[d] Schafer (2014), Rinsed columns, MWMP test

[e] reflects final leaching PLS composite, as presented in Schafer geochem section

[f] Max shown in parantheses

(g) The Present and Potential Use for the Land

The Project area is located within the administrative boundaries of the BLM Battle Mountain District, Mount Lewis Field Office. BLM-administered land in the Project vicinity currently is managed under the guidance of the Shoshone-Eureka Resource Management Plan. The Project area is located in Eureka County, which is managed under the Eureka County Master Plan. Other land management designations that overlap the Project area include the Gibellini Mining District, Fish Creek Ranch Grazing Allotment, and Fish Creek Wild Horse Management Area. No specific recreational areas are located within the Project area. Present land uses within the Project area include mining, grazing (both cattle and wild horses), dispersed recreation and open space, and wildlife habitat.

Potential use for the land during operations would include these uses plus mining activities. Land uses after closure would restore the Project site to original uses consistent with Resource Management Plans and the Eureka County Master Plan. Outdoor workers would be present on-site periodically for post-closure maintenance and monitoring.

(h) Preferred Routes of Migration

A conceptual model illustrating potential sources, migration pathways and exposure routes for the HLP, open pit, and a no-action scenario, is shown in Figure 1. The following are measures that the Project has proposed to prevent and control complete pathways between sources of constituents associated with the open pit and HLP, and primary migration routes:

<u>HLP</u>

If uncontrolled and unmanaged, chemical constituents from the HLP could leak or spill into the subsurface soil, which could then leach into groundwater. Depending on the mobility of the constituents, materials could be transported to irrigation or drinking water wells if the wells were present, or emerge in surface water. Due to the lack of existing drinking water wells or irrigation wells, however, surrounding human populations would not be exposed to constituents through ingestion or dermal exposure to irrigated crops or groundwater ingestion. After closure, the HLP will be covered and revegetated with native plants. If not managed correctly, plants could root into the HLP materials and take up constituents into edible parts, which would create an exposure pathway to wildlife and livestock.

The Project is proposing a number of control and prevention measures to address each of the potential primary routes of migration associated with the HLP. As described in the Plan of Operations, the potential for leaks and spills are controlled and minimized through multiple means, including:

1. The HLP would be designed as a zero-discharge facility that incorporates liners and leak detection systems to prevent leakage during operations. The process ponds associated with the HLP are designed to connect via overflow weirs to provide for emergency containment. The lining system for the ponds would consist of an 80-mil HDPE primary liner, an 80-mil HDPE secondary liner, and a geonet drainage layer. Each pond would have an independent leak detection system consisting of a lined sump constructed at the lowest point in the pond bottom and monitored using an inclined riser consisting of an HDPE pipe. The reagent tanks would be designed and constructed on a sealed, cement slab with secondary containment and a steel building cover supported by a steel frame. The secondary containment would be designed to contain 110 percent of the volume of the largest tank or container within the area of containment (in accordance with NDEP regulations at Nevada Revised Statutes 445A.350-447. Each containment area would be sized based on these criteria. Process solution would be collected and transported to the pond system in pipelines placed in trapezoidal, lined

secondary containment channels. The channel lining system would consist of an 80-mil HDPE geomembrane liner placed on a prepared subgrade. Because of the design of the ponds and other process facilities, any leaks would be identified, contained, and mitigated without any release of process water.

2. The HLP would be designed as a zero-discharge facility that incorporates liners and leak detection systems to prevent leakage during operations. The HLP liner will be composite lining system consisting of the use of geosynthetic clay liner (GCL), native clayey soils, imported clayey soils and/or bentonite augment soils (BAS) overlain by an 80-mil HDPE geomembrane liner. The HDPE geomembrane liner would be covered with a three-foot thick cushioning/drainage layer of liner cover material called overliner. An integrated piping network (underdrain piping) is included in the heap leach pad design to enhance solution recovery and limit heads on the liner system. Overliner material would consist of crushed and/or screened suitable borrow material to serve as a drainage layer immediately over the HDPE liner.

3. Management of runoff from storm events and solution applications would occur during construction, operations and closure. Surface water hydrologic and hydraulic calculations would be performed to establish design peak flows, runoff volumes, channel and underdrain capacities, minimum channel dimensions and slopes required to pass the design peak flows from the on-site storm events and solution applications. The facility layout and off-site runoff diversion system route up gradient runoff around the heap leach facility. Therefore, stormwater considerations are dictated by direct precipitation falling on the facilities. The Project's Stormwater Management Plan details best management practices for all components of the Project to manage stormwater and prevent stormwater pollution including measures to completely contain accumulations resulting from the 100-year, 24-hour storm event.

4. The slope stability analysis indicates that acceptable minimum factors of safety (1.3 static, 1.1 pseudostatic under the operational basis earthquake and over 1.0 under the maximum credible earthquake used to model closure conditions) are achieved in all cases (NewFields Document No. GIB-0372001-HLF-EM-0007). The minimum pseudostatic factors of safety are all above 1.0.

Closure of the HLP would be concurrent with operations through phased development of the leach pad. Once the ore has been fully leached, the pad would be regraded, and the top surface would be synthetically lined to construct an evaporation cell (E Cell) that would be used to actively reduce process fluid inventory through forced evaporation. The active fluid reduction phase would occur for 3.1 years until the draindown flow is less than 24 gallons per minute, at which point the conversion of the process ponds to evaporation cells can handle the evaporation of all the remaining draindown flow. The active E Cell covering the entire top surface of the HLP would be sealed with an HDPE liner placed over the cell and welded to the underlying HDPE liner and the entire leach pad would be covered by a 3-foot-thick evapotranspiration soil cover (ET cover). Conversion of existing process ponds and evaporation ponds to evaporation cells is anticipated to occur during the last year of the active solution reduction phase, followed by an additional 30 years of semi-passive treatment and evaporation of the final heap draindown in the process pond E Cells. The long-term drainage would be managed in E-cells in accordance with NDEP and Nevada BLM Reclamation/Closure requirements such that closure of the facilities would not present the potential to degrade waters of the State.

The HLP would be covered by 3 feet of evapotranspiration cover that would serve as growth media, is sufficient to prevent net percolation (Geosystems 2019), and would provide sufficient depth for plants to root within the growth media material. The double synthetic liner over the top surface of the HLP would prevent plant rooting potential into HLP material. Root penetration on the HLP side slopes would be minimal due to the differential moisture content between the cover and underlying heap leach material. The lack of penetration is thought to be due to the preferred water holding capacity of the cover soils and the residual acidity of the partially rinsed spent ore.

A Spill Contingency Plan (SCP) addresses spill prevention, and best management practices to contain and minimize accidental spills during and after operations. Clean up procedures are included that include post clean up sampling to verify full removal of contaminants.

If constituents do reach subsurface soil, mobility potential of constituents to reach alluvial groundwater, which is 300 to 400 feet below ground surface, would be minimal due to the lack of hydraulic pressure under the liner. PLS and rinse solutions would be effectively neutralized and that the constituent metals are attenuated by the materials present in the unsaturated zone. Monitoring wells would be placed between the HLP and the nearest source of irrigation to detect transport of constituents.

<u>Open Pit</u>

After closure, the open pit would remain as a depression in the landscape, and allowed to vegetate naturally. An access road into the pit would be maintained for post-closure storm water management and monitoring. The types of potential exposure pathways to human receptor populations is illustrated in Figure 1. As shown, exposure is primarily limited to direct contact with exposed surfaces of the open pit.

During operations, ponding within the pit would be transient in nature. The residence time of water collected in sumps would be minimized through pumping of the water for use in dust suppression.

Water runoff and precipitation into the open pit will be managed during to prevent and minimize migration into the subsurface, as described in the Project's SWPPP and required by the Project general stormwater pollution control permit. The stormwater control system for the Project as a whole consists of diversion channels and berms, inlet channels, and sediment basins to protect process and non-process facilities from storm runoff. Process components would be isolated from stormwater flow in natural drainage areas via diversion channels to minimize the potential for local impacts to watershed areas. It is anticipated that during the life of the Project, the limited runoff that presently occurs would be somewhat reduced in the ephemeral drainages. However, successful reclamation and closure in accordance with NDEP/BLM reclamation requirements minimize disturbance to the ephemeral drainages.

