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

Gemfield Mine Project

Draft Environmental Impact Statement

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Cooperating Agencies:
Esmeralda County, Nevada Department of Transportation, Nevada Department of Wildlife, Nye County, U.S. Environmental Protection Agency, Region IX

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List of Acronyms and Abbreviations

AAQS	Ambient Air Quality Standards
ABA	acid base accounting
ADT	average daily traffic
amsl	above mean sea level
ANFO	ammonium nitrate and fuel oil
AO	Authorized Officer
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
AUM	animal unit month
BATF	Bureau of Alcohol, Tobacco, and Firearms
bgs	below ground surface
BLM	Bureau of Land Management
BMP	Best Management Practice
BMRR	Bureau of Mining Regulation and Reclamation
CESA	Cumulative Effects Study Area
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
COPEC	Chemicals of Potential Ecological Concern
CR	County Road
CSM	conceptual site model
dB	decibels
dBA	decibels on the A-weighted scale
E-cell	evaporation cell
EIS	Environmental Impact Statement
EO	Executive Order
EPM	Environmental Protection Measure
ERA	Ecological Risk Assessment
FLPMA	Federal Land Policy and Management Act
GCMC	Goldfield Consolidated Mines Company
GHG	greenhouse gas
GHMD	Goldfield Historic Mining District
gpm	Gallons Per Minute
GRL	Gemfield Resources, Ltd.
GWWTP	Goldfield Waste Water Treatment Plant
HCM	Highway Capacity Manual
HDPE	High-Density Polyethylene
HLP	Heap Leach Pad
HMA	Herd Management Area
HQ	hazard quotients
IHI	Interflow Hydrology Inc.
IM	Instruction Memorandum
km	kilometer
KOP	Key Observation Point

kV	kilovolt
LCRS	Leak Collection and Recovery System
LOAEL	Lowest Observed Adverse Effects Level
LOS	Level of Service
mg/L	Milligrams Per Liter
mi^2	square miles
MOA	memorandum of agreement
MOU	Memorandum of Understanding
MSHA	Mine Safety and Health Administration
Mt	Million Tons
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NAGPRA	Native American Graves Protection and Repatriation Act
NBAPC	Nevada Bureau of Air Pollution Control
NBAQP	Nevada Bureau of Air Quality Planning
NDEP	Nevada Division of Environmental Protection
NDIR	Nevada Division of Industrial Relations - Mine Safety and Training Section
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NO^2	nitrogen dioxide
NOAEL	No Observed Adverse Effects Level
NOI	Notice of Intent
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NTTR	Nevada Test and Training Range
OHV	off highway vehicle
PAG	Potentially Acid Generating
PCPI	per capita personal incomes
PFYC	Potential Fossil Yield Classification
Plan	Plan of Operations
PLS	Pregnant Leach Solution
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
POD	Plan of Development
Project	the Plan and the proposed new and amended ROWs
RCRA	Resource Conservation and Recovery Act
RFFA	reasonably foreseeable future action
RMP	Resources Management Plan
ROW	Right-of-Way
SCS	Soil Conservation Service
SHPO	State Historic Preservation Office

SO_2	sulfur dioxide
SPPCo	Sierra Pacific Power Company
SWReGAP	Southwest Regional Gap Analysis Project
TCP	traditional cultural property
TDS	total dissolved solids
TFO	Tonopah Field Office
TGI	Tierra Group International, Ltd.
TRV	Toxicity Reference Value
U.S. 95	U.S. Highway 95
U.S.C.	United States Code
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VRM	Visual Resource Management
WPCP	Water Pollution Control Permit
WRC	Wildlife Resource Consultants
WRCC	Western Region Climate Center
WRDA	waste rock disposal area

Executive Summary

The Bureau of Land Management (BLM) Tonopah Field Office is preparing this Environmental Impact Statement (EIS) in response to a Plan of Operation (Plan) submittal by Gemfield Resources, Ltd. (GRL) for the Gemfield Mine Project (Project).

Proposed Action

GRL is planning to construct and operate a conventional open pit mining operation in the Goldfield Mining District of Esmeralda County, Nevada. The Proposed Action would include the following new mine components:

- Open pit;
- Crushing facilities, conveyors, and associated stockpiles;
- Waste rock disposal areas (WRDAs);
- Overburden stockpile;
- Stormwater diversion channels, sediment basins, and berms;
- Heap leach pad (HLP), processing facilities, and ponds;
- Water supply and de-watering wells and delivery/storage system;
- Haul and secondary roads;
- Exploration activities; and
- Ancillary facilities including: power supply; reagent, fuel, and explosives storage; buildings including administration, change house, laboratory, security, warehouse, and parking; water supply and septic systems; maintenance shop; ready line; vehicle wash; communications facilities; plant growth media stockpiles; area for temporary storage of petroleum-contaminated soils; groundwater monitoring wells; water supply pipeline and facilities; water pipeline for rapid filling of the pit lobes; borrow areas; fencing; yards; and stormwater controls and diversion structures.

Proposed right-of-way (ROW) amendments to existing BLM authorizations (relinquishments and amendments to existing authorizations) and new ROWs include the following permittees:

- Nevada Department of Transportation;
- AT&T;
- Esmeralda County;
- Sierra Pacific Power Company doing business as NV Energy;
- Nevada Hospital Association/SWITCH; and
- Esmeralda County.

The Proposed Action has an anticipated mine life of up to 12 years, including 1 to 2 years of post-mine leaching. The Plan boundary covers a total of 1,935.9 acres, including 1,214.2 acres of BLM-administered land and 721.7 acres of private land. Proposed disturbance includes 969.4 acres of BLM-administered land and 367.9 acres of private land for a total proposed disturbance of 1,337.3 acres.

No Action Alternative

Under this alternative, GRL would not engage in any of the proposed mining operations but would be permitted to continue exploration activities under existing approved authorizations (NV-076555 and NV-

077457). Exploration has been permitted on 23.84 acres of previously disturbed federally administered land and privately owned and patented and unpatented lands.

Reduced Mine Plan Alternative

The Reduced Mine Plan Alternative would consist of the same overall activities as described for the Proposed Action but would have a reduced open pit footprint, configuration, and depth. The resulting open pit would result in corresponding effects on the configuration of the major mine facilities, particularly the WRDAs and HLP. However, there would be no changes to the Plan boundary access routes, land status, or proposed ROW actions (GRL 2017a).

Overall, this alternative would result in approximately 86.6 fewer acres of disturbance (including approximately 13 fewer acres of disturbance on BLM land) as compared to the Proposed Action. Total disturbance for this alternative is 1,250.7 acres (956.4 acres of public and 294.3 acres of private).

Partial Backfill Alternative

Under this alternative, approximately 37 million tons of waste rock from the East WRDA would be placed in the East and West lobes of the open pit at elevations ranging from 5,405 feet to 5,510 feet, which is the modeled recovered water level and the minimum amount of backfill required to eliminate the development of the pit lakes (GRL 2018a). Placement of waste rock in the open pit would eliminate the formation of pit lakes and would reduce the height of the East WRDA. The proposed surface disturbance, project location, access routes, land status, ROW amendments, and existing disturbance would be the same as described for the Proposed Action. This alternative also would add approximately 2 years to mine operation and reclamation activities.

Alternatives Considered but Eliminated from Detailed Analysis

The alternatives considered but eliminated from detailed analysis include Goldfield Main, McMahon Ridge and Gemfield Milling Alternative, Gemfield Stand-alone Heap Leach Facility Alternative, Gemfield Stand-alone Heap Leach with WRDAs Located Further to the East Alternative, Historic Goldfield Consolidated Mines Company Tailings placed on Heap Alternative, Gemfield Stand-alone Heap Leach with WRDAs Located Further to the East Alternative, Complete Pit Backfill Alternative, and several U.S. Highway 95 (U.S. 95) Alternatives (U.S. 95 Alternative 1, U.S. 95 Alternative 2, U.S. 95 Alternative 3, U.S. 95 Alternative 4, U.S. 95 Alternative 5, U.S. 95 Alternative 6, U.S. 95 Alternative 7).

Resource impacts as discussed in Chapter 4.0 of the EIS are summarized below by resource.

Geology and Minerals

Proposed Action: Approximately 25 million tons of ore material containing approximately 600,000 ounces of gold would be mined.

No Action Alternative: No ore extraction or waste rock would be generated.

Reduced Mine Plan Alternative: Same as proposed Project except 14.4 million tons of ore would be processed.

Partial Backfill Alternative: Same as proposed Project except 37 million tons of waste rock would be placed in the open pit after mining.

Water Resources and Geochemistry

Proposed Action: Groundwater modeling indicates a projected drawdown induced by pit dewatering with a maximum extent of the 3-foot drawdown contour at 1.1 miles northeast from the center of the mine pit. End of mining drawdowns of 2 feet or more are projected to extend out in a radial pattern from the center of the Klondike wellfield approximately 1.8 miles at the end of mining and expands to a radial distance of

approximately 2.3 miles 20 years after mining ceases. No surface water resource impacts are expected. Two separate pit lakes are predicted to develop after mining ceases. Pit water quality is not predicted to result in impacts to surface or groundwater quality beyond the pit boundaries. Ephemerial drainage in the proposed Plan boundary would be affected by project components. Based on geochemical characterization results, no special handling or management of the waste rock is proposed. Placement of the waste rock over the historic tailings is expected to substantially reduce the potential for the historic tailings to impact surface water and groundwater quality in the future compared to existing conditions.

No Action Alternative: Groundwater elevations are predicted to continue to re-equilibrate over the next several decades as a result of historic underground mining (and dewatering). This could result in an increase in groundwater elevations of up to approximately 100 feet in some areas. Residual drawdown would persist around the Klondike wellfield as long as the wellfield is pumped to supply the town of Goldfield. A pit lake would not develop under this Alternative. Surface water and groundwater quality may be affected by the continued exposure and erosion of historic mine tailings. The historic tailings would continue to erode and be transported and deposited along the Big Wash downstream from the study area. WRDAs would not be developed and existing historic tailings could continue to impact groundwater quality.

Reduced Mine Plan Alternative: Same as the proposed Project except, groundwater levels (drawdown) is localized around the two open pits such that the maximum extent of the 3-foot drawdown contour extends up to a maximum of approximately 0.5 mile to the northeast from the center of the Main Pit and 0.4 miles from the East Pit. Instead of development of two separate pits (Main Pit and East Pit), three separate pit lakes are predicted to develop.

Partial Backfill Alternative: Same as proposed Project except a pit lake would form under this Alternative with the backfilling of 37 million tons of waste rock into the pit. Groundwater outflow from the pit backfill material is predicted to impact groundwater quality downgradient from the pit.

Soil Resources

Proposed Action: Disturbance of 1,216.3 acres of soils, of which 509 acres would not be reclaimed.

No Action Alternative: No additional disturbance beyond the authorized and historic disturbance. Beneficial moderate effects from covering and reclaiming the historic tailings would not occur.

Reduced Mine Plan Alternative: Approximately 87 fewer acres of disturbance to soils would occur as compared to the proposed Project.

Partial Backfill Alternative: Same as proposed Project.

Vegetation (including Noxious Weeds, Invasive and Non-Native Species

Proposed Action: Removal of approximately 1,067 acres of vegetation and 509 acres would not be reclaimed. Indirect impacts from the spread and establishment of noxious weeds and invasive species could occur and result in decreased resilience in native plant communities and disturbance.

No Action Alternative: No new vegetation disturbance beyond the authorized and historic disturbance. Beneficial effects from covering and reclaiming the historic tailings and treating existing noxious weeds and invasive species populations would not occur. Indirect impacts from the spread and establishment of noxious weeds and invasive species could occur on existing disturbance.

Reduced Mine Plan Alternative: Same as the proposed Project except removal of approximately 980 acres of vegetation and 509 acres would not be reclaimed.

Partial Backfill Alternative: Same as proposed Project, except less reclaimed vegetation would become established on the East WRDA since the height of this Project component would be lower.

Wildlife Resources (Including Migratory Birds)

Proposed Action: Reduction of 1,067.3 acres of wildlife habitat, including 1,026.5 acres of mixed desert shrub, 36.6 acres of fourwing saltbush association, and 4.2 acres of sagebrush shrubland and 509 acres would remain unreclaimed. Direct losses of smaller, less mobile species of wildlife 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. Incremental increase in habitat fragmentation in the study area until reclamation has been completed. Potential impacts to mammalian species resulting from drinking exposure to antimony and molybdenum in the post-mining pit lakes. Potential long-term impacts in mammalian populations would occur through Year 100. Risk to avian species was not predicted for antimony or molybdenum but impacts in individual rough-winged swallows could occur from mercury exposures in Year 100. Potential long-term impacts were predicted for avian populations.

No Action Alternative: No additional loss of habitat beyond the authorized and historic disturbance. The level of human use would remain the same as the current levels.

Reduced Mine Plan Alternative: Same as proposed Project except 87 acres of less disturbance (85 acres of mixed desert shrub and 0.5 acres of fourwing saltbrush and 2 acres of existing historic disturbance) and 48 fewer acres of permanent disturbance. Reclamation would occur 1 year sooner. Impacts from a pit lake are anticipated to be overall minor, long-term, and localized impacts would occur more slowly and affect fewer ecological receptors under this mitigated Alternative than under the proposed Project.

Partial Backfill Alternative: Same as proposed Project except the duration of impacts would last approximately 2 years longer. In addition, less reclaimed vegetation (e.g., forage) would be established on the East WRDA. No pit lakes would form under this alternative, therefore no impacts from pit lakes are anticipated.