During reclamation, the pit bottom would be graded to drain so that stormwater does not accumulate on the pit floor. This design feature would help avoid potential impacts to groundwater quality by minimizing infiltration within the pit. However, during operations, storm events may result in temporary ponding of water within the pit. The open pit is located on a ridge and thus, has a relatively small upstream catchment area. Because of the small catchment area and typical low precipitation rates in the Project area (8 inches per year), temporary ponding within the pit would be rare.

During closure, water that drains from the open pit through the slot drain could impact groundwater or surface-water quality within the drainage downgradient of the slot drain. The slot drain would serve as a sediment control as the slot would be a riprap-filled basin that would allow any water reporting to the drain to have sufficient residence time for any suspended solids to be removed. Only during extreme storm events would flow from the drain occur due to the low precipitation and high evaporation rates at the site.

(i) The Location of Structures or Impediments

Structures associated with the HLP to prevent infiltration is addressed in the section on containment and monitoring for the HLP.

(j) The potential for a hazard related to fire, vapor or an explosion

The potential for a hazard related to fire, vapor, or an explosion is very low as there will be no free combustible liquid.

(k) Other Information

This memorandum provides additional sections on other information requested by NDEP.

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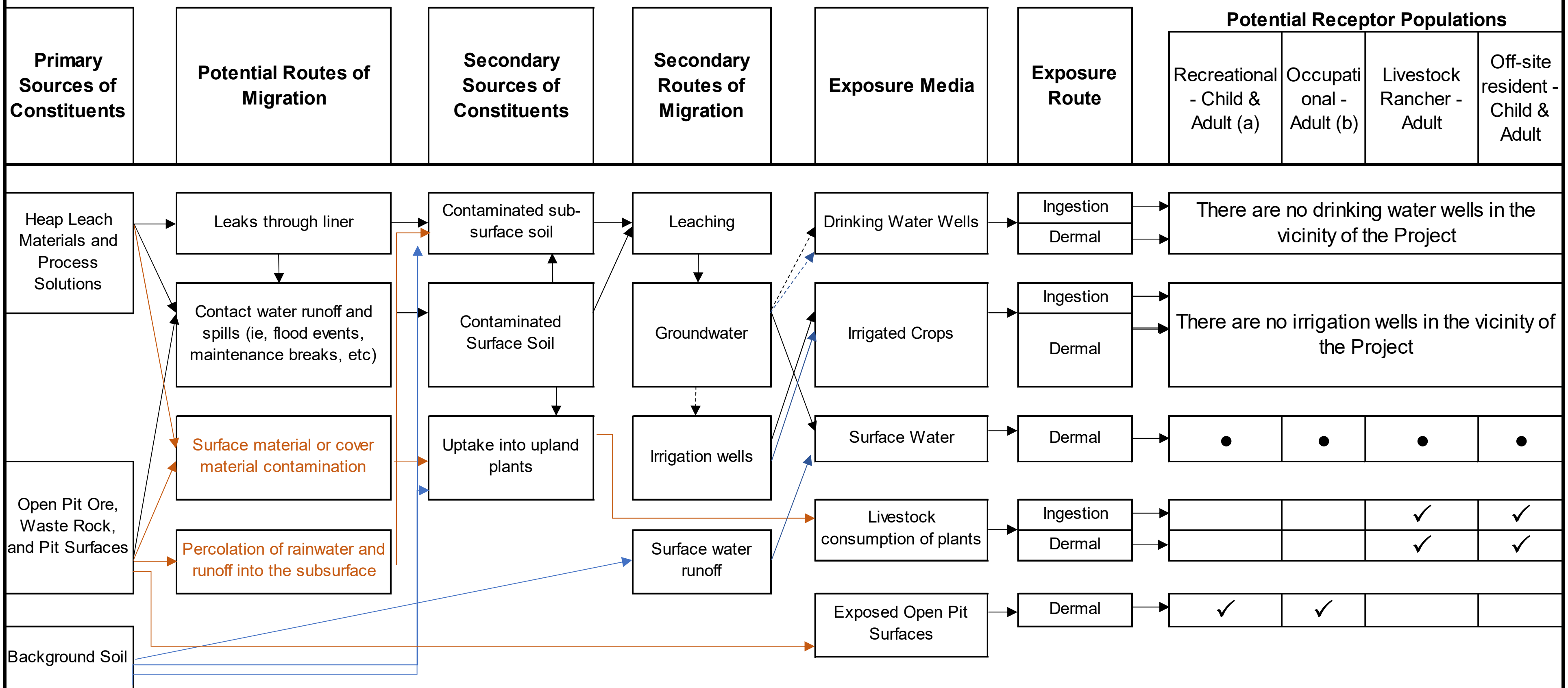
Figures



LEGEND:

Blue text/boxes indicate background exposure (No Action Scenario)

Orange text/boxes indicate post-closure conditions

Dashed arrows represent lack of complete and significant transport pathway.

✓	Exposure pathway is complete for this population
	Exposure pathway is not complete for this population or potential exposures are negligible
●	Exposure pathway is potentially complete for this population without controls in place

Receptor Populations:

(a) Recreational activities include hunting or ATV use. Activities expected to be short-term or seasonal.

(b) Includes workers during operations and care and maintence site workers post-closure. Workers are assumed to be non-contact intensive: Workers that engage in activities that do not usually have extensive contact with sediments or surface water.

CEDAR CREEK ASSOCIATES, INC.