Special Status Species

Proposed Action: Long-term localized reduction of approximately 1,067.3 acres of potential special status species habitat, including approximately 1,026.5 acres of mixed desert shrub, 36.6 acres of fourwing saltbush association, and 4.2 acres of sagebrush shrubland. Approximately 509 acres would not be reclaimed. Numerous Joshua trees potentially would be removed due to proposed Project activities.

No Action Alternative: No additional loss of habitat beyond the authorized and historic disturbance. Impacts to Joshua trees would not occur.

Reduced Mine Plan Alternative: Same as proposed Project except 87 acres of less disturbance (85 acres of mixed desert shrub and 0.5 acres of fourwing saltbrush and 2 acres of existing historic disturbance) and 48 fewer acres of permanent disturbance. Reclamation would occur 1 year sooner. Fewer individual Joshua trees being impacted.

Partial Backfill Alternative: Same as proposed Project except the duration of impacts would last approximately 2 years longer. Less reclaimed vegetation would become established on the East WRDA.

Range Resources

Proposed Action: Long-term localized reduction of 1,067.3 acres of forage for livestock. However, the number of animal unit months (AUMs) would not be reduced at this time but may be re-evaluated by the BLM in the future.

No Action Alternative: No reduction in AUMs within the Montezuma Grazing Allotment.

Reduced Mine Plan Alternative: Same as proposed Project, except 87 fewer acres of forage would be disturbed and mine life reduced by 1 year.

Partial Backfill Alternative: Same as proposed Project except the perimeter fence would remain in place for 1 additional year.

Wild Horses and Burros

Proposed Action: Disturbance to 86.3 acres of the Goldfield Herd Management Area (HMA) and 143.8 acres of the Montezuma Peak HMA. Approximately 61.1 acres in the Montezuma Peak HMA would not be reclaimed.

No Action Alternative: No loss of wild horses and burros habitat or forage would occur.

Reduced Mine Plan Alternative: Same as proposed Project (disturbance acreage within the HMAs does not change). Reclamation would occur 1 year sooner.

Partial Backfill Alternative: Same as the proposed Project except less reclaimed forage would become established on the East WRDA.

Paleontological Resources

Proposed Action: Potential impacts to paleontological resources may occur with the high likelihood of encountering fossils in the Siebert Formation.

No Action Alternative: Impacts are not anticipated.

Reduced Mine Plan Alternative: Same as Proposed Project.

Partial Backfill Alternative: Same as Proposed Project.

Cultural Resources

Proposed Action: Within the direct effects Area of Potential Effect (APE), impacts would occur to the Goldfield Historic Mining District and eight archaeological sites. Within the indirect impacts APE, which encompasses the auditory and vibrational APEs, indirect effects would occur to 16 cultural resources.

No Action Alternative: Impacts to cultural resource sites would not occur.

Reduced Mine Plan Alternative: Same as proposed Project except indirect impacts would occur to the 16 architectural resources within the indirect APEs and would be 1 year shorter than the proposed Project.

Partial Backfill Alternative: Same as proposed project except indirect impacts to the 16 architectural resources within the indirect APEs would be 2 years longer than the proposed Project.

Native American Concerns

Proposed Action: No properties of traditional religious and cultural importance, traditional cultural properties, or sacred sites occur in the study area. Therefore, no impacts would occur.

No Action Alternative: Same as Proposed Project.

Reduced Mine Plan Alternative: Same as Proposed Project.

Partial Backfill Alternative: Same as Proposed Project.

Air Quality

Proposed Action: Air quality impacts would be localized near the proposed Project site and dissipate with distance and below the National Ambient Air Quality Standards (AAQS) and Nevada AAQS and would not exceed applicable air quality standards and would return to background levels after mine reclamation.

No Action Alternative: No air quality impacts would occur.

Reduced Mine Plan Alternative: Same as proposed Project except fugitive particulate matter emissions and construction-related emissions would be reduced due to the smaller disturbed area.

Partial Backfill Alternative: Same as proposed Project except mine operation and reclamation activities and associated air emissions would increase by 2 years.

Noise and Vibration

Proposed Action: Maximum construction noise levels at residential locations would range from approximately 30 decibels on the A-weighted scale (dBA) to 50 dBA. Blast vibration damage from the proposed Project is not anticipated at the historic Goldfield High School.

No Action Alternative: No additional noise or blasting vibrations beyond the existing environment would occur.

Reduced Mine Plan Alternative: Same as proposed Project except mine-generated noise would be reduced by 1 year. Same as proposed Project except blast vibration would be reduced by 1 year.

Partial Backfill Alternative: Same as proposed Project except mine-generated noise would occur for 2 additional years.

Transportation and Access

Proposed Action: A reduction from nine U.S. 95 intersections to five intersections. Modest Project-related increase in traffic would remain within the existing capacity of the roadways.

No Action Alternative: No traffic and access impacts would occur.

Reduced Mine Plan Alternative: Same as proposed Project except traffic effects would be reduced by 1 year.

Partial Backfill Alternative: Same as proposed Project except traffic effects would be 2 additional years.

Land Use and Realty

Proposed Action: Project-related disturbance of 1,337 acres would reduce the amount of land available for livestock grazing and dispersed recreation. The proposed Project would conflict with the existing ROWs in the Project vicinity. New or amended ROW authorizations would be required for the proposed realignments of U.S. 95, utilities, and county roads.

No Action Alternative: No impacts to land use or realty would occur. No impacts to existing ROWs except Esmeralda County likely would replace and upgrade the existing pipeline from the Klondike wellfield to the town of Goldfield.

Reduced Mine Plan Alternative: Same as proposed Project except 87 fewer acres of land would be disturbed by mine development.

Partial Backfill Alternative: Same as proposed Project except the mine life would be extended an additional 2 years.

Recreation

Proposed Action: Recreational use would be restricted from 1,210.9 acres of public land. Areas proposed for the relocation of U.S. 95 and realignment of local roads would not be available. Potential impact on the annual “Vegas to Reno” race due to the relocation of U.S. 95; however, this would be a slight change to the highway alignment.

No Action Alternative: No impacts to recreational use.

Reduced Mine Plan Alternative: Same as proposed Project.

Partial Backfill Alternative: Same as proposed Project except the perimeter fence would remain in place for an additional 2 years.

Social and Economic Values

Proposed Action: Employment of up to 200 contract workers for varying periods primarily during a 1-year construction period. Annual indirect earnings impact would add an additional $5.1 million in total combined wages. Demand for an estimated 145 housing units for the 10-year duration. No significant capacity or service issues have been identified for most public facilities and services in the Tonopah-Goldfield area. The combination of property taxes and net proceeds taxes from the proposed Project would have a major beneficial impact on Esmeralda County revenues.

No Action Alternative: No impacts to income, employment, population, housing, infrastructure, community services, and public finance are anticipated.

Reduced Mine Plan Alternative: Same as proposed Project except for the 1-year reduction in the Project life. Reduction in total production of ore and a reduction in net proceeds and ad valorem taxes generated.

Partial Backfill Alternative: Same as proposed Project except for the 2-year increase in the Project life.

Environmental Justice

Proposed Action: Potential impacts would not be expected to disproportionately affect any particular population.

No Action Alternative: No impacts on environmental justice would not occur.

Reduced Mine Plan Alternative: Same as proposed Project.

Partial Backfill Alternative: Same as proposed Project.

Visual Resources

Proposed Action: Overall visual impacts during mining are weak to moderate contrast. Following reclamation, views from all four Key Observation Points would not conflict with established BLM Visual Resource Management Class IV objectives. Minor increase in night sky impacts from project lighting.

No Action Alternative: No significant impacts to visual resources including night skies would occur.

Reduced Mine Plan Alternative: Same as proposed Project except a reduced timeline of 1 year.

Partial Backfill Alternative: Same as proposed Project except an increased timeline of 2 years.

Hazardous Materials and Solid Waste

Proposed Action: Based on the small quantities of hazardous waste that would be generated by the proposed Project, an accident resulting in a release to the environment during transportation is not anticipated.

No Action Alternative: No accidental spills/releases or generation of solid wastes would occur.

Reduced Mine Plan Alternative: Same as proposed Project except lower amounts of hazardous materials and solid waste would be used/generated due to a reduced timeline of 1 year.

Partial Backfill Alternative: Same as proposed Project except higher amounts of hazardous materials and solid waste would be used/generated due to an increased timeline of 2 years.

1.0 Introduction

1.1 Introduction and General Location

In July 2013, Metallic Goldfield Inc. (now Gemfield Resources, Ltd. [GRL]) submitted a Plan of Operations (Plan) (N-91038) and Nevada Reclamation Permit Application for the Gemfield Mine Project (GRL 2018b) to the Tonopah Field Office (TFO) of the Battle Mountain District Bureau of Land Management (BLM) and Nevada Division of Environmental Protection (NDEP), Bureau of Mining Regulation and Reclamation (BMRR). A revised Plan was submitted to the BLM in April 2017 and March 2018. The Plan was submitted to comply with Title 43 Code of Federal Regulations (CFR), subpart 3809 (43 CFR 3809.401 *et seq.*, as amended), State of Nevada regulations governing the reclamation of mined lands (Nevada Administrative Code [NAC] 519A.010-635), and BLM Instruction Memorandum (IM) No. NV-2011-004 – Guidance for Permitting 3809 Plans of Operation. The 43 CFR 3809 regulations require that the BLM fulfill its obligation under the National Environmental Policy Act of 1969 (NEPA) by analyzing and disclosing the potential environmental impacts of the Gemfield Mine. In addition, GRL has submitted right-of-way (ROW) applications and associated Plan of Development (POD) to support the Gemfield Mine (GRL 2017a) in accordance with 43 CFR 2800. The proposed ROWs and amendments are subject to review and approval by the BLM pursuant to the Federal Land Policy and Management Act of 1976 (FLPMA) as amended, and the ROW principles and procedures (Title V, 43 CFR 2800). Together the Plan and the proposed new and amended ROWs are defined as the Proposed Action (proposed Project).

The proposed Project is located approximately 30 miles south of Tonopah, Nevada, and approximately 0.5 mile north of the town of Goldfield, in the historic Goldfield Mining District, in Esmeralda County, Nevada. Goldfield is located approximately 30 miles south of Tonopah and 174 miles northwest of Las Vegas, Nevada. Approximately 1,935.9 acres would occur within the Plan boundary, including approximately 1,214.2 acres of BLM land and 721.7 acres of private land. The Plan boundary, which would include all proposed Project activities, is located entirely within Sections 14, 15, 22, 23, 24, 25, 26, 27, 34, and 35 of Township 2 South, Range 42 East (**Figure 1.1-1**). The proposed Project consists of 57 patented and 127 unpatented lode mining claims either owned or controlled by GRL.

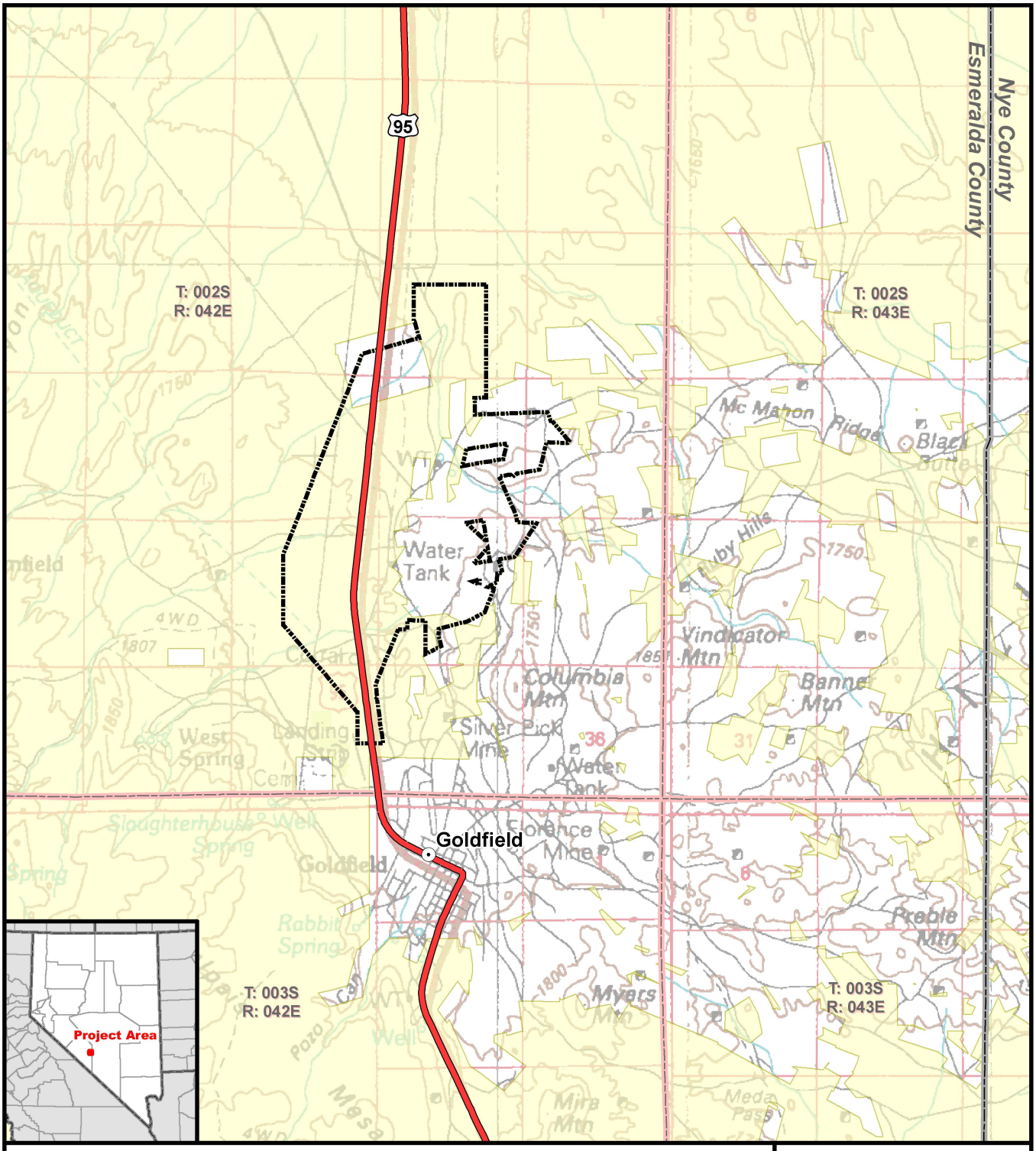
The BLM is serving as the lead agency for preparing the Environmental Impact Statement (EIS) in compliance with the following: NEPA, the Council on Environmental Quality (CEQ) NEPA implementing regulations (40 CFR 1500-1508); the BLM's NEPA Handbook (H-1790-1); Guidelines for Assessing and Documenting Cumulative Impacts (BLM 1994); CEQ's Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ 2005); Nevada State Office IM NV-2010-014, Nevada BLM Rock Characterization and Water Resources Analysis Guidance for Mining Activities (January 2010); Nevada BLM State Office IM NV-2008-032, Nevada BLM Water Resource Data and Analysis Policy for Mining Activities (April 2008); and other applicable guidance. The Nevada Department of Wildlife (NDOW), Nye County, and Esmeralda County are serving as cooperating agencies for preparation and review of the EIS, as outlined in the Memoranda of Understanding (MOUs).