Human Health Conceptual Model for the HLP, Open Pit, and No-Action

Figure 1

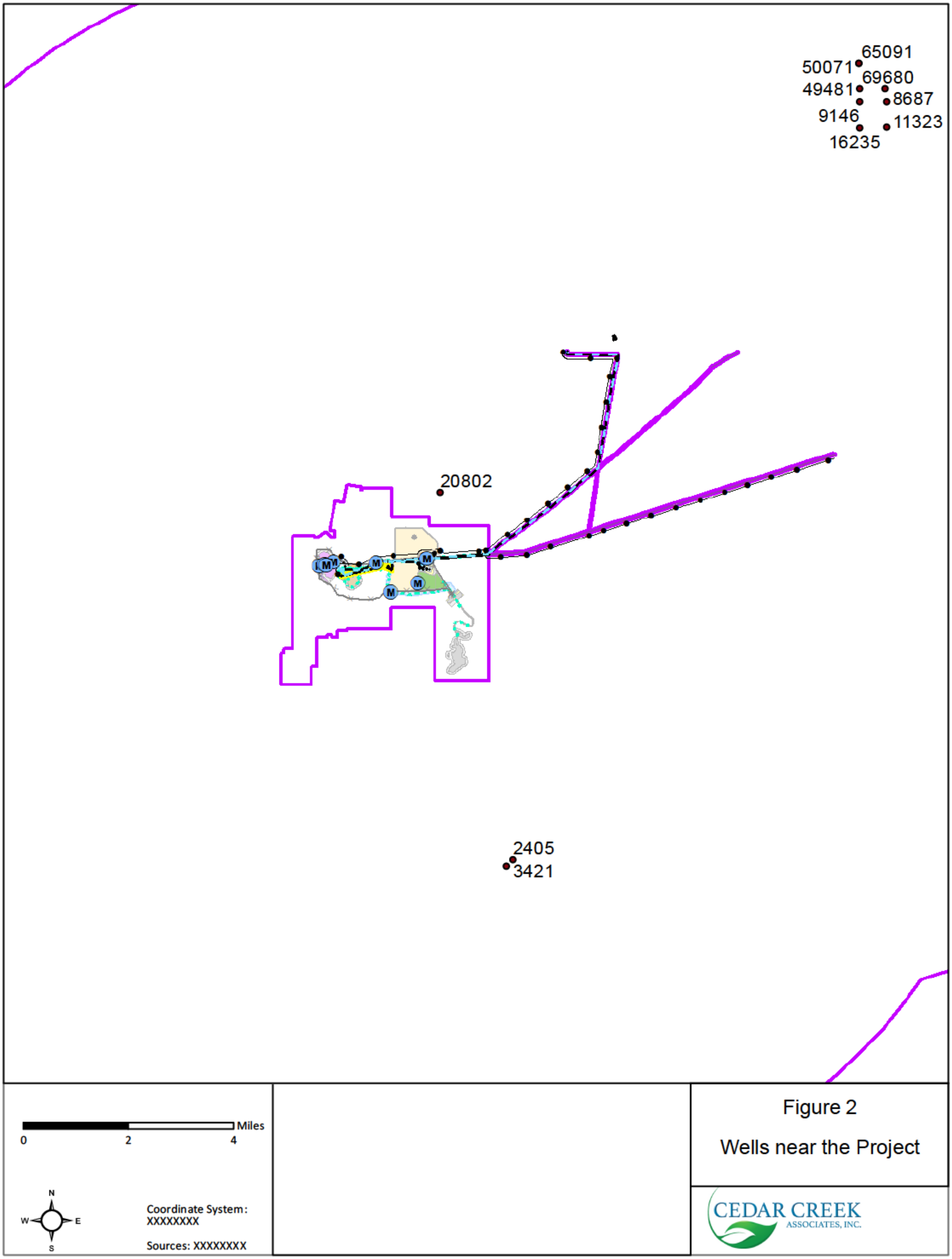


Figure 2

Wells near the Project

CEDAR CREEK ASSOCIATES, INC.

APPENDIX D
VISUAL RESOURCE SIMULATIONS

APPENDIX D. VISUAL RESOURCE SIMULATIONS

Two visual resource simulations were conducted for the Gibellini Vanadium Mine Project (Project). In 2020, SWCA prepared visual resource simulations for the No Action Alternative and the Proposed Action for five identified key observation points (KOPs) (i.e., KOP 1, KOP 2, KOP 3, KOP 4a, and KOP 4b). Attachment C below includes these visual contrast rating sheets and visual simulations.

In 2021, Cedar Creek Associates prepared a technical memo and updated the visual resource simulations for the Proposed Action, South Access Road Alternative and the No Action Alternative using the same KOPs as the 2020 simulations. The technical memo below includes these simulations.

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ATTACHMENT C

Contrast Rating Forms and Visual Simulations

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date
February 24 , 2020

District
Battle Mountain

Resource Area
Mount Lewis FO

Activity (program)
Mineral Extraction/ Mining

SECTION A. PROJECT INFORMATION

1. Project Name
Gibellini Vanadium Mine

2. Key Observation Point
KOP 1 – U.S. 50 / Strawberry Rd.

3. VRM Class
Interim VRM Class IV
VRI Class II /IV

4. KOP Location
Township T17N
Range R55E
Section S6

39° 22' 30.15"N
-115° 49' 43.10"W

5. Location Sketch
See report map for location

Approximately 15 miles from mine facilities (background of KOP)

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Distant, broad, expansive valley with isolated, large sloping and rounded buttes backdropped by low, rounded hills that transition to more mountainous, angular forms.	Distant, indistinct forms of pinyon-juniper in clustered patterns; indistinct forms of grasses and shrubs	None visible or discernible
LINE	Horizontal and continuous line of valley mixed with undulating lines of buttes and low rounded hills. More rugged, horizontal line of higher elevation forms.	Indistinct and irregular	N/A
COLOR	Muted grey to soft, subtle tans	Seasonal variations; golden tones, pale yellow of grasses and shrubs; muted dark green to black of pinyon-juniper	N/A
TEX-TURE	Smooth and continuous valley with undulating, repetitive, lumpy, low hills	Overall even and smooth with subtle stippling of pinyon-juniper along slopes	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project activities not discernible from this KOP	Project activities not discernible from this KOP	Project activities not discernible from this KOP
LINE	N/A	N/A	N/A
COLOR	N/A	N/A	N/A
TEX-TURE	N/A	N/A	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM X LONG TERM

1. DEGREE OF CONSTRAST

ELEMENTS	LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form				X				X				X
Line				X				X				X
Color				X				X				X
Texture				X				X				X

2. Does project design meet visual resource management objectives? X Yes ☐ No
(Explain on reverse side)

3. Additional mitigating measures recommended?
X Yes ☐ No (Explain on reverse side)

Evaluator's Names C. Bockey, E. Hunt, A. Bettinger

Date February 24, 2020

SECTION D. (Continued)

Comments from item 2.

Project activities are consistent with BLM VRM Class objectives assigned for this area.

Additional Mitigating Measures (See item 3)

Retain existing rock formations, vegetation, drainages, etc., whenever possible.

Round or warp slopes to match existing landforms when possible.

Minimize impacts on existing vegetation by the following:

- Partial clearing of the limits of expansion rather than clearing the entire area if possible.
- Use irregular clearing shapes to minimize contrast with existing landforms
- Design vegetative openings to repeat natural openings in the landscape. Edges that are scalloped and irregular are more natural looking. Straight line edges should be avoided.
- Feathering / thinning the edges of cleared areas. Feathering edges reduces strong lines of contrast.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date
February 24 , 2020

District
Battle Mountain

Resource Area
Mount Lewis FO

Activity (program)
Mineral Extraction/ Mining

SECTION A. PROJECT INFORMATION

1. Project Name Gibellini Vanadium Mine	**4. KOP Location** **Township** T16N **Range** R53E **Section** S10 39°16'4.51"N -115°59'22.10"W	**5. Location Sketch** See report map for location Approximately 5 miles from mine facilities (foreground of KOP)
2. Key Observation Point KOP 2 – Fish Creek Ranch		
3. VRM Class Interim VRM Class IV VRI Class II /IV		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Broad, expansive valley with isolated, large sloping and rounded buttes; rounded hills that transition to more mountainous, angular forms of Fish Creek Range	Indistinct forms of pinyon-juniper in clustered patterns; low, rounded sagebrush and rabbit brush intermixed with indistinct grasses	None visible or discernible
LINE	Horizontal and continuous line of valley mixed with undulating lines of buttes and low rounded hills. Rugged, horizontal line of Fish Creek Range	Broken to jagged lines of pinyon-juniper intermixed with irregular lines of low grasses, shrubs and sagebrush	N/A
COLOR	Light tan to muted grey soils at lower elevations transitioning to darker brown at higher elevations	Seasonal variations; golden tones, pale yellow of grasses and shrubs; muted deep, dark green of pinyon-juniper	N/A
TEX-TURE	Smooth and continuous valley with undulating, low rounded hills that transition to more jagged, rough textures of Fish Creek Range	Overall even and smooth within valley with patchy, clustered transitions of pinyon-juniper as transition from valley to higher elevations occur	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Geometric, angular forms of leach heap pads; amorphic shape of borrow pit, mine pit and stock piles	No discernible change in form	Geometric and angular patterns associated with facility structures; tall, thin form of low voltage transmission lines
LINE	Geometric, sloping, angular faces of heap leach pads; amorphic, sinuous line of borrow pit; vertical, horizontal of facility structures; continuous, linear line of access roads	Sinuous and/or linear along roads and cleared areas and landform modifications	Distinctive, directional of facility structures; linear, horizontal and continuous of transmission lines
COLOR	Light grey to tan, with subtle tones earth tone variations	No discernible change in color	Muted, flat green tones for structures following BLM guidelines; dark brown of transmission line poles
TEX-TURE	Rigid, clustered, organized patterns of facility infrastructure intermixed with continuous and repetitive transmission lines	No discernible change in texture	Clustered, organized, rigid; distinctive

SECTION D. CONTRAST RATING ☐ SHORT TERM X LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form		X						X		X		
	Line			X				X			X		
	Color		X						X			X	
	Texture			X					X		X		

2. Does project design meet visual resource management objectives? X Yes ☐ No **(Explain on reverse side)**

3. Additional mitigating measures recommended? X Yes ☐ No **(Explain on reverse side)**

Evaluator's Names	Date
C. Bockey, E. Hunt, A. Bettinger	February 24, 2020

SECTION D. (Continued)

Comments from item 2.

Project activities are consistent with BLM VRM Class objectives assigned for this area.

Additional Mitigating Measures (See item 3)

Retain existing rock formations, vegetation, drainages, etc., whenever possible.