The following appendices are included in this EIS: Major Permits and Approvals (**Appendix A**), List of Preparers (**Appendix B**), Special Status Species Support Information (**Appendix C**) and References (**Appendix D**).

1.2 Summary of Proposed Action

The proposed Project includes the construction and operation of a conventional open pit mining operation to extract and recover gold. The proposed Project would include the following new components:

- Open pit;
- Crushing facilities, conveyors, and associated stockpiles;
- Waste rock disposal areas (WRDAs);
- Overburden stockpile;



Legend

- Plan of Operations (PoO) Boundary
- City
- U.S. Highway
- County Boundary
- Township/Range Boundary
- BLM Land
- Private Land

0 0.5 1 2 Miles

N

Source: GRL 2017.

Gemfield Mine Project

Figure 1-1

Project Vicinity

- Stormwater diversions channels, sediment basins, and berms;
- Heap leach pad (HLP), processing facilities, and ponds;
- Water supply and dewatering wells and delivery/storage system;
- Haul and secondary roads;
- Exploration activities; and
- Ancillary facilities including: power supply; reagent, fuel, and explosives storage; buildings including administration, change house, laboratory, security, warehouse, and parking; water supply and septic systems; maintenance shop; ready line; vehicle wash; communications facilities; plant growth media stockpiles; area for temporary storage of petroleum-contaminated soils; groundwater monitoring wells; water supply pipelines and facilities, borrow areas; fencing; yards; and stormwater controls and diversion structures.

Several ROW actions would require amendments to existing FLPMA grants, in accordance with 43 CFR 2800 and a new ROW. New ROW actions include issuance of a grant to the Nevada Department of Transportation (NDOT); authorizations of an east access road to Esmeralda County, and short-term construction ROWs for Sierra Pacific Power Company (SPPCo) dba NV Energy in accordance with 43 CFR 2800 and Title V FLPMA. A POD that describes these amendments was submitted to the BLM in July 2013 (amended May 2017). These amendments would be necessary to accommodate the development and operation of the proposed Gemfield Mine.

1.2.1 Purpose and Need

The BLM is responsible for administering mineral rights access on certain federal lands as authorized by the General Mining Law of 1872. Under the law, qualified prospectors are entitled to reasonable access to mineral deposits on public domain lands, which have not been withdrawn from mineral entry. In order to use public lands managed by the BLM for locatable mineral exploration and development, persons must comply with the FLPMA and BLM's surface management regulations, use and occupancy regulations, State of Nevada laws and regulations applicable to mine reclamation, and other applicable statutes and regulations. Additionally, to utilize public lands for certain types of linear facilities related to exploration and development of minerals on public lands, persons must comply with applicable ROW regulations at 43 CFR 2800.

The purpose of this federal action and associated EIS is to analyze the environmental impacts associated with GRL's Proposed Action and connected actions.

The need for the federal action is established by the BLM's responsibilities under FLPMA to respond to an applicant's appropriately submitted request for approval of a mining Plan of Operations. The BLM reviews such requests in consideration of the applicable regulations and controlling resource management plan (RMP). In this case, the Tonopah RMP instructs the BLM.

The NEPA mandates that the BLM evaluate the impacts of the Project and connected actions and develop alternatives and mitigation, when necessary, to lessen any impacts to environmental resources.

The BLM's purpose is to consider approval of the new applications, amendment applications, and relinquishments to respond to the ROW applications for electrical distribution facilities, access road, fiber optic line, and U.S. Highway 95 (U.S. 95) relocation as authorized under Title V, Section 501 of the FLPMA of 1976. Further, the BLM would assess the proponent's objectives while preventing unnecessary or undue degradation to the environment in accordance with the objectives defined by 43 CFR 2801.2(a)(d).

The BLM needs to consider approval of the submitted amendments relinquishments, and new applications to respond to its mandate under the FLPMA to manage the public lands for multiple uses and sustained yield. The process of these applications also fulfills the Administration's priorities to promote energy and mineral production on federal land, conservation stewardship and in supporting the economies by creating employment opportunities. BLM will further review the Plan proposal and the ROW applications, amendments, and relinquishments in consideration of the Administration's priorities of promoting energy and

mineral production on federal land, conservation stewardship, and the support for local economies by creating employment opportunities (https://www.blm.gov/basic/national-priorities).

1.2.2 Decision to be Made

The BLM's TFO Manager's decision to be made is whether to authorize the proposed Project as described within the Plan, as submitted, modify, or reject the decision. This decision would be made through consideration of the results of this EIS analysis conducted under the NEPA and other applicable federal, state, or local requirements.

The TFO's Field Manager's decision to be made is whether to: 1) amend or issue new ROWs as submitted, 2) amend or issue the ROWs through additional mitigation or stipulations included, but not limited to, use of timing restrictions, relocation, or configuration of the ROW grants, or 3) deny the ROW application, amendments, or relinquishments. This decision would be made through consideration of the results of this EIS analysis conducted under the NEPA and other applicable federal, state, or local requirements.

1.3 Land Use Plan Conformance

This EIS was prepared in conformance with the policy guidance provided in the updated BLM NEPA Handbook H-1790-1 (BLM 2008), the CEQ regulations (40 CFR 1500-1508), and agency guidance on the analysis of cumulative impacts.

The Proposed Action would be in conformance with the Tonopah RMP (BLM 1997), the Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment (as there is no Greater Sage-Grouse habitat within the proposed Project) (BLM 2015), the 2018 Nevada and Northeaster California Greater Sage-Grouse Proposed Resource Management Plan Amendment and Final Environmental Impact Statement (BLM 2018a), Esmeralda County Public Lands Policy Plan (Esmeralda County 2013). The ROW applications also conform to the FLPMA 90 Stat. 2750, 43 (United States Code [U.S.C.]) 1701,1713, and 1719, which were passed to authorize BLM's management of public lands.

1.4 Scoping and Environmental Review Process

Numerous opportunities for public input occur during the NEPA decision-making process. The initial step in the EIS process was to notify the public and other government agencies of the BLM's intent to prepare an EIS. The BLM published a Notice of Intent (NOI) to prepare an EIS for the proposed Project in the Federal Register on December 24, 2013, which initiated the beginning of the 30-day public scoping period for the proposed Project. The purpose of public scoping was to actively solicit and acquire input from the public and other interested Federal, State, Tribal, and local agencies about the proposed Project. The BLM hosted one public scoping meeting for the proposed Project in the town of Goldfield, Nevada, on January 10, 2014.

The topics that represent public concern raised about the proposed Project are listed out in Section 5.2.

1.5 Project Permits and Approvals

In addition to the EIS, implementing the proposed Project would require authorizing actions from other Federal, State, and local agencies with jurisdiction over certain aspects of the proposed Project. **Appendix A** lists the required permits or approvals already in place or that would be obtained. GRL is responsible for amending existing permits, and applying for and acquiring additional permits, as needed.

2.0 Alternatives Including the Proposed Action

This chapter describes the Proposed Action as defined in the Plan and the POD; alternatives, including the No Action Alternative, action alternatives, and alternatives that were considered but eliminated from detailed analysis; and a comparative impact analysis summary of the Proposed Action and alternatives.

2.1 Proposed Action

GRL is planning to construct and operate a conventional open pit mining operation in the Goldfield Mining District of Esmeralda County, Nevada. Proposed surface disturbance by mine component and ROW amendments is illustrated on **Figure 2-1** and summarized in **Table 2-1**. The proposed Project would include the following mine components:

- Open pit;
- Crushing facilities, conveyors, and associated stockpiles;
- WRDAs;
- Overburden stockpile;
- Stormwater diversion channels, sediment basins, and berms;
- HLP, processing facilities, and ponds;
- Water supply and de-watering wells and delivery/storage system;
- Haul and secondary roads;
- Exploration activities; and
- Ancillary facilities.

Proposed ROW amendments to existing BLM authorizations and a new ROW request include the NDOT, AT&T, Esmeralda County, SPPCo) doing business as NV Energy, and Nevada Hospital Association/SWITCH.

The Plan boundary covers a total of 1,935.9 acres, including 1,214.2 acres of BLM-administered land and 721.7 acres of private land. **Figure 1-1** illustrates the surface ownership in the Plan boundary. The Proposed Action is discussed further below with additional details available in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b).

2.1.1 Open Pit Mining

The Proposed Action would include the development and operation of a new open pit. The location of the open pit is illustrated on **Figure 2-1**. Bench heights would vary depending on rock type and pit orientation. Open pit benches would be 20 feet high and for most rock types would be double benched for effective catch benches of 40 feet high.

Mining would commence near the eastern perimeter of the open pit to allow time for the relocation and construction of U.S. 95. The open pit would be approximately 3,500 feet long by 3,300 feet wide and a depth of approximately 500 feet below the current ground level.

Dewatering would be required at an average rate of 71 gallons per minute (gpm), which is anticipated to be managed with an in-pit sump. Although no dewatering wells currently are anticipated for the mine construction and operation, if necessary, water from pit dewatering operations may be pumped from dewatering wells to the raw water storage tank and used as process water.

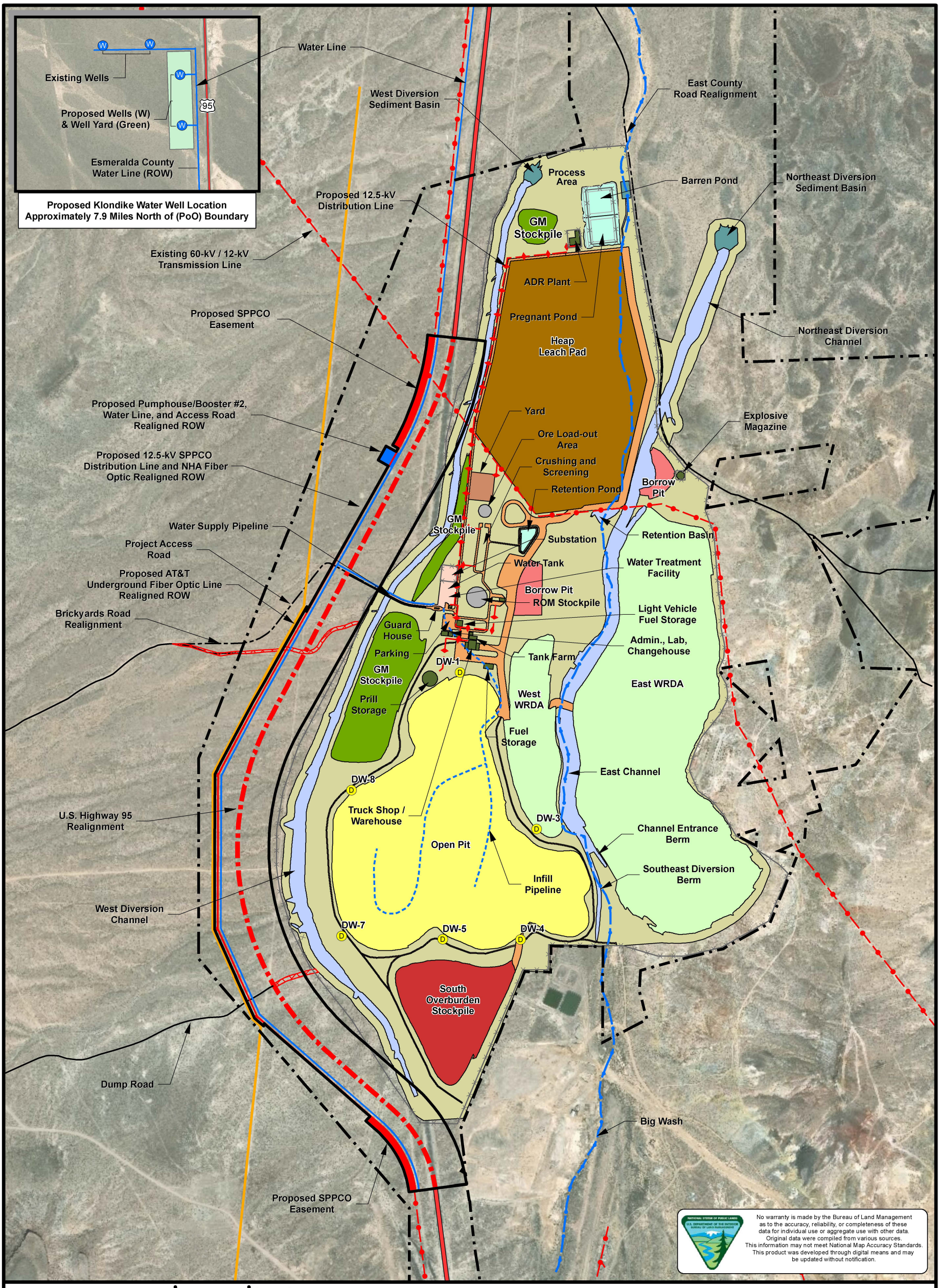


Figure 2-1
Proposed Action

Gemfield Mine Project

Legend

- Borrow Pit
- Building
- Diversion Channel/Berm
- Growth Media (GM) Stockpile
- Heap Leach Pad (HLP)
- Inter-facility Disturbance
- Ore Stockpile
- Open Pit
- Pond
- Road
- Sediment Basin
- South Overburden Stockpile
- Utilities
- Waste Rock Disposal Area (WRDA)
- Yard
- Powerline Easement (SPPCO)
- Proposed Pumphouse/Booster #2
- Consolidated Transportation and Utility ROW Area
- Road to be Decommissioned
- Water Line (Esmeralda County) Reroute
- Access Road Realignment
- Infill Pipeline
- Fence
- Underground Fiber Optic Line
- Powerline
- Dewatering Well
- U.S. Highway 95 Realignment

Other Features

- Powerline, Existing
- Access Road, Existing
- U.S. Highway 95, Existing
- Existing Big Wash
- Plan of Operations (PoO) Boundary

Source: GRL 2017.
Note:
1) Base topography provided in feet (NGVD 1929).

N

0 500 1,000 2,000 Feet

Table 2-1 Proposed Action Surface Disturbance by Land Status

Facility Type	Private Land (acres)	Public Land (acres)	Total Proposed Disturbance (acres)
Mine Components			
Open Pit	15.1	145.0	160.1
Waste Rock Disposal Areas	188.5	20.5	209.0
Overburden Stockpile	0	34.4	34.4
Ore Stockpile Facility	0	0.5	0.5
ROM Stockpile	0	1.3	1.3
Heap Leach Pad	20.9	106.1	127.0
Growth Media Stockpiles	4.0	33.3	37.3
Borrow Pits	3.1	4.7	7.8
Ponds	5.5	3.4	8.9
Buildings	0.6	2.0	2.6
Yard	0	2.4	2.4
Roads	3.7	30.6	34.3
Utilities	0	2.9	2.9
Inter-facility Disturbance	89.8	195.8	285.6
Stormwater Facilities	35.5	35.0	70.5
Exploration	0	121.0	121.0
Mine Components Total	**366.7**	**738.9**	**1,105.6**
Rights-of-Way			
Consolidated Transportation and Utility ROW Area	0	196.5	196.5
AT&T Underground Fiber	0.2	5.7	5.9
Brickyards Road	0	2.5	2.5
East County Road	0.1	4.6	4.7
Water Pipeline/Facilities	0.9	21.2	22.1
Rights-of-Way Total	**1.2**	**230.5**	**231.7**
Total	**367.9**	**969.4**	**1,337.3**

Source: GRL 2018a.

2.1.2 Waste Rock Disposal Areas and South Overburden Stockpile

Mining is anticipated to generate approximately 50 million tons (Mt) of waste rock and alluvial overburden during the life of the mine. The Proposed Action includes development of two new WRDAs (East and West WRDAs) and one overburden stockpile (South Overburden Stockpile). The South Overburden Stockpile would be used for alluvial overburden material only; no waste rock would be placed in this facility.

Waste rock would contain a mixture of varying-sized material that would be delivered and placed in lifts using 50-ton haul trucks. **Table 2-2** provides the design parameters and a summary of dimensions for the WRDAs and the South Overburden Stockpile

Table 2-2 WRDAs Design Parameters and Dimensions

WRDA	Inter-Bench Slope* (Gradient)	Overall Slope (Gradient)	Lift Height (feet)	Max Height Above Original Topography (feet)	Crest Elevation (feet)	Surface Area (acres)	Volume (Mt)**
East WRDA	2.5H:1V	2.75H:1V	40	260	5,860	182.4	53.4
West WRDA	2.5H:1V	2.75H:1V	40	110	5,660	30.6	4.2
South Overburden Stockpile	2.5H:1V	2.75H:1V	40	135	5,700	34.5	8.8

*As-built slope is laid back to allow for a horizontal slope break on each bench.

Capacity assumes a material density of 18.18 cubic feet per ton.**

Source: GRL 2018a.

2.1.3 Processing Facilities

Ore would be hauled from the pit to the crushing and screening plant located immediately south of the HLP (**Figure 2.1-1**). The HLP would be designed to include a composite liner system complete with

geomembrane liner, low permeability soil layer, and ore cushion overliner layer. The HLP would be constructed with a slope angle of 3H:1V. The final reclaimed slope angle would be approximately 3H:1V. HLP design parameters for the Proposed Action are provided in **Table 2-3.**

Table 2-3 Heap Leach Pad Design Parameters for Proposed Action

Maximum Lift Heights (feet)	Heap Height[1] (feet)	Crest Elevation (feet above mean sea level [amsl])	Area (acres)	Capacity (million tons)
25	290	5,700	127	25

The HLP would be designed with an 80-mil (1 mil equals 1/1000 of an inch) high-density polyethylene (HDPE) geomembrane system overlying a compacted, low-permeability soil layer equivalent to a 12-inch layer with maximum permeability of $1x10^{-6}$ centimeters per second. A network of perforated pipes and collector pipes would be placed at base of the HLP to collect and convey the pregnant (i.e., gold-bearing) leach solution (PLS) to the toe of the HLP. A uniform, permeable overliner layer consisting of crushed rock would be placed over the primary liner and piping network to protect it from punctures and to provide a drainage layer under the heap.

PLS would be collected at the eastern toe of the HLP and conveyed to the pregnant solution pond via a solution conveyance pipeline contained within a HDPE-lined channel. The lined channel would include overliner material to protect the HDPE liner and PLS pipe as well as a leak collection and recovery system (LCRS). The LCRS would consist of a perforated collection pipe beneath the composite liner and a standpipe that would be installed beneath the main conveyance channel to intercept any potential PLS leakage from the main solution conveyance pipeline.

Ponds would include a pregnant process pond and a barren process pond (**Figure 2.1-1**). The barren pond would receive overflow from the pregnant pond as well as excess solution from the plant than can be sent back to the HLP. The ponds are designed to contain in excess of the 100-year, 24-hour storm event.

The liner system for the process ponds would consist of a double geomembrane liner and a LCRS. An 80-mil HDPE liner would serve as the primary liner, and a 60-mil HDPE liner would serve as the secondary liner. The secondary liner would function as a seepage barrier in the event the primary liner is damaged or punctured. A geonet drainage layer would be placed between the primary and secondary HDPE pond liners, which would intercept and convey leakage to the gravel-filled LCRS sump with riser pipes located at pond low points to allow for the collection of leakage.

The process ponds would be fenced with a minimum 8-foot-high chain-link fence to minimize wildlife access to the ponds. Floating “bird balls” or other exclusion methods, such as netting, would be used to minimize avian species exposure to pond solution.

The process building would be fully enclosed with walls and a roof except for the cyanide holding tanks, acid storage tanks, and caustic storage. All areas would be contained with concrete walls and curbs providing containment at least 110 percent of the largest container.

2.1.4 Roads

Haul roads would be designed to accommodate up to 100-ton loader/trucks and would have a maximum running width of 100 feet. Haul roads would be constructed to MSHA haul road specifications and Best Management Practices (BMPs). Safety berms would be designed in accordance with MSHA requirements.

The mine would be accessed from the town of Goldfield by traveling north on U.S. 95 approximately 1.5 miles, and south from the town of Tonopah approximately 25 miles by road. A short section of gravel road, which currently serves as the main access road (N-88527) to the mine site from U.S. 95 would be used as the main access road to the mine during operations (**Figure 2-1**). The main access road would be upgraded to meet both U.S. Department of Transportation (USDOT) and NDOT requirements.

Secondary roads within the mine would be approximately 30 feet wide. The actual road disturbance width may be wider at certain locations to account for topography and to allow for cut and fill on side slopes. GRL would control fugitive dust emission from roads using water or chemical dust suppressant application (e.g., magnesium chloride or lignin sulfonate), as needed.

2.1.5 Stormwater Management

The stormwater control system for the proposed Project is designed for a storm event with a 24-hour duration and 100-year recurrence interval. GRL's stormwater management practices would employ a variety of measures to protect process and non-process facilities from the effects of upstream stormwater runoff. Most of the stormwater runoff to be managed would be generated in small watersheds upstream (south and west) of the Plan boundary. Surface water flow in the area is ephemeral and generally related to large precipitation events. Snow accumulations in the area are generally small, short-lived, and do not contribute significantly to runoff in most years. The Proposed Action facilities would be located adjacent to Big Wash, an ephemeral drainage that drains into an unnamed playa approximately 19 miles downgradient of the Plan boundary. The playa is normally dry with water present only after significant precipitation events.

Stormwater would be diverted around the east side of the open pit by way of the Southeast Diversion Berm and around the west side of the pit by the West Diversion Channel (**Figure 2-1**). Downstream of the Southeast Diversion Berm, flows would be managed in the east channel between the West WRDA and East WRDA and then would continue in the Northeast Channel around the leach pad to the east and to a natural drainage to the north.

Stormwater management measures for the Proposed Action would include the reduction of contact between stormwater and industrial mining activities (including disturbed unvegetated ground), erosion and sediment controls, structural controls, fugitive dust control, and non-structural controls such as good housekeeping, inspections, training, and maintenance.

2.1.6 Water Needs and Uses

The average daily water demand at the mine would be approximately 500 gpm. Water would be obtained from the Esmeralda County's Klondike wellfield, located approximately 7.9 miles north of the Plan boundary. The water demand would be for the estimated mine life of 12 years and an additional year following mining to facilitate rapid infilling of the pit. Further detail on the Rapid infill of the pit is provided in Section 2.1.13.1.

Water would be piped to the mine and stored within tanks at the water tank and utilities management area (**Figure 2-1**). Raw water storage of 500,000 gallons (12-hour capacity) would be available for mine use. A raw water distribution system would deliver water, as required, for dust control, process make-up water, cooling, and reagents mixing.

It is expected that approximately 5 gpm of potable water would be required. Potable water demand would be obtained by water from the Esmeralda County Goldfield Public Utilities' new Klondike wellfield. Water from the new Klondike wellfield would be treated on site prior to delivery through the site's potable water system.

Fire protection water would be supplied from the raw water storage tank. Fire hydrants would be placed at regular intervals around the mine buildings. The buildings would have sprinkler systems and hand-held fire extinguishers available in accordance with MSHA regulations and industry standards.

Water rights for the Proposed Action have been appropriated by the NDWR to GRL. GRL currently holds approximately 967.8 acre-feet per year. GRL also has completed an agreement with Esmeralda County Public Utility District to procure water to support the mine.

2.1.7 Hazardous Materials and Explosives

Hazardous materials would be transported to the proposed mine by USDOT-regulated transporters and would be stored on site in USDOT-approved containers. Explosive agents would be purchased, transported,

stored, and used in accordance with the BATF and Department of Homeland Security provisions; MSHA regulations; and other applicable federal, state, or local requirements. All liquid petroleum products and reagents would be stored in above ground tanks within a secondary containment area that is equal to 110 percent of the largest container, per NAC 445A.436.

2.1.8 Work Force and Schedule

GRL would employ up to 200 workers for mine construction. During mine operations, there would be approximately 150 employees, including contractors. Mining operations would occur 24 hours per day, 7 days a week. Worker schedules would include 12-hour shifts with two rotating shifts per day. Blasting would occur up to 7 days a week during daylight hours.

2.1.9 Ancillary and Support Facilities

On-site ancillary facilities include various infrastructure buildings, power supply, sanitary sewage systems, communication facilities, and roads. **Figure 2-1** shows the location of the main ancillary infrastructure.

2.1.10 Exploration

GRL proposes an additional 121 acres of exploration disturbance consisting of 15,000 linear feet of drill roads (approximately 6.9 acres of disturbance), and 500 new drill pads (approximately 115 acres of disturbance), and up to three drill holes per drill pad (average of 5-inch-diameter drill holes; average depth of 1,200 feet below ground surface [bgs]) for future exploration.

2.1.11 Rights-of-Way

As part of the Proposed Action, several ROW actions would require amendments to existing FLPMA grants, in accordance with 43 CFR 2800. Modifications to ROWs would require amendments to existing BLM ROW authorizations including actions to relinquish portions of the existing authorization and additions to existing authorizations. A POD and individual ROW applications (SF 299) for ROW amendments were submitted to the BLM as part of the Plan package on July 19, 2013, with and updated for the water pipeline submitted in January 2017 (GRL 2017a). The POD was submitted by GRL on behalf of NDOT, Nevada Bell Telephone Company dba AT&T Nevada, SPPCo dba NV Energy, Nevada Hospital Association, and Esmeralda County as these entities hold the ROWs. ROW actions and amendments that would be necessary to accommodate the development and operation of the proposed mine are presented in **Table 2-4**. Proposed surface disturbance according to surface ownership is summarized in **Table 2-4**. **Figure 2-2** depict the ROW actions described above for roads, water line and associated infrastructure, transmission and distribution lines, and the fiber-optic lines.