Round or warp slopes to match existing landforms when possible.

Minimize impacts on existing vegetation by the following:

- Partial clearing of the limits of expansion rather than clearing the entire area if possible.
- Use irregular clearing shapes to minimize contrast with existing landforms
- Design vegetative openings to repeat natural openings in the landscape. Edges that are scalloped and irregular are more natural looking. Straight line edges should be avoided.
- Feathering / thinning the edges of cleared areas. Feathering edges reduces strong lines of contrast.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

State Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date
February 24 , 2020

District
Battle Mountain

Resource Area
Mount Lewis FO

Activity (program)
Mineral Extraction/ Mining

SECTION A. PROJECT INFORMATION

1. Project Name Gibellini Vanadium Mine	**4. KOP Location** **Township** T16N **Range** R53E **Section** S10 39°14'0.62"N -115°54'34.41"W	**5. Location Sketch** See report map for location Approximately 8 miles from mine facilities (middleground of KOP)
2. Key Observation Point KOP 3 – State Route 379		
3. VRM Class Interim VRM Class IV VRI Class II /IV		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Broad, expansive valley with isolated, large sloping and rounded buttes; rounded hills that transition to more mountainous, angular forms of Fish Creek Range	Indistinct forms of pinyon-juniper in clustered patterns; low, rounded sagebrush and rabbit brush intermixed with indistinct grasses	Vertical, thin, single-pole transmission line within immediate foreground
LINE	Horizontal and continuous line of valley mixed with undulating lines of buttes and low rounded hills. Rugged, horizontal line of Fish Creek Range	Broken to jagged lines of pinyon-juniper intermixed with irregular lines of low grasses, shrubs and sagebrush	Vertical, straight; continuous of transmission line
COLOR	Indistinct at lower elevations transitioning to darker brown at higher elevations	Seasonal variations; golden tones, pale yellow of grasses and shrubs; muted deep, dark green of pinyon-juniper	Dark to light brown tones of wood poles; grey of transmission line
TEXTURE	Smooth and continuous valley with undulating, low rounded hills that transition to more jagged, rough textures of Fish Creek Range	Overall even and smooth within valley with patchy, clustered transitions of pinyon-juniper as transition from valley to higher elevations occur	Repetitive and continuous.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Geometric, angular forms of leach heap pads; amorphic shape of borrow pit, mine pit and stock piles	No discernible change in form	Geometric and angular patterns associated with facility structures; tall, thin form of low voltage transmission lines
LINE	Geometric, sloping, angular faces of heap leach pads; amorphic, sinuous line of borrow pit; vertical, horizontal of facility structures; continuous, linear line of access roads	Sinuous and/or linear along roads and cleared areas and landform modifications	Distinctive, directional of facility structures; linear, horizontal and continuous of transmission lines
COLOR	Light grey to tan, with subtle tones earth tone variations	No discernible change in color	Muted, flat green tones for structures following BLM guidelines; dark brown of transmission line poles
TEXTURE	Rigid, clustered, organized patterns of facility infrastructure intermixed with continuous and repetitive transmission lines	No discernible change in texture	Clustered, organized, rigid; distinctive

SECTION D. CONTRAST RATING ☐ SHORT TERM X LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form		X						X			X	
Line		X				X					X	
Color		X						X			X	
Texture			X					X		X		

2. **Does project design meet visual resource management objectives?** X Yes ☐ No **(Explain on reverse side)**

3. **Additional mitigating measures recommended?** X Yes ☐ No **(Explain on reverse side)**

Evaluator's Names: C. Bockey, E. Hunt, A. Bettinger

Date: February 24, 2020

SECTION D. (Continued)

Comments from item 2.

Project activities are consistent with BLM VRM Class objectives assigned for this area.

Additional Mitigating Measures (See item 3)

Retain existing rock formations, vegetation, drainages, etc., whenever possible.

Round or warp slopes to match existing landforms when possible.

Minimize impacts on existing vegetation by the following:

- Partial clearing of the limits of expansion rather than clearing the entire area if possible.
- Use irregular clearing shapes to minimize contrast with existing landforms
- Design vegetative openings to repeat natural openings in the landscape. Edges that are scalloped and irregular are more natural looking. Straight line edges should be avoided.
- Feathering / thinning the edges of cleared areas. Feathering edges reduces strong lines of contrast.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date
February 24 , 2020

District
Battle Mountain

Resource Area
Mount Lewis FO

Activity (program)
Mineral Extraction/ Mining

SECTION A. PROJECT INFORMATION

1. Project Name
Gibellini Vanadium Mine

2. Key Observation Point
KOP 4 – County Road M-104

3. VRM Class
Interim VRM Class IV
VRI Class II /IV

4. KOP Location

Township T15N
Range R52E
Section S13

39°10'34.87"
-116° 4'6.61"W

5. Location Sketch
See report map for location

Approximately 1-2 miles from mine facilities / borrow pit (foreground of KOP)

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Broad, expansive valley with isolated, large sloping and rounded buttes; rounded hills that transition to more mountainous, angular forms of Fish Creek Range	Indistinct forms of pinyon-juniper in clustered patterns; low, rounded sagebrush and rabbit brush intermixed with indistinct grasses	None visible or discernible
LINE	Horizontal and continuous line of valley mixed with undulating lines of buttes and low rounded hills. Rugged, horizontal line of Fish Creek Range	Broken to jagged lines of pinyon-juniper intermixed with irregular lines of low grasses, shrubs and sagebrush	N/A
COLOR	Indistinct at lower elevations transitioning to darker brown at higher elevations	Seasonal variations; golden tones, pale yellow of grasses and shrubs; muted deep, dark green of pinyon-juniper	N/A
TEXTURE	Smooth and continuous valley with undulating, low rounded hills that transition to more jagged, rough textures of Fish Creek Range	Overall even and smooth within valley with patchy, clustered transitions of pinyon-juniper as transition from valley to higher elevations occur	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Geometric, angular forms of leach heap pads; amorphic shape of borrow pit, mine pit and stock piles	No discernible change in form	Geometric and angular patterns associated with facility structures; tall, thin form of low voltage transmission lines
LINE	Geometric, sloping, angular faces of heap leach pads; amorphic, sinuous line of borrow pit; vertical, horizontal of facility structures; continuous, linear line of access roads	Sinuous and/or linear along roads and cleared areas and landform modifications	Distinctive, directional of facility structures; linear, horizontal and continuous of transmission lines
COLOR	Light grey to tan, with subtle tones earth tone variations	No discernible change in color	Muted, flat green tones for structures following BLM guidelines; dark brown of transmission line poles
TEXTURE	Rigid, clustered, organized patterns of facility infrastructure intermixed with continuous and repetitive transmission lines	No discernible change in texture	Clustered, organized, rigid; distinctive

SECTION D. CONTRAST RATING ☐ SHORT TERM X LONG TERM

1. DEGREE OF CONSTRAST

FEATURES	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form	X							X	X			
Line	X					X			X			
Color	X							X		X		
Texture	X							X	X			

2. **Does project design meet visual resource management objectives?** X Yes ☐ No (Explain on reverse side)

3. **Additional mitigating measures recommended?** X Yes ☐ No (Explain on reverse side)

Evaluator's Names — C. Bockey, E. Hunt, A. Bettinger

Date — February 24, 2020

SECTION D. (Continued)

Comments from item 2.

Project activities are consistent with BLM VRM Class objectives assigned for this area.

Additional Mitigating Measures (See item 3)

Retain existing rock formations, vegetation, drainages, etc., whenever possible.

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- Feathering / thinning the edges of cleared areas. Feathering edges reduces strong lines of contrast.