Table 2-4 Rights-of-Way Amendment Descriptions

Facility	Permittee	BLM ROW Authorization	Proposed ROW Actions	ROW Dimensions / Acreage
U.S. 95	NDOT	NVCC-020796 and Nev 001467 N-92346	Amend and relinquish a portion of ROW to relocate U.S. 95. Relinquish a portion of NVCC-020796 and Nev 001467; add new ROW N-92346. May reissue two new grants to NDOT under Federal Aid Highway Administration for NVCC-020796 and Nev 001467.	600 feet by 12,750 feet / 176 acres
East Access Road	Esmeralda County	New - Long-term ROW N-92354	Relocate a portion of the east access road from its current location away from proposed mine facilities.	25 feet by 8,110 feet / 4.7 acres
Dump Road	Esmeralda County	N-53624	Amend and relinquish a portion of Esmeralda County ROW in current location to shorten Dump Road.	50 feet by 1,740 feet / 2 acres
Gemfield/ Brickyards Road (County Road [CR] 210)	Esmeralda County	N-88527	Amend Esmeralda County ROW to extend the ROW to U.S. 95 while shortening and realigning the eastern portion of Brickyards Road (CR 210) to the north to intersect with the proposed U.S. 95 realignment (and proposed mine Proposed Action access road).	Decommission and reclaim 3,311 feet / 3 acres of the existing easternmost section of Brickyards Road (CR 210) and add a realigned segment: of 40 feet by 2,761 feet/ 2.5 acres in length (total of -0.5 acres)

Table 2-4 Rights-of-Way Amendment Descriptions

Facility	Permittee	BLM ROW Authorization	Proposed ROW Actions	ROW Dimensions / Acreage
Water Line and Facilities	Esmeralda County	N-31308	Amend and relinquish a portion of Esmeralda County water line facilities ROW to: • Upgrade water pipeline to either i) one 10-inch pipe, or ii) one 6-inch pipe and one 8-inch pipe from the Klondike groundwater wells to the Consolidated Transportation and Utility ROW Area within the existing ROW; • Relocate and upgrade water pipeline to either i) one 10-inch pipe or ii) one 6-inch pipe, and one 8-inch pipe; • Relocate Booster #2 pumphouse and water tank (20,000-gallon) and add a new 30,000-gallon water tank; • Install a new 30,000-gallon water tank and enlarge the pumphouse at Booster #1 (including an 8-foot by 16-foot pump house); • Relocate water line access road; • Install two additional groundwater wells; • Include two ROWs connecting new wells to water pipeline (includes access road and power line); • Pipeline to connect Esmeralda County line to the Plan boundary; • Install a piezometer and monitoring well in the wellfield study area and within proposed disturbance; and • Construct service connection of water pipeline Esmeralda County line to mine site.	Water pipeline upgrade in existing ROW: No new surface disturbance outside of existing ROW Water pipeline ROW relocation: 20 feet by 12,750 feet / 5.9 acres Booster #2 and tanks: 209 feet by 208 feet / 1 acre Booster #1 modification: No new disturbance Access road: 20 feet by 12,750 feet / 5.9 acres Groundwater wells, access road, and power line: 200 feet by 200 feet / 1.84 acres Two pipelines connecting new wells to water pipeline: 25 feet by 300 feet / 0.2 acres
12.5-kilovolt (kV) Aerial Distribution Line	NV Energy	N-90391[1]	Amend and relinquish a portion of ROW in current location to relocate SPPCo 12.5-kV aerial distribution line and access road ROW.	Transmission line: 20 feet -100 feet (varies) by 12,750 feet / 10.5 acres Access road: 20 feet by 12,750 feet / 5.9 acres
60-kV Aerial Transmission Line with 12.5-kV Underbuild	NV Energy	Nev 043264	Adjust transmission line poles (within existing SPPCo ROW) to accommodate the U.S. 95, Esmeralda County Water line, Esmeralda County access road, and SPPCo 12.5-kV aerial transmission line relocations.	No ROW amendment necessary to the 100-foot width or ROW length
60-kV Aerial Distribution Line	NV Energy	New - Long-term ROW N-92349	Tap SPPCo 60-kV aerial transmission line (N-043264) and run a 60-kV aerial distribution line to the proposed operation plant substation.	40 feet by 1,850 feet / 1.8 acres
12.5-kV Aerial Distribution Line	NV Energy	New - Short-term ROW N-92350	Tap SPPCo 12.5-kV aerial distribution line (sharing poles with the 60-kV aerial transmission line [N-043264]) and run a 12.5-kV aerial distribution line to the proposed construction laydown yard.	20 feet by 185 feet / 0.09 acres
Fiber-optic Line - Aerial	Nevada Hospital Association	N-90056	Amend Nevada Hospital Association ROW to relocate aerial fiber-optic line.	20 feet - 100 feet (varies) by 12,750 feet / 10.5 acres
Fiber-optic Line - Underground	AT&T	N-73706	Amend and relinquish a portion of the AT&T ROW in current location to relocate the buried fiber-optic line.	20 feet by 16,944 feet / 7.78 acres

[1] Access road ROWs N-90391 and N-31308 are the same.

Sources: GRL 2017a, 2018a.

Construction, operation, and maintenance of the ROW actions would be conducted in accordance with the POD (GRL 2017a). The existing facilities (U.S. 95, access roads, transmission lines, water lines, pumphouse and water tank, fiber-optic lines, etc.) would remain in place and active until the new facilities are constructed and operational. Once the new and realigned facilities are constructed, they would be connected into the existing facilities at the north and south ends of the realignment with minimal to no down time. No noticeable service disruptions to utility and telecommunications customers serviced by these facilities are anticipated during construction.

After the realigned facilities are completely operational, the old facilities either would be abandoned or removed per industry standards.

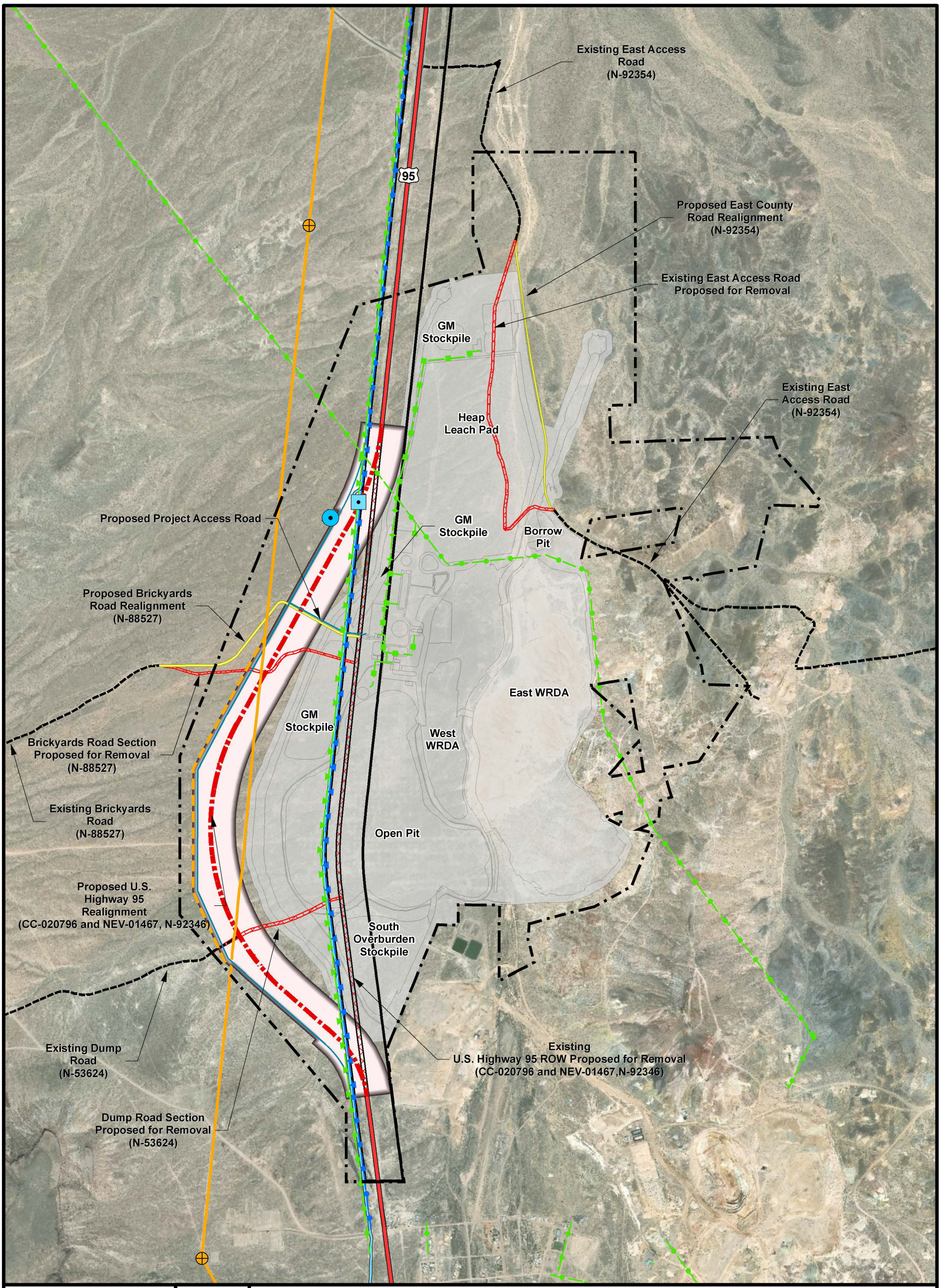


Figure 2-2

Right-of-Way Actions

Gemfield Mine Project

Access Roads
- Access Road, Existing (to Remain)
- Access Road, Proposed

U.S. Highway 95, Existing
- U.S. Highway 95 Centerline
- ROW Corridor
- Highway Utility Corridor
- Road, Proposed for Removal

U.S. Highway 95, Realignment
- U.S. Highway 95 Centerline

Powerline, Existing
- Transmission Line (60-kV/12.5-kV)
- Transmission Line (60-kV/12.5-kV), To Be Relocated

Powerline, Proposed
- Distribution Line (12.5-kV)
- Transmission Line (60-kV)
- Transmission Line (60-kV/12.5-kV) Reroute

Water Facilities
- Water Line, (Esmeralda County)
- Water Line, To Be Relocated
- Water Line Facilities and Access Road ROW Reroute, Proposed
- Infill Pipeline
- Town of Goldfield Pumphouse/Booster Station and Water Tank, Existing
- Proposed Pumphouse/Booster #2
- Water Line Facilities and Access Road ROW, Existing
- Water Line Facilities and Access Road ROW, Proposed

Fiber Optic Facilities
- Existing Splice Vault
- Existing Underground Fiber Optic Line
- Proposed Underground Fiber Optic Line

Other Features
- Plan of Operations (PoO) Boundary
- Facility Boundary, Proposed
- Road, Proposed for Removal

0 500 1,000 2,000 Feet

N

Source: GRL 2017. Note: Base topography provided in feet (NGVD 1929).

2.1.12 Applicant-Committed Environmental Protection Measures

The Proposed Action includes applicant-committed environmental protection measures (EPMs) described in the following sections. These measures are commitments by the proponents taken from the Mine Plan and ROWs PODS. They are outlined by resource and by the Mine Plan and ROWs POD.

2.1.12.1 Erosion, Sediment Control, and Surface Water Quality

Mine Plan of Operations

- BMPs (BLM 2013) would be used to limit erosion, trap sediment, and control stormwater from the effects of wind, precipitation, and stormwater run-off from proposed mine facilities and on disturbed areas during construction, operation, and initial stages of reclamation. BMPs that would be used may include:
  - Surface stabilization measures – compaction, surface roughening, dust control, mulching, erosion matting, riprap, temporary gravel construction access, temporary and permanent revegetation/reclamation, and placing plant growth media;
  - Run-off and run-on control and conveyance measures – engineered channels, grade stabilization structures, ditch checks, run-off and run-on diversion berms; and
  - Sediment traps and barriers – sediment detention basins, sediment traps, stabilized construction entrances, tire wash stations, silt fence, wattles, and straw bale barriers.
- Revegetation of disturbed areas would reduce the potential for wind and water erosion. Upon reaching final grade or where construction activities have temporarily ceased, disturbed areas such as cut-and-fill embankments and plant growth media/cover stockpiles would be seeded with permanent or temporary certified weed-free seed mix, as soon as practicable and safe. Revegetation concurrent with construction activities would be maximized to the extent practicable to accelerate revegetation of disturbed areas.
- Stormwater and erosion control BMPs would be inspected regularly, evaluated for performance, and repairs and additional BMPs added as needed.
- Process components would be designed, constructed, and operated in accordance with NAC 445A. The proposed process facilities would be zero-discharge, and the heap leach facilities would have engineered liner and leak detection systems in accordance with NAC 445A design criteria.
- GRL has prepared a Water Management Plan that identifies specific control measures and monitoring requirements. The actual locations and numbers of sediment controls will be determined during final design and where appropriate during operations.

Rights-of-Way Plan of Development

- Individual Stormwater Pollution Prevention Plans appropriate for each ROW action would be developed.

2.1.12.2 Vegetation, Noxious Weeds, and Invasive and Non-Native Species

Mine Plan of Operations

- State-protected yucca and cacti would either be transplanted off site or would be mitigated for any loss during the development or operation of the proposed mine.
- GRL would minimize noxious weeds and invasive and non-native species in accordance with the Noxious Weed Management Plan that would be implemented during construction and would continue to be implemented during operations.

Rights-of-Way Plan of Development

- Any areas where botanical surveys have not been conducted will be surveyed prior to any project-related surface disturbance.

- Any heavy equipment moving in to the project area from another project site would have wheel wells, wheels and tires, bumpers, undercarriage, etc., cleaned with high pressure water or air to remove any weed seeds prior to moving onto the site.
- Only certified weed-free seed would be used for reclamation seeding.
- All reclamation would be monitored for infestations of noxious weeds.
- Eradication measures would be implemented in coordination with the BLM if noxious weeds were found.
- Concurrent reclamation would be used to reduce the establishment of invasive species.

2.1.12.3 Growth Media Management

Mine Plan of Operations

- Plant growth media storage would be minimized through concurrent reclamation practices. Suitable growth media would be salvaged and stockpiled during the development of mine facilities. Following stripping, plant growth media would be stockpiled within designated areas. Plant growth media stockpiles would be located where mining operations would not disturb them. The surfaces of the stockpiles would be shaped after construction to reduce erosion. To further minimize wind and water erosion, the plant growth media stockpiles would be seeded after shaping with an interim seed mix developed in conjunction with BLM. Diversion channels and/or berms would be constructed around the stockpiles, as needed, to prevent erosion from overland run-on or run-off. BMPs such as silt fences or staked certified weed-free straw bales would be used as necessary to contain sediment resulting from direct precipitation.

Rights-of-Way Plan of Development

- None

2.1.12.4 Wildlife, Including Special Status Species and Migratory Birds

Mine Plan of Operations

- Land clearing and surface disturbance would be timed to prevent destruction of active bird nests or chicks during the avian breeding season as determined by the BLM to comply with FLPMA 43 U.S.C. 1701(a) Sec. 102 (8), NEPA requirements for a description of baseline conditions and anticipated Project-related impacts, as well as BLM BMPs for wildlife use of habitat. If surface-disturbing activities are unavoidable during the avian breeding and nesting season, GRL would have a qualified biologist survey area proposed for disturbance for the presence of active nests immediately prior to the disturbance. If active nests are located, or if other evidence of nesting is observed (mating pairs, territorial defense, carrying nesting material, transporting of food), an appropriate buffer would be identified by the BLM and the NDOW and be placed around the nest to prevent destruction or disturbance of nests until the birds are no longer present.
- Operators would be trained by BLM-qualified individuals to monitor the mining and process areas for the presence of larger wildlife such as deer and sensitive species. Mortality information would be collected and reported on a quarterly basis in accordance with the NDOW industrial artificial pond permit. GRL would establish wildlife protection policies that would prohibit hunting, feeding, or harassment of wildlife unless attempting to move wildlife off the site. Barriers (e.g., bird balls, netting, or other cover) would be used in cyanide ponds/ditches, and power poles would be built with anti-perch devices to protect raptors from electrocution.
- GRL has prepared a Bird and Bat Conservation Strategy for the Project (Wildlife Resource Report, Appendix B). Coordination with the BLM, NDOW, and USFWS and GRL would occur prior to the implementation of the features of the Bird and Bat Conservation Strategy to minimize impacts to birds and bats from the proposed Project.

Rights-of-Way Plan of Development

- The proposed transmission line would provide raptor protection in compliance with the standards described in “Suggested Practices for Raptor Protection on Power Lines. The State of the Art in 2006” (Avian Power Line Interaction Committee [APLIC] 2006).
- Prior to any planned disturbance in potential migratory bird nesting habitat from March 1 to July 31 (the approximate nesting season), a field survey for migratory birds, their nests, eggs or young should be performed, in order to comply with FLPMA 43 U.S.C. 1701(a) Sec. 102 (8), NEPA requirements for a description of baseline conditions and anticipated Project-related impacts, as well as BLM BMPs for wildlife use of habitat. If any nests, eggs or young are found either: 1) the project should be delayed until the birds have completed their nesting and brood rearing activities; 2) a protective buffer zone around nests, eggs, or young migratory birds should be established on a site- and species-specific basis by a qualified biologist (to the approval of the BLM) allowing work to proceed outside of the buffer zone; or 3) the project should be designed as to not harm the migratory birds, their nests, eggs, or young.

2.1.12.5 Wild Horses & Burros

Mine Plan of Operations

- To avoid human-animal conflicts, GRL will construct fencing around the mine boundary. This would prevent horse and burro traffic through the mine and reduce stress on the herd.

Rights-of-Way Plan of Development

- None

2.1.12.6 Paleontological Resources

Mine Plan of Operations

- If vertebrate fossils are discovered during construction, operation, or reclamation, construction activities would be halted in the area of discovery, and GRL would contact the BLM Authorized Officer (AO) and if requested, also may contact a qualified paleontologist. The AO and/or the qualified paleontologist would evaluate the discovery within 5 working days of being notified. If the discovered paleontological resource is determined significant, appropriate mitigation measures would be developed to mitigate potential adverse effects. Construction, operation, or reclamation activities in the area of the discovery would not resume until a notice to proceed was granted by the AO.

Rights-of-Way Plan of Development

- Areas that demonstrate high potential for buried paleontological resources would be monitored during construction.

2.1.12.7 Cultural Resources

Mine Plan of Operations

- Avoidance is the BLM-preferred treatment for preventing adverse effects to any prehistoric or historic site eligible for listing in the National Register of Historic Places (NRHP); unevaluated cultural resources are included. If avoidance is not feasible because an area is needed for mine facilities or Project operations or is not adequate to prevent adverse effects, GRL would undertake mitigation such as data recovery at the affected historic properties in accordance with the applicable Memorandum of Agreement between BLM, Nevada State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation. Development of a treatment plan would be based on the Secretary of the Interior's Standards and Guidelines along with any relevant BLM Nevada guidance documents. If an unevaluated site cannot be avoided, additional information would be gathered, and the site would be evaluated, as applicable. If the site does not meet eligibility criteria as defined by the National Register Criteria for Evaluation, no further cultural work would be

performed. If the site meets the eligibility criteria, a data recovery plan or appropriate mitigation would be completed under an applicable Memorandum of Agreement.

- To minimize the potential for illegal collection, vandalism, and inadvertent damage, GRL would ensure that all its Project personnel and contractors are instructed on cultural resources avoidance and protection measures, including the statutes protecting cultural resources as part of its environmental training program prior to being authorized to work in the Project area.
- GRL employees would be trained to identify cultural resources. Training would be administered to new hires and as an annual refresher using BLM-approved materials. If cultural resources are encountered during Project construction, operation, or reclamation, activity in the area of the discovery would cease immediately. The AO would be notified, and the resource would be evaluated. The results of the evaluation would determine subsequent action.
- If construction or other Project personnel discover what may be human remains, funerary objects, or items of cultural patrimony on BLM-administered land, construction would cease within the vicinity of the discovery. The location of the find would not be publicly disclosed, and the remains would be secured and preserved in place. GRL or its contractors would immediately notify the AO of the discovery, followed by written notification. Any discovered Native American human remains, funerary objects, or items of cultural patrimony found on federal land would be handled in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA). Non-Native American human remains would be handled in accordance with Nevada state law. Construction would not resume in the area of the discovery until the AO has issued a Notice to Proceed.
- If human remains and associated funerary objects are discovered on private land during construction activities, construction would cease within the vicinity of the discovery and the county coroner or sheriff would be notified of the find. The location of the find would not be publicly disclosed, and the remains would be secured and preserved in place. Treatment of any discovered non-Native American human remains and associated artifacts found on private land would be handled in accordance with Nevada Revised Statutes (NRS) 440.025; Native American human remains found on private land would be handled in accordance with NRS 383.150. Construction would not resume in the area of the discovery until the AO has issued a Notice to Proceed.

Rights-of-Way Plan of Development

- Any areas containing cultural resources of significance would be avoided, or the potential for impacts mitigated in a manner acceptable to the BLM. GRL employees, contractors, and suppliers would be reminded that all cultural resources are protected and if uncovered, shall be left in place and reported to the GRL representative and/or their supervisor.
- A buffer of approximately 100 to 150 feet would be established around eligible and unevaluated cultural sites that lie very close to project activities. When initial construction is close to the buffered areas, an archaeological monitor would be present to ensure that eligible and unevaluated cultural sites are not disturbed.
- Any cultural or paleontological resources (historic or prehistoric site or object) discovered by the contractor, or any person working on his behalf on public lands, shall be immediately reported to the AO.
- The contractor shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the AO. An evaluation of the discovery would be made by the AO to determine appropriate actions to prevent the loss of significant cultural or scientific values. GRL or the contractor would be responsible for the cost of evaluation. The AO would make any decision regarding suitable mitigation measures after consulting with GRL or the contractor. GRL or the contractor shall be responsible for the resultant mitigation costs.

2.1.12.8 Air Quality

Mine Plan of Operations

- Air quality permits would be obtained from the NBAPC for the Project facilities and land disturbance.
- Committed air quality practices would include dust control for mine unit operations as described by the NBAPC required Fugitive Dust Control Plan. In general, the Fugitive Dust Control Plan would provide for speed limits, water and/or chemical suppressant application on haul roads and other disturbed areas, seeding plant growth media and other stockpiles, and other dust control measures as acceptable. Disturbed areas would be seeded with an interim seed mix to minimize fugitive dust emissions from non-vegetated surfaces where appropriate.
- Fugitive dust emissions in the process area would be controlled at the crusher and conveyor drop points through the use of water sprays and dry-ducted dust collection systems. Appropriate emission control equipment would be installed and operated in accordance with the construction and operating air permits.
- GRL would acquire Nevada Mercury Control Program air quality operating permits from the NBAPC for mercury control devices installed on thermal units in the process building.

Rights-of-Way Plan of Development

- Dust would be minimized by application of water to disturbed areas. A dust control permit issued by the appropriate regulating agency would be obtained prior to start of construction. Construction would comply with all the requirements of the dust control permit. Initially proposed protection measures designed to minimize impacts to air quality would include:
  - Water would be applied to the ground during the construction and use of the access roads and other disturbed areas as necessary to control dust.
  - During excavation, backfilling, contouring, and rehabilitation, the disturbed soil would be wetted, chemically treated, or treated by other means satisfactory to the resident engineer to effectively reduce airborne dust and reduce soil erosion. A regular maintenance program would include, but would not be limited to, soil stabilization and reapplication of dust abatement methods as necessary.

2.1.12.9 Land Use and Access

Mine Plan of Operations

- GRL would install wildlife-friendly perimeter fencing and restrict site access to the public during operations. Appropriate signage would be displayed.
- Post-mining safety barriers (e.g., fencing, berms) would be installed peripherally to the ultimate perimeters of the pits after mining has been completed.
- GRL would protect all survey monuments, witness corners, reference monuments, bearing trees, and line trees against any unnecessary or undue destruction or damage. If, in the course of operations, any monuments, corners, or accessories are destroyed, GRL would immediately report the matter to the AO.

Rights-of-Way Plan of Development

- Any survey monuments, witness corners, or reference monuments would be protected.

2.1.12.10 Visual Resources and Lighting

Mine Plan of Operations

- GRL would reshape the leach pad to round the slope angles and to establish mid-slope undulation to break up the strong pyramidal form.

- Geomorphic design of the WRDAs seeks to mimic natural processes and landscapes. The goal of the geomorphic design is to establish a sustainable landform.
- GRL would apply lighting protection measures designed to minimize impacts of excessive artificial light beyond the Project area during operation and mining. 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 pit areas that may be directed toward public roads during travel. In the pit and WRDA, the lights and equipment would be naturally shielded by the pit walls and distance. 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, located within soffits, and directed into the operating site. Light fixtures would incorporate shields and/or louvers where possible and be full cut-off type. Buildings would be painted, stained, and/or treated to produce flat-toned, non-reflective surfaces with approval from the BLM Visual Resource Management (VRM) specialist. Facilities would be painted using the BLM-approved color chart. The use of dimmers, timers, and motion sensors would be installed where appropriate. Fugitive dust would be minimized to reduce "sky glow" by reducing the light reflectance from the dust particles.

Rights-of-Way Plan of Development

- All portions of the roads that are located on BLM-administered land would be managed in accordance with Class IV VRM objectives.
- Pumphouse structures would include BLM-approved colors chosen to minimize the visual contrast with the surrounding landscape.

2.1.12.11 Hazardous Material and Solid Waste

Mine Plan of Operations

- Non-hazardous solid wastes generated at the site would be disposed of at a regulated, off-site landfill.
- Sanitary liquid wastes would be handled and disposed of through septic tanks/leach fields permitted by the NDEP. Waste oil and lubricants would be collected and transported off site by a buyer/contractor for recycling. Reagent containers would be recycled by the reagent supplier. Scrap metal would be sold to a dealer and transported off site.
- Nonhazardous solid wastes from the laboratory would be disposed of in the off-site landfill. Other wastes from the laboratory that exhibit hazardous characteristics, including off-specification commercial chemicals and assay wastes, would be managed as hazardous waste.
- Employee training would include appropriate disposal practices such as the allowable wastes that can be shipped to the landfill, management of used filters, oily rags, fluorescent light bulbs, aerosol cans, and other regulated substances. Used solvent, liquids drained from aerosol cans, accumulations of mercury fluorescent lights, and used antifreeze may be regulated pursuant to the Resource Conservation and Recovery Act (RCRA).
- Hazardous materials will be transported to the Project by USDOT regulated transporters and stored on site in USDOT-approved containers. Spill containment structures will be provided for storage containers.
- Hazardous materials will be managed in accordance with regulations identified in 40 CFR § 262 Standards Applicable to Generators of Hazardous Waste.
- Blasting components, including ammonium nitrate and fuel oil, will be stored onsite in silos and tanks. All explosive materials will be stored away from the plant site in compliance with the MSHA, Nevada State Mine Inspector's regulations, and U.S. Department of Homeland Security requirements.