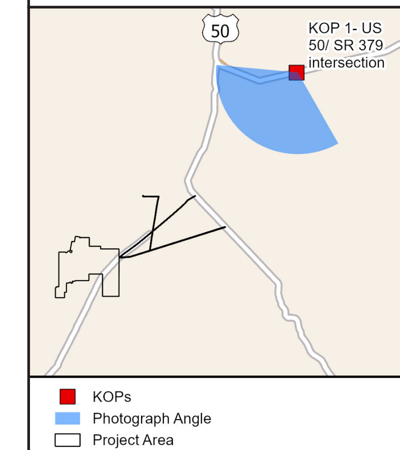
U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

KOP 1: U.S. Route (U.S.) 50/ Strawberry Road - Existing Condition

KOP 1: U.S. Route (U.S.) 50/ Strawberry Road - Proposed Action

Gibellini Mine

KOP 1: U.S. Route (U.S.) 50/ Strawberry Road



Base Photographic Documentation

Date	02/24/2019
Time (24H)	09:35
Longitude (°)	-115.828800
Lattitude (°)	39.375128
Viewpoint Elevation (ft)	5965
Camera Height (m)	1.2
Camera Heading(deg.)	221

Camera Information

Camera Make & Model	Nikon D5600
Camera Sensor Size	23.6mm x 15.6mm
Lens Make & Model	AF-P Nikkor 18-55 mm
Lens Focal Legth	22mm
Crop Factor	1.53

Sun and Weather Information

Sun Azimuth (°)	134 SE
Sun Elevation (°)	29
Lighting Angle on Project	Side Lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	*46*
Humidity (%)	*29*

Proposed Infrastructure Information

Closest Distance to Heap Leach Pads	16.5 miles

How to View at Real World Scale

Tabloid Size Print, distance from face	7.33 inches

Simulation Created Using:
ArcGIS Pro; Adobe Photoshop;
Google EarthPro

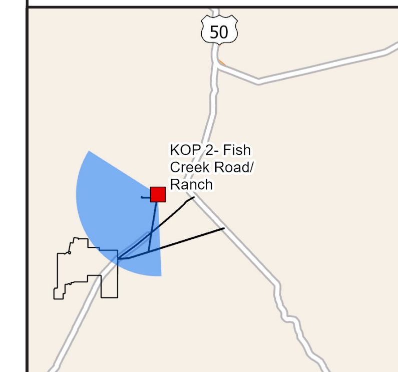
Provided by
SWCA®
ENVIRONMENTAL CONSULTANTS

KOP 2: Fish Creek Ranch - Existing Condition

KOP 2: Fish Creek Ranch - Proposed Action

Gibellini Mine

KOP 2: Fish Creek Ranch



KOPs
Photograph Angle
Project Area

Base Photographic Documentation

Date	02/24/2019
Time (24H)	10:45
Longitude (°)	-115.989472
Lattitude (°)	39.267920
Viewpoint Elevation (ft)	6059
Camera Height (m)	1.2
Camera Heading(deg.)	229

Camera Information

Camera Make & Model	Nikon D5600
Camera Sensor Size	23.6mm x 15.6mm
Lens Make & Model	AF-P Nikkor 18-55 mm
Lens Focal Legth	22mm
Crop Factor	1.53

Sun and Weather Information

Sun Azimuth (°)	154 SSE
Sun Elevation (°)	38
Lighting Angle on Project	Side Lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	50
Humidity (%)	25

Proposed Infrastructure Information

Closest Distance to Heap Leach Pads	5.2 miles

How to View at Real World Scale

Tabloid Size Print, distance from face	7.33 inches

Simulation Created Using:
ArcGIS Pro; Adobe Photoshop;
Google EarthPro

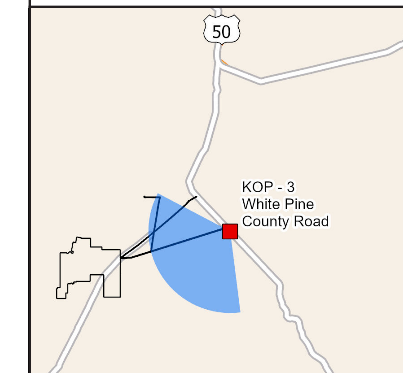
Provided by
SWCA®
ENVIRONMENTAL CONSULTANTS

KOP 3: State Route 379 - Existing Condition

KOP 3: State Route 379 - Proposed Action

Gibellini Mine

KOP 3: State Route 379



KOPs
Photograph Angle
Project Area

Base Photographic Documentation

Date	02/24/2019
Time (24H)	11:40
Longitude (°)	-115.909558
Lattitude (°)	39.233505
Viewpoint Elevation (ft)	6066
Camera Height (m)	1.2
Camera Heading(deg.)	235

Camera Information

Camera Make & Model	Nikon D5600
Camera Sensor Size	23.6mm x 15.6mm
Lens Make & Model	AF-P Nikkor 18-55 mm
Lens Focal Legth	22mm
Crop Factor	1.53

Sun and Weather Information

Sun Azimuth (°)	170 S
Sun Elevation (°)	41
Lighting Angle on Project	Side Lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	55
Humidity (%)	14

Proposed Infrastructure Information

Closest Distance to Heap Leach Pads	8.1 miles

How to View at Real World Scale

Tabloid Size Print, distance from face	7.33 inches

Simulation Created Using:
ArcGIS Pro; Adobe Photoshop;
Google EarthPro

Provided by
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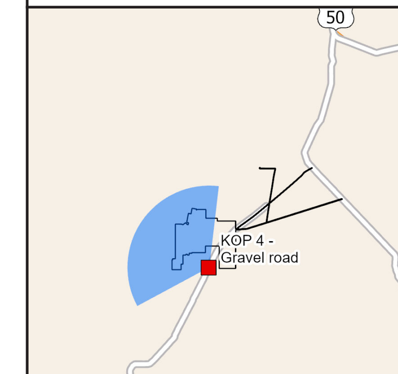
KOP 4a: County Road M-104 - Existing Condition

KOP 4a: County Road M-104 - Proposed Action

Gibellini Mine

KOP 4a: County Road 104



KOPs
Photograph Angle
Project Area

Base Photographic Documentation

Date	02/24/2019
Time (24H)	13:45
Longitude (°)	-116.067958
Lattitude (°)	39.177194
Viewpoint Elevation (ft)	6413
Camera Height (m)	1.2
Camera Heading(deg.)	308

Camera Information

Camera Make & Model	Nikon D5600
Camera Sensor Size	23.6mm x 15.6mm
Lens Make & Model	AF-P Nikkor 18-55 mm
Lens Focal Legth	22mm
Crop Factor	1.53

Sun and Weather Information

Sun Azimuth (°)	209 SSW
Sun Elevation (°)	37
Lighting Angle on Project	Side Lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	59
Humidity (%)	7

Proposed Infrastructure Information

Closest Distance to Heap Leach Pads	1.7 miles

How to View at Real World Scale

Tabloid Size Print, distance from face	7.33 inches

Simulation Created Using:
ArcGIS Pro; Adobe Photoshop;
Google EarthPro

Provided by
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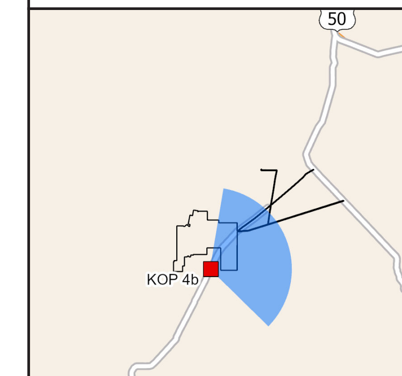
ENVIRONMENTAL CONSULTANTS

KOP 4b: Borrow Pit Area - Existing Condition

KOP 4b: Borrow Pit Area - Proposed Action

Gibellini Mine

KOP 4b: Borrow Pit Area



- KOPs
- Photograph Angle
- Project Area

Base Photographic Documentation

Date	02/24/2019
Time (24H)	14:05
Longitude (°)	-116.067675
Lattitude (°)	39.177652
Viewpoint Elevation (ft)	6412
Camera Height (m)	1.2
Camera Heading(deg.)	308

Camera Information

Camera Make & Model	Nikon D5600
Camera Sensor Size	23.6mm x 15.6mm
Lens Make & Model	AF-P Nikkor 18-55 mm
Lens Focal Legth	22mm
Crop Factor	1.53

Sun and Weather Information

Sun Azimuth (°)	214 SSW
Sun Elevation (°)	35
Lighting Angle on Project	Side Lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	*59*
Humidity (%)	*7*