- All liquid petroleum products and reagents used in the process will be stored in above ground tanks within a secondary containment area capable of holding 110 percent of the volume of the largest vessel in a given containment area, as per NAC 445A.436.
- Fuel and oil for diesel and gas-powered equipment will be stored in above-ground, covered tanks generally in the mining area. The tanks will include appropriate secondary containment as required by state regulation. Surface piping will lead from each tank to the fuel dispensing area. The refueling hoses will be equipped with overflow prevention devices as well as secondary containment.
- Hazardous wastes other than those from the laboratory will be managed in the short-term storage facility prior to their shipment to an offsite licensed disposal facility. These materials may include waste paints and thinners. Spent solvents and used oils will be returned to recycling facilities. Waste oil and lubricants will be collected and hauled offsite by a buyer/contractor for recycling. Solvents will be collected by a contractor and disposed of or recycled offsite.
- Petroleum-contaminated soils resulting from spills or leaks of hydrocarbons would be removed from the spill site and stored in appropriate secondary containment areas in accordance with NDEP guidelines. A petroleum-contaminated soils management plan would be submitted as part of the state WPCP. Materials would be tested to determine their RCRA status.

Rights-of-Way Plan of Development

- The contractor would comply with applicable laws pertaining to proper usage and disposal of potentially hazardous materials. All hazardous waste materials will be properly labeled in accordance with 40 CFR Part 262.
- Trash and solid waste generated from construction activities would be stored in closed containers at the construction yards and staging sites and would be disposed of in accordance with regulatory requirements. Any spills would be immediately reported to the resident engineer and permittee construction inspectors so that cleanup can be implemented immediately. The permittee would notify the appropriate authorities if a spill occurs. All spill materials would be labeled and stored at a GRL-designated off-site facility for accumulation and disposal. Initially proposed protection measures to ensure compliance with applicable hazardous materials regulations could include:
  - Equipment would be properly maintained to reduce the possibility of leaks and hose ruptures. In the event of a discharge or spill, cleanup procedures would be implemented immediately to ensure that no materials would be available for transport by storm water run-off.
  - Regulated wastes would be removed from the Project area and disposed in a state, federal, or local designated area.
  - Hazardous materials would not be drained onto the ground or into streams or drainage areas.
  - Totally enclosed containment would be provided for all trash.
  - All construction waste including trash, litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials.
  - No debris of any kind would be deposited in the Project area.
  - No biodegradable debris would be left in the Project area.

2.1.12.12 Fire Protection

Mine Plan of Operations

- GRL would institute a fire protection training program and would have a rehearsed fire suppression plan. A fire protection system would be installed that would incorporate Esmeralda County and/or state code requirements in the administration and warehouse complexes, truck shop, crushing plant, and process plant. Water would be reserved for fire protection and would be serviced by

dedicated firewater protection pumps and hydrants. Water trucks, used for dust suppression, would be available in the event of a fire.

- GRL would promptly comply with any emergency directives and requirements of Esmeralda County and the BLM pertaining to industrial operations during the fire season.
- The following precautionary measures would be taken to prevent wildland fires:
  - Light vehicles would be fitted with spark arrestors and would carry firefighting equipment as required by regulation.
  - Vehicle catalytic converters would be inspected often and cleaned of brush and grass debris.
  - Welding operations would be conducted in an area free of vegetation. A minimum of 10 gallons of water and a shovel would be on hand to extinguish any fires created from the sparks. Extra personnel would be at the welding site to watch for fires created by welding sparks.
  - Wildland fires would be reported immediately to the BLM Central Nevada Interagency Dispatch Center at (775) 623-3444. To the extent known by GRL, the information provided would include the location (latitude and longitude if possible), what is burning, the time the fire started, who/what is near the fire, and the direction of fire spread.
  - GRL would contact the BLM, Division of Fire and Aviation, at (775) 289-1925 to find out about fire restrictions in place and to advise TFO of approximate beginning and ending dates for exploration activities outside of the mine area.

Rights-of-Way Plan of Development

- All federal, state, and county laws, ordinances, rules, and regulations, which pertain to prevention, pre-suppression, and suppression of fires, would be strictly followed. All personnel would be advised of their responsibilities under the applicable fire laws and regulations. It would be the responsibility of the construction contractor to notify the BLM when a Project-related fire occurs within or adjacent to the construction area. The Permittee or its contractor would be responsible for any fire started in or out of the Project area by its employees or operations during construction. The Permittee or its contractor would be responsible for fire suppression and rehabilitation. The Permittee or its contractor would take aggressive action to prevent and suppress fires on and adjacent to the Project area and would use its workers and equipment on the Proposed Action for fighting fires within the Project area.
- When fire suppression is the responsibility of the BLM, current BLM standard firefighting rates for labor would be used. Equipment would be paid at negotiated rates established in BLM rental agreement contracts for a particular working season. The BLM may call on the contractor's workers and equipment in emergencies for fires outside the Project area. Payment would be made in a similar manner to that above. Costs involved with the Permittee or contractor-caused fires would be charged to the Permittee or the contractor. There would be no extension of time for line construction for delays caused by contractor-related fires. Specific construction-related activities and safety measures would be implemented during construction of the transmission line to prevent fires and to ensure quick responses and suppression in the event a fire occurs. These activities and requirements include:
  - All construction and operating equipment would be equipped with applicable exhaust spark arresters;
  - Personnel would be allowed to smoke only in designated areas, and they would be required to follow applicable BLM regulations regarding smoking;
  - Water that is used for construction and dust control would be available for firefighting;
  - The Permittee or the contractor would provide and store in a place easily accessed at each construction site shovels and one 5-pound ABC dry powder carbon dioxide (CO_2) fire extinguisher during all construction activities; and

- The Permittee or the contractor would have the appropriate notification numbers, including the BLM fire dispatch, the BLM Project representative, and Permittee construction project manager readily available on site for all employees in case of fire.

2.1.12.13 Safety and Security

Mine Plan of Operations

- Public safety would be maintained throughout the life of the proposed Project and all equipment and facilities would be maintained in a safe and orderly manner. To protect public safety, all activities would be conducted in conformance with applicable federal and state health and safety requirements.
- Perimeter fencing would be installed, site access would be restricted, and appropriate signage would be displayed. Site visitors would be properly instructed in site safety procedures prior to admittance.
- The Proposed Action would comply with environmental and health and safety regulations of all governmental agencies, including but not limited to the MSHA, NDEP, the Nevada Division of Industrial Relations (NDIR) - Mine Safety and Training Section, the Nevada State Engineer's Office, and the Nevada Bureau of Mines and Geology.
- The NDEP has jurisdiction over ambient air quality, discharges to groundwater, surface water impacts, solid waste disposal, and liquid waste disposal (sanitary facilities). The MSHA and NDIR have jurisdiction over health and safety within the mine; the Nevada State Engineer's Office is concerned with the tailings dam construction and operation, and the administration of water rights. The NDEP is responsible for issuing a mining permit and is concerned with all issues related to mine operations and reclamation.
- Appropriate dust collection and noise abatement equipment would be installed at the mine. Noise levels in both the mine area and process area also would be subject to MSHA regulations.
- All drinking water storage vessels would be enclosed to preserve the water's potable quality. Within the mine and process areas, vehicular traffic and human movement would be controlled by fences, locked gates, signs, and supervisory personnel. Fencing also would discourage access by livestock.

Rights-of-Way Plan of Development

- Public safety would be maintained throughout the life of the project. All equipment and other facilities would be maintained in a safe and orderly manner.
- A speed limit of 15 miles per hour would be used by project-related equipment on roads within the project areas to reduce the potential for collisions with recreationists and grazing animals.
- Fences and gates would be repaired or replaced to their original condition if they are damaged by construction activities.

2.1.12.14 Geology and Minerals

Mine Plan of Operations

- A rock characterization and handling plan and a waste rock management plan (WRMP) have been prepared in accordance with BLM and NDEP guidance. These plans describe the management of the limited volume of Potentially Acid Generating (PAG) materials and materials with the potential to mobilize deleterious constituents.

Rights-of-Way Plan of Development

- To the extent possible, project induced geologic hazards that may cause environmental concern or threaten the structural integrity of any road would be taken into account during the selection of final road improvements.

2.1.13 Reclamation

Closure and reclamation activities would occur concurrently during and following mine operations. Post-closure monitoring would be initiated following the closure of the HLP for 5 years or until deemed successful by the NDEP and BLM. Reclamation monitoring would be conducted for each reclaimed area for 3 years or until successful reclamation has been achieved according to BLM reclamation standards.

GRL anticipates that all surface mine components would be reclaimed except for the open pit, for which an exemption under NAC 519A.250 would be sought. In addition, the process ponds (converted to an evaporation cell [E-cell]), the West and Northeast diversion channels and East Diversion Channel, and the Southeast Diversion Berm would remain in place to evaporate seepage from the heap and to protect the spent heap and WRDAs from extreme storm events. Disturbance associated with exploration plan activities that occurred within the Plan boundary would be reclaimed as described in the reclamation plan. Reclamation measures for specific facilities are discussed in the following sections.

A Tentative Plan for Permanent Closure, as required by NAC 445A.398, would be included within the WPCP application. A Final Plan for Permanent Closure would be prepared and submitted to the NDEP and BLM 2 years prior to the anticipated final termination of the HLP operation, as per NAC 445A.447.

2.1.13.1 Pit Lake Formation and Rapid Filling of Pit

When mining operations and pit dewatering activities have ceased, two separate lakes are anticipated to form in the open pit, known as the West Pit Lake and East Pit Lake. Over the long term, it is predicted that pit lakes would form through passive infiltration of groundwater and precipitation. Without active pumping to accelerate pit lake filling, both pit lakes are predicted to begin to form in the first year after mining ceases and continue to rise until the maximum lake water level elevation is reached at approximately 33 years (West Lobe) to 35 years (East Lobe) post-mining (SRK 2017a). Predicted pit lake water quality at selected time intervals over the 100-year post-mining period for the Main Pit and East Pit for the Reduced Mine Plan Alternative rapid fill scenario show that the total dissolved solids (TDS) concentrations (i.e., salinity) of the pit lakes are predicted to steadily increase over time in response to evaporation. The pit lake water quality is predicted to have elevated concentrations of antimony, fluoride, mercury, molybdenum, sodium, selenium, and TDS are projected to exceed their respective reference NDEP Profile III values in both the Main Pit and East Pit lakes over the 100-year post-mining simulation period (SRK 2017a).

Rather than allowing the formation of pit lakes from passive infiltration of groundwater and precipitation, water would be pumped into the Gemfield Pit upon cessation of mining at a total rate of 500 gpm until the predicted equilibrium elevation of each lake is reached. Water delivery would occur in the West and East pit lakes simultaneously at an average rate of 250 gpm. Water would be supplied by the process water system. The rapid filling is intended to improve the pit water quality as compared with concentrations predicted under the passive infiltration scenario.

Infrastructure would be required to deliver the water from the Project water systems to the open pits. A pipeline consisting of 8-, 6- and 4-inch diameter HDPE would be constructed from the water tank and utilities management areas to the pit lobes as shown on **Figure 2-1**. Water would be conveyed with existing pump(s) from the existing water tank to the pit perimeter, from where it would be gravity fed to the lowest elevation of each pit lobe. Energy dissipation structures would be constructed as necessary at the end of the pipe to reduce erosion.

Rapid filling of the open pit would occur concurrently with the post-mining residual leach activities, which would result in an increased demand for fresh water during the post-mining period. Rapid fill activities are predicted to last for up to 1 year during which time the fresh water demand would remain at an average of 500 gpm.

2.1.13.2 Concurrent and Interim Reclamation

Concurrent reclamation would occur during mining and processing activities in other areas to the extent practicable. Concurrent reclamation would be implemented in areas that would not be re-disturbed and

would no longer be needed for additional exploration, mining, and ore processing including WRDAs, WRDA access roads, exploration roads, and sumps. Detailed information regarding concurrent and interim reclamation is provided in the Plan.

2.1.13.3 Temporary Closure and Interim Reclamation

Per NAC 445A.382, "temporary closure" is defined as the cessation of the operation of a process component for more than 30 days from planned or unplanned activity. There is a possibility that continuous, full-scale mining operations might be interrupted for short periods in response to economic considerations or unforeseen circumstances. In this event, temporary closure and interim reclamation measures would be initiated. Interim reclamation procedures would be implemented as necessary to stabilize disturbed sites during the temporary closure period. These procedures would be coordinated with the appropriate agencies and would emphasize erosion control, weed management, and sustaining soil productivity. Interim reclamation would occur on growth media stockpiles and cut-and-fill slopes on roads and yards.

2.1.13.4 Facilities Not Reclaimed

Facilities that would not be reclaimed include the open pit, West and Northwest diversion channels, East Diversion Channel, diversion berms, process ponds, and the sediment basins. The West, Northeast, East, and Southeast diversion channels would continue to intercept and convey runoff to existing sediment basins post-closure. Stormwater diversion structures would be maintained upgradient of the HLP to prevent erosion of the HLP toe or other impacts from stormwater run on. Approximately 509 acres of disturbance are not anticipated to be reclaimed.

Roads on public lands suitable for public access or which continue to provide public access consistent with pre-mining conditions would not be reclaimed at closure. GRL would continue to use the access road from U.S. 95 to the fence line to access the proposed mine for monitoring and other purposes.

ROW construction activities described in the POD may result in surface disturbance that would require reclamation activities upon completion of construction activities by the permittee. Although portions of some existing ROWs would be consumed by proposed mine development, some ROW authorizations, actions, and relinquishments may require reclamation activities following ROW construction or abandonment. In the event that surface disturbance would not be consumed by mine development, the area generally would be reclaimed by ripping the disturbed area to relieve compaction and provide a suitable surface for seed gemination. All reclaimed disturbance would be seeded with a BLM-approved seed mix. In limited circumstances, some regrading of disturbance may be required to ensure a smooth transition with surrounding topography.