Proposed Infrastructure Information

Closest Distance to Heap Leach Pads	1.7 miles

How to View at Real World Scale

Tabloid Size Print, distance from face	7.33 inches

Simulation Created Using:
ArcGIS Pro; Adobe Photoshop;
Google EarthPro

Provided by
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ENVIRONMENTAL CONSULTANTS

Technical Memo

PO Box 272150, Fort Collins, CO 80527
info@cedarcreekassociatesinc.com
(303) 818-1978

Date: July 29, 2021
To: Nevada Vanadium
From: Cedar Creek Associates, Inc.
Subject: Gibellini Project – Visual Impact of Renewable Alternative

---

Cedar Creek Associates, Inc. (Cedar Creek) was contracted by Nevada Vanadium (NVV) to evaluate the additional visual impacts of the renewable energy alternative. Initially, visual impact findings presented in the *Gibellini Vanadium Project - Final Supplemental Environmental Report 15 - Visual Resources* were reviewed. This report describes the visual impacts from the Proposed Action, South Access Road Alternative, and No Action Alternative. According to section 4.0, the Proposed Action would introduce structural elements, modifications in landform, and exposure of contrasting material, would have predominantly moderate to high impacts on scenic quality in the existing landscape. The Project components would introduce form, line, colors, and textures not common on the landscape. As a result, the Project components would be visually prominent in areas of the viewshed where they are visible and discernible to the viewer. There would be areas where the Project components would be similar to existing features (e.g., roads and transmission lines); however, due to the scale of the landform modifications and introduction of structural elements in comparison to the existing landscape, there would be a perceived change in the area's scenic quality.

Nevada Vanadium is proposing to support operations at the Gibellini Mine with a combination of renewable energy and a utility interconnection with future large scale battery storage. This alternative, if selected, would ramp up the installation of Solar Electric Photovoltaics capacity so the site would become a net generation facility with battery storage to perform peak smoothing and daily load management as well as providing a sustainable long term power source servicing the remote needs of southern Eureka County and Northern Nye County. On site power generation would be achieved through the use of Solar PV and future battery storage. The field of PV panels and the battery storage would be located on approximately 33 acres to the north of the process area and main office, within the Project area boundary. The solar facilities would consist of 6 Mega Watts (MW) of solar photovoltaic (PV) generation and a future battery that can deliver 2MW at any given time with 10MW hour storage capability.

The Renewable Energy Alternative would result in an additional 33 acres of permanent surface disturbance. Like the proposed leach pad and buildings, the solar panels would have a strong regular geometry, and similar to some mine infrastructure, the solar panel structures would have a smooth texture, which would contrast with the existing landscape. However, as shown in the updated simulations (attached), the contrast in shapes, texture, and lines from the solar panels would be negligible at the Key Observations Points (KOPs). This is due largely to the relatively minor size and height of the solar panels (20 feet). In contrast, for example, the leach pad, with an ultimate height of 150 feet, is visible.

The color of metal support structures associated with the solar facilities would be similar to other mine facilities in the proposed Project. Although the solar panels have a glass surface that is reflective, solar PV modules are designed to reduce reflection because reflected light cannot be converted into electricity. PV modules have been found to exhibit less glare than windows and water (Day and Mow 2018[1]). Any reflective potential of the solar panels at specific KOPs depends on the time of day, weather conditions, and solar panel angle. Therefore, the casual observer might be able to see some reflection of sunlight from the solar panels some times of the day, but would not otherwise able to discern differences in vegetation and exposed soil color of the renewable energy alternative from Proposed Action at any of the for the Project. Overall, potential impacts from reflectivity are therefore anticipated to be negligible.

Similar to the Proposed Action, the Renewable Energy Alternative would conform to Interim VRM Class IV Objectives, which allow for a high level of modification to the existing characteristic landscape.

[1] Day, M. and B. Mow. 2018. Research and Analysis Demonstrate Lack of Impacts of Glare from Photovoltaic Modules. July 31,2018 publication of the Natural Renewable Energy Laboratory at https://www.nrel.gov.

Existing Conditions

Mining Operations

Post-Closure

Gibellini Mine

KOP 1
Proposed Action

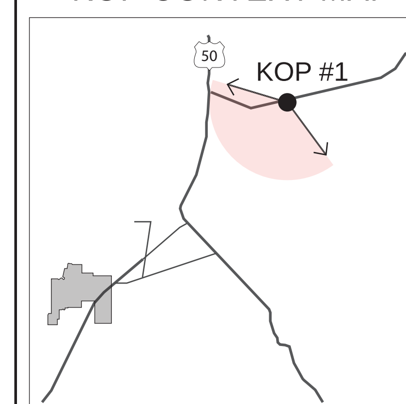
U.S. Route
(U.S.) 50 / Strawberry Road

PREPARED BY:

CEDAR CREEK
ASSOCIATES, INC.

ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

DATE: 04.016.2021

Existing Conditions

Mining Operations

Post-Closure

Gibellini Mine

KOP 1
South Access Road
Alternative
U.S. Route
(U.S.) 50 / Strawberry Road

PREPARED BY:

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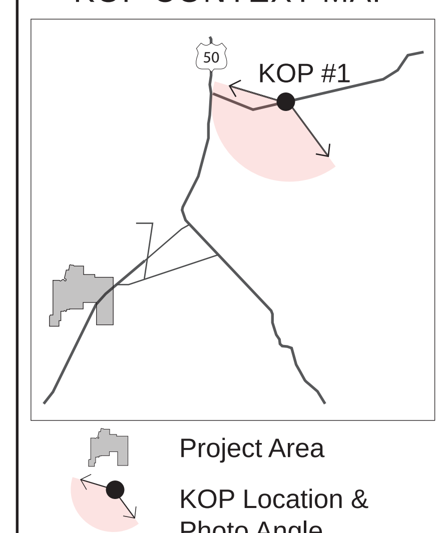
ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



DATE: 04.01.2021

Existing Conditions

Mining Operations

Post-Closure

Gibellini Mine

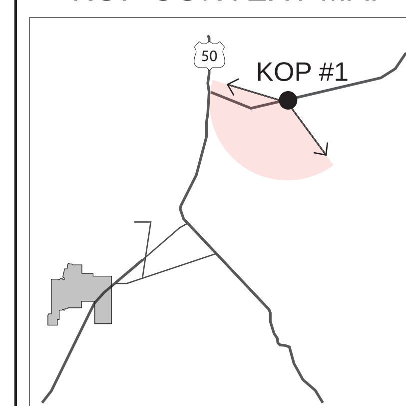
KOP 1
Renewable Energy Alternative
U.S. Route (U.S.) 50 / Strawberry Road

PREPARED BY:

CEDAR CREEK ASSOCIATES, INC.

ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



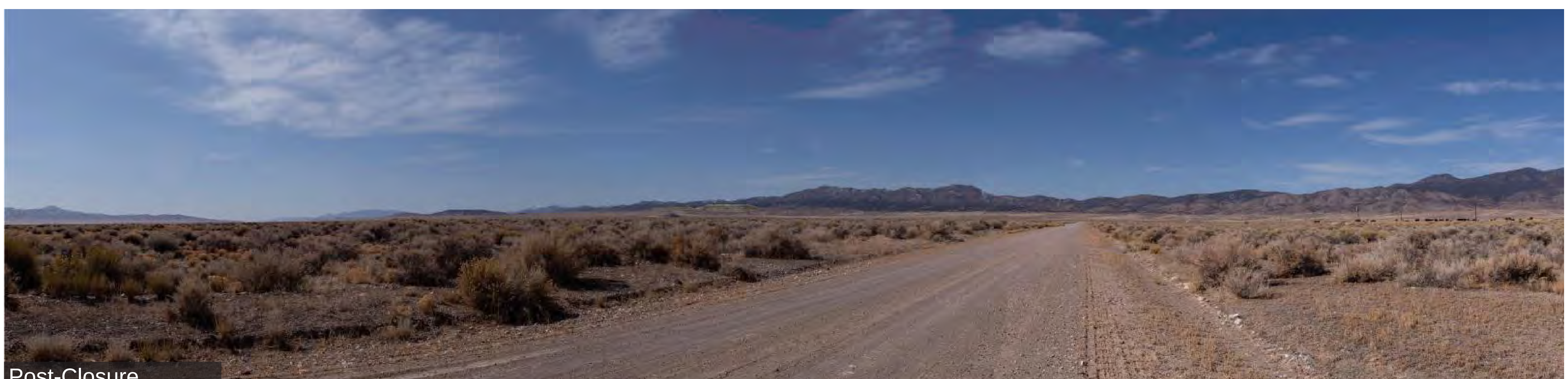
Project Area

KOP Location & Photo Angle

DATE: 04.01.2021


Existing Conditions


Mining Operations


Post-Closure

Gibellini Mine

KOP 2
Proposed Action

Fish Creek Ranch

PREPARED BY:

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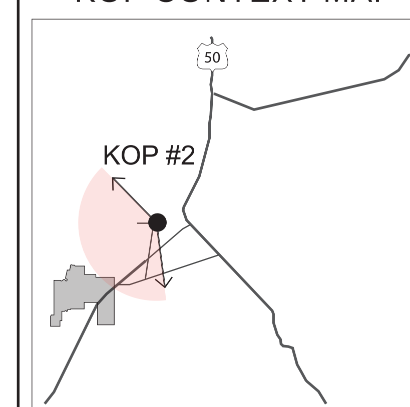
LANDSCAPE ARCHITECTURE, LAND PLANNING

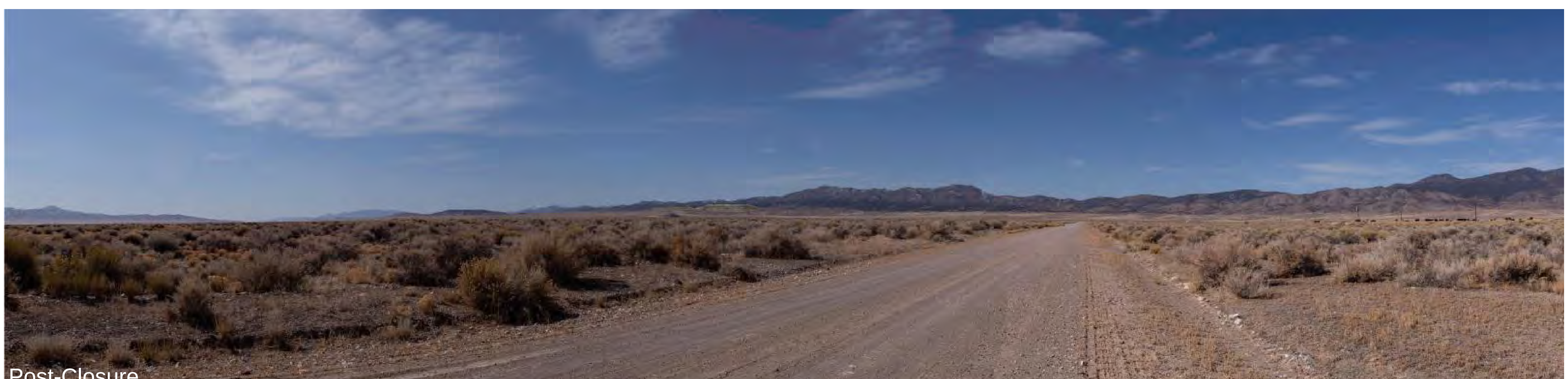
KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

DATE: 04.06.2021



Gibellini Mine

KOP 2
South Access
Road Alternative
Fish Creek Ranch

PREPARED BY:

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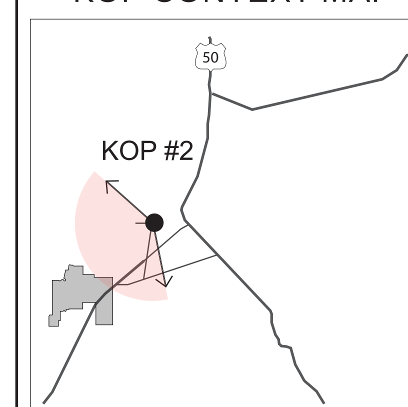
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



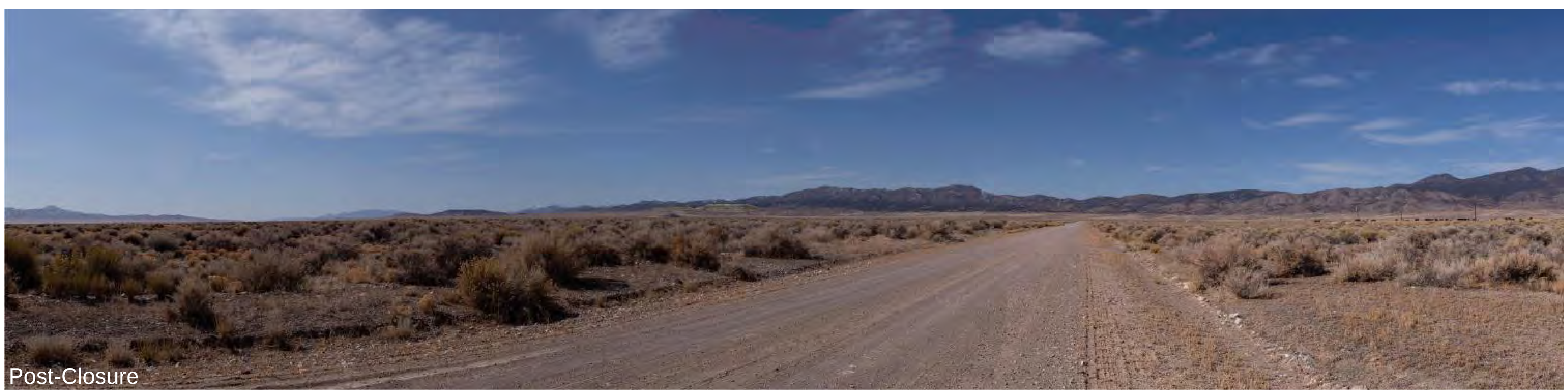
Project Area

KOP Location & Photo Angle

DATE: 04.06.2021

Existing Conditions

Mining Operations



Post-Closure

KOP 2
Renewable Energy
Alternative
Fish Creek Ranch

PREPARED BY:

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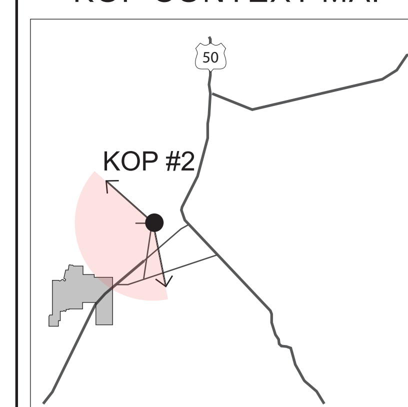
ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

DATE: 04.06.2021

Existing Conditions

Mining Operations

Post-Closure

Gibellini Mine

KOP 3
Proposed Action

County Road M-103

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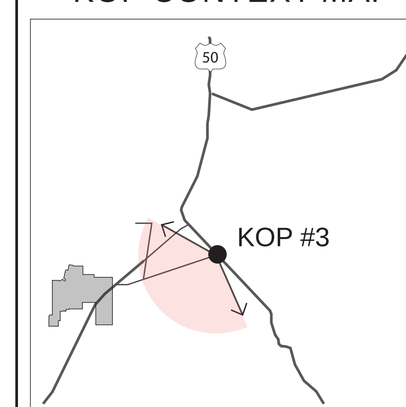
ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP

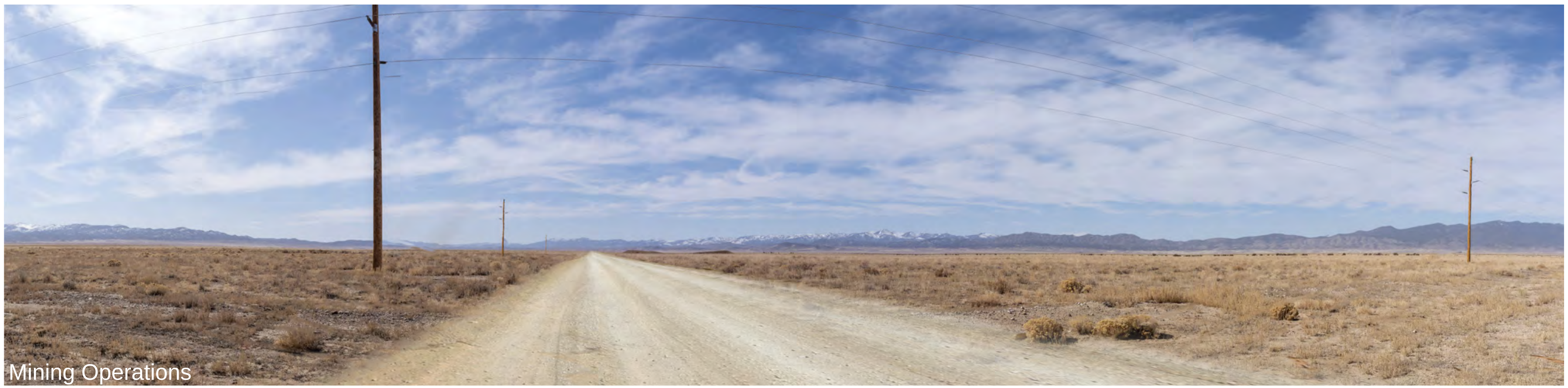


Project Area

KOP Location &
Photo Angle

DATE: 04.06.2021


Existing Conditions


Mining Operations


Post-Closure

KOP 3
South Access Road
Alternative
County Road M-103

PREPARED BY:

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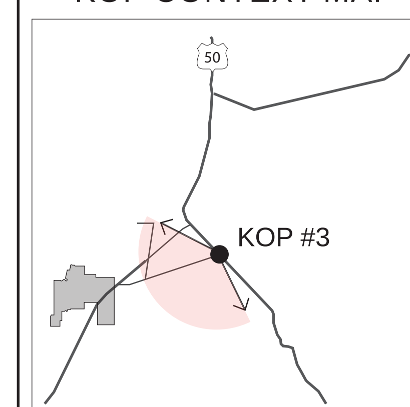
ASSOCIATES, INC.

ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

DATE: 04.06.2021

Existing Conditions

Mining Operations

Post-Closure

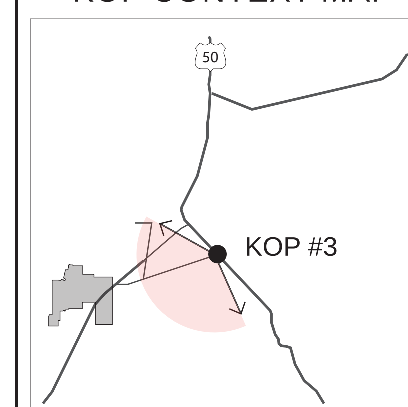
KOP 3
Renewable Energy
Alternative
County Road M-103

PREPARED BY:

CEDAR CREEK ASSOCIATES, INC.

ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

DATE: 04.06.2021

Existing Conditions

Mining Operations

Post-Closure

Gibellini Mine

KOP 4A
Proposed Action

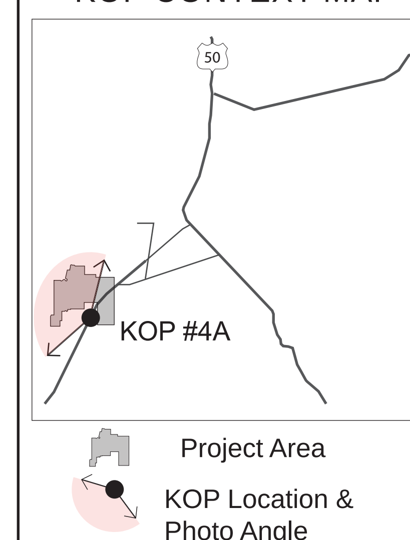
County Road M-104

PREPARED BY:

CEDAR CREEK ASSOCIATES, INC.

ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



DATE: 04.06.2021

Existing Conditions

Mining Operations

Post-Closure

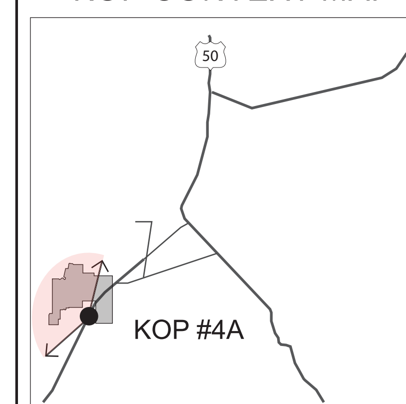
KOP 4A
South Access Road Alternative
County Road M-104

PREPARED BY:

CEDAR CREEK ASSOCIATES, INC.

ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

DATE: 04.06.2021

Existing Conditions

Mining Operations

Post-Closure

KOP 4A
Renewable Energy Alternative
County Road M-104

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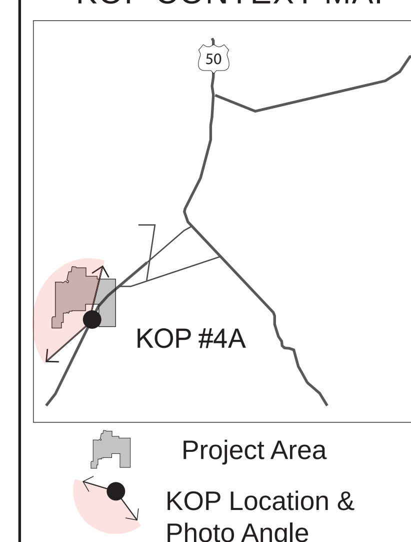
ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



DATE: 04.06.2021


Existing Conditions


Mining Operations


Post-Closure

Gibellini Mine

KOP 4B
Proposed Action

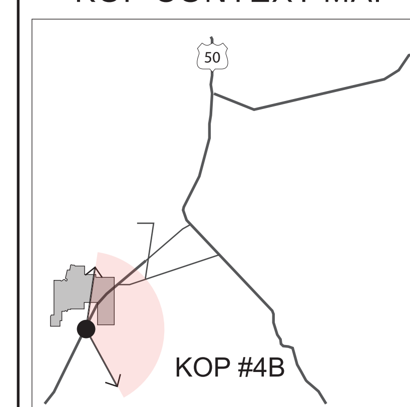
Borrow Pit Area

PREPARED BY:

CEDAR CREEK ASSOCIATES, INC.

ripley design
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

Date: 04.06.2021

Existing Conditions

Mining Operations

Post-Closure

KOP 4B
South Access Road Alternative
Borrow Pit Area

PREPARED BY:

CEDAR CREEK ASSOCIATES, INC.

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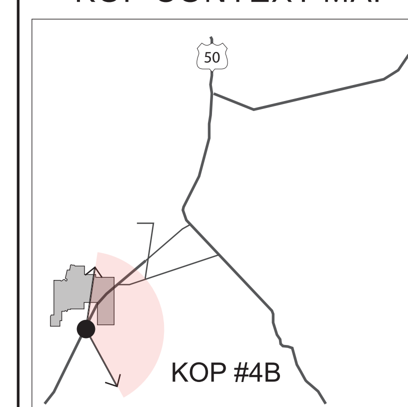
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

DATE: 04.06.2021

Existing Conditions

Mining Operations

Post-Closure

KOP 4B
Renewable Energy Alternative
Borrow Pit Area

PREPARED BY:

CEDAR CREEK ASSOCIATES, INC.

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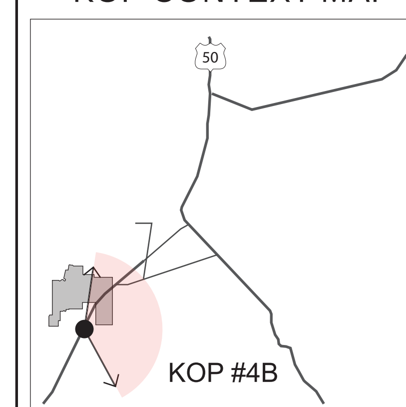
LANDSCAPE ARCHITECTURE, LAND PLANNING

KOP CONTEXT MAP



Project Area

KOP Location & Photo Angle

Date: 04.06.2021