2.1.13.5 Post-Closure Monitoring and Maintenance

GRL would create a Long-Term Funding Mechanism (LTFM) for the proposed Project for the BLM to assure completion of post-closure monitoring and mitigation obligations in perpetuity (after reclamation and financial guarantee release) for the Project if GRL was not able to carry them out itself. The LTFM for the proposed Project would be reviewed every three years during the operation phase of the Project and potentially increased to meet the monitoring and mitigation needs associated with the Project. There is a potential for additional monitoring and maintenance tasks to be required beyond closure (i.e., after operations cease) that is currently not included in the reclamation cost estimate. Financial assurance for these tasks would be provided outside of the reclamation financial guarantee by means of the LTFM. The specifics of the LTFM and the amount of the assurance needed would be determined in cooperation with the BLM. The maintenance specifics and costs would be determined in cooperation with the BLM. Based on future monitoring and evaluation, additional mitigation measures and funding requirements can be implemented at any time if conditions warrant. GRL would remain financially responsible for any additional mitigation that might be required.

2.2 No Action Alternative

The development of new facilities that comprise the Proposed Action would not be constructed under the No Action Alternative. Under this alternative, GRL would not engage in any of the proposed mining operations but would be permitted to continue exploration activities under existing authorizations (NV-076555 and NV-077457). Exploration has been permitted on 23.84 acres of previously disturbed lands.

A total of 329 acres of surface disturbance has occurred in the Plan boundary, including 150.4 acres of surface disturbance from the historic placement of tailings, 160.4 acres of surface disturbance from other historic activities, and 18.2 acres of disturbance from U.S. 95 and other existing roads. This disturbance includes existing GRL Notice Level Disturbance (23.84 acres). Surface disturbance according to surface ownership are summarized in **Table 2-5**.

Table 2-5 No Action Alternative – Existing Surface Disturbance in the Plan Boundary

Component	Private Land (acres)	BLM (acres)	Total Disturbance (acres)
Tailings	125.6	24.8	150.4
Other Historic	79.2	57.36	136.56
GRL NOIs	0	23.84	23.84
U.S. 95 and Existing Roads	2.9	15.3	18.2
Total	**207.8**	**121.2**	**329**

Source: GRL 2018a.

2.3 Reduced Mine Plan Alternative

The Reduced Mine Plan Alternative would consist of the same overall activities as described for the Proposed Action but would have a reduced open pit footprint, configuration, and depth. The resulting open pit would result in corresponding effects on the configuration of the major mine facilities, particularly the WRDAs and HLP. However, there would be no corresponding effects to the Plan boundary access routes, land status, or proposed ROW actions, as compared to the Proposed Action (GRL 2017b).

The layout of the Reduced Mine Plan Alternative by facility is illustrated on **Figure 2-3**. Overall, this alternative would result in approximately 86.6 fewer acres of disturbance (including approximately 13 fewer acres of disturbance on BLM land) as compared to the Proposed Action. Total disturbance for this alternative is 1,250.7 acres including 956.4 acres of public and 294.3 acres of private land.

The primary differences of the Reduced Mine Plan Alternative as compared the Proposed Action are discussed below. Only facilities resulting in changes from the Proposed Action are discussed. EPMs discussed for the Proposed Action would apply to this alternative as well.

2.3.1 Open Pit

Under the Reduced Mine Plan Alternative, the open pit(s) would include approximately 112 acres of surface disturbance, a reduction of 48 acres compared to the Proposed Action. There would be no changes to mining methods or pit bench configurations as compared to the Proposed Action.

Under the Reduced Mine Plan Alternative, the main pit would be approximately 3,000 feet long by 1,900 feet wide and would have a depth of approximately 530 feet below the current ground level; the smaller East Pit would be approximately 1,000 feet long by 1,000 feet wide and would have a depth of approximately 190 feet below current ground level. Mining methods used to extract ore and waste rock from the of the open pits would be the same as discussed for the Proposed Action.

2.3.2 Waste Rock Disposal Areas and South Overburden Stockpile

Under the Reduced Mine Plan Alternative, mining is anticipated to generate approximately 41 Mt of waste rock and alluvial overburden during the life of the mine. This alternative would include the development of

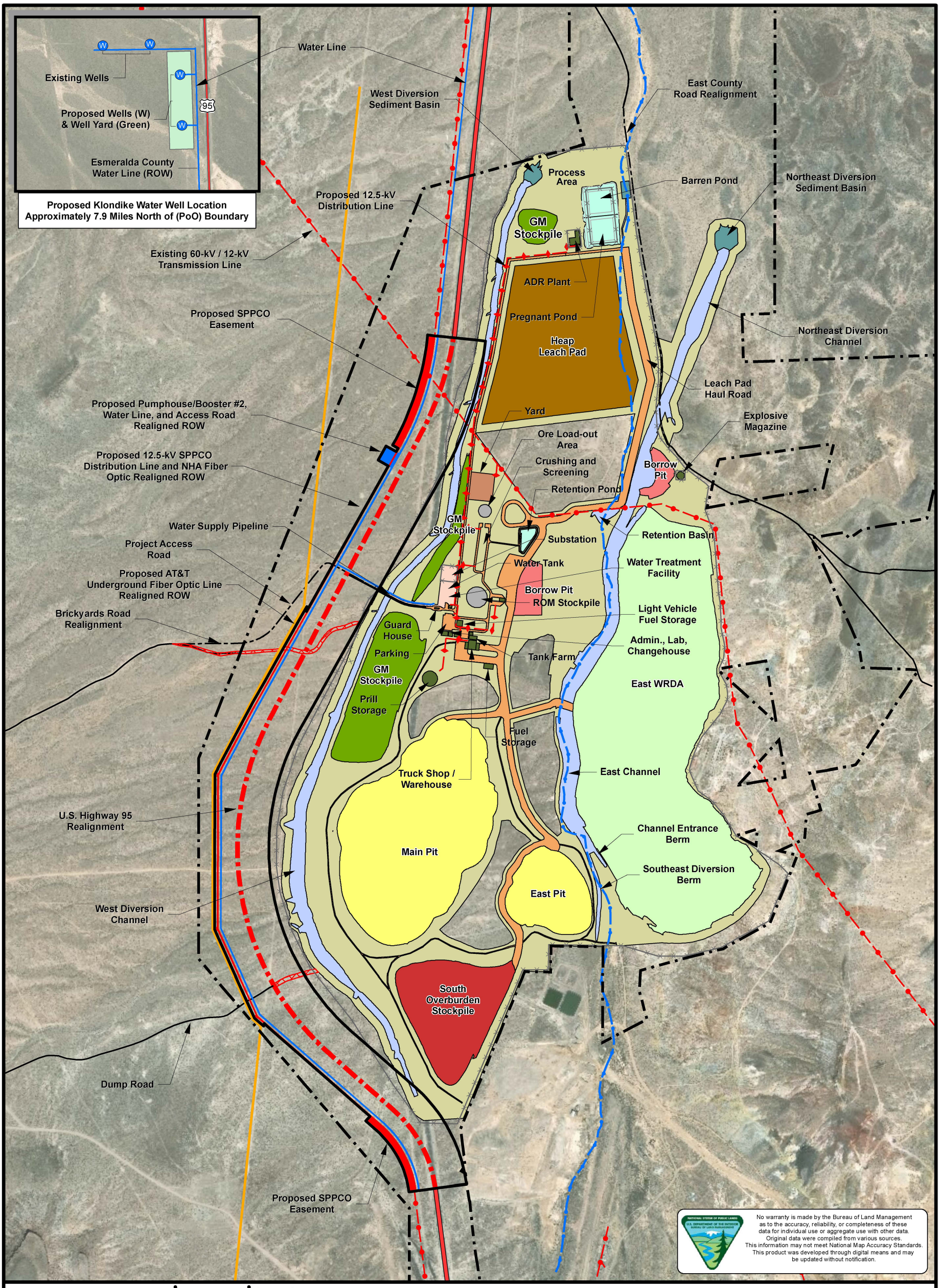


Figure 2-3
Reduced Mine
Plan Alternative

Gemfield Mine Project

Legend

- Plan of Operations (PoO) Boundary

Other Features

- Powerline, Existing
- Water Line (Esmeralda County) Reroute
- Access Road Realignment
- Fence
- Underground Fiber Optic Line
- Powerline
- U.S. Highway 95 Realignment
- Access Road, Existing
- Existing Big Wash
- U.S. Highway 95, Existing
- Powerline Easement (SPPCO)
- Proposed Pumphouse/Booster #2
- Consolidated Transportation and Utility ROW Area
- Road to be Decommissioned

Facility, Proposed

- Borrow
- Yard
- Building
- Road
- Stormwater Facilities
- Leach Pad
- Ore Stockpile Facilities
- Pit
- Pond
- Stockpile
- Overburden Stockpile
- WRD
- Interfacility Disturbance
- Utilities

Source: GRL 2017.
Note: Base topography provided in feet (NGVD 1929).

0 500 1,000 2,000 Feet

N

one WRDA (East WRDA) and one overburden stockpile (South Overburden Stockpile), as compared to two WRDAs for the Proposed Action. **Table 2-6** provides the design parameters and a summary of dimensions for the East WRDA under this alternative. Proposed methods for the development and construction of the East WRDA would be the same as the Proposed Action.

Table 2-6 Reduced Mine Plan Alternative WRDAs Design Parameters and Dimensions

WRDA	Inter-Bench Slope* (Gradient)	Overall Slope (Gradient)	Lift Height (feet)	Maximum Height Above Original Topography (feet)	Crest Elevation (feet)	Surface Area (acres)	Volume (Mt)**
East WRDA	3H:1V	3H:1V	40	220	5,700	177.2	45.4
South Overburden Stockpile	2.5H:1V	2.75H:1V	40	135	5,700	34.5	8.8

*As-built slope is laid back to allow for a horizontal slope break on each bench.

**Capacity assumes a material density of 18.18 cubic feet per ton.

2.3.3 Processing Facilities

Under the Reduced Mine Plan Alternative, the HLP would be result in approximately 55 fewer acres of surface disturbance, as compared to the Proposed Action (**Figure 2-3**). This reduction of acres is because of the reduction in size of the open pit the amount of material placed on the HLP would be reduced, therefore reducing the size of the facility. Construction, operation, and reclamation methods of the HLP would be the same as discussed for the Proposed Action. Process ponds design and operation would be the same as discussed for the Proposed Action. Heap leach design parameters for the Reduced Mine Plan Alternative are provided in **Table 2-7**.

Table 2-7 Heap Leach Design Parameters for Reduced Mine Plan Alternative

Maximum Lift Heights (feet)	Heap Height[1] (feet)	Crest Elevation (feet above mean sea level [amsl])	Area (acres)	Capacity (Mt)
25	185	5,700	72.0	14.4

2.3.4 Roads

Under the Reduced Mine Plan Alternative, new haul road configurations would be needed to access the crusher, East WRDA, and South Overburden Stockpile (**Figure 2-3**). However, there would be no changes to the proposed haul road design and construction, as compared to the Proposed Action. The proposed haul road crossing of Big Wash (an ephemeral surface water drainage that transects the Proposed Action) between the pit and East WRDA would remain unchanged under the Reduced Mine Plan Alternative.

2.3.5 Stormwater Management

Under the Reduced Mine Plan Alternative, the West Protection Berm would no longer be needed due to the reduced facility footprints. No other changes to stormwater management facilities or practices, as compared to the Proposed Action. All other erosion and sediment control measures, structural controls, stormwater diversion channels, berms and sediment and retention basins would be the same as discussed for the Proposed Action.

2.3.6 Water Needs and Uses

The water needs and uses would be the same as described for the Proposed Action except the purchase of makeup water from Esmeralda County would be reduced by 1 year.

2.3.7 Work Force and Schedule

Under this alternative, the operational schedule would be reduced by 1 year due to reduced quantities of overburden, waste rock, and mineralized ore. The operational workforce and number of shifts would not change relative to the Proposed Action.

2.3.8 Reclamation

With the exception of growth media salvage, reclamation practices would be the same as the Proposed Action. Under the Reduced Mine Plan Alternative, the volume of salvaged growth media and the footprints of growth media stockpiles would decrease slightly, as compared to the Proposed Action, based on the reduced footprints of the open pit and HLP.

2.4 Partial Pit Backfill Alternative

Figure 2-4 illustrates the Partial Pit Backfill Alternative. Under this alternative, approximately 37 Mt of waste rock from the East WRDA would be placed in the east and west lobes of the open pit at elevations ranging from 5,405 to 5,510 feet, which is the modeled recovered water level and the minimum amount of backfill required to eliminate the development of the pit lakes (GRL 2018b). Placement of waste rock in the open pit would eliminate the formation of pit lakes and would reduce the height of the East WRDA. The proposed surface disturbance, project location, project area, access routes, land status, or existing disturbance would be the same as described for the Proposed Action. Proposed ROW amendments to existing BLM authorizations would be the same as described for the Proposed Action.

This alternative would add approximately 2 years to mine operation and reclamation activities. The primary differences of this alternative as compared the Proposed Action are discussed below. Only facilities resulting in changes from the Proposed Action are discussed. EPMs discussed for the Proposed Action would apply to this alternative as well.

2.4.1 Open Pit

The pit would be backfilled with approximately 37 Mt of waste rock material (**Figure 2-4**), which would consist of a mixture of waste rock from the mining operation as summarized in **Table 2-8**. This material is comprised primarily of Oxidized Siebert and Oxidized Sandstorm Rhyolite material.

Table 2-8 Partial Backfill Alternative – Backfill Composition

Material Type	Proportion of Total Waste Rock Available for Backfill (%)	Total Mass in Backfill (Mt)
Alluvium/Unclassified	5	1.85
Oxidized Siebert	49	18.1
Unoxidized Siebert	5	1.85
Milltown Andesite	9	3.33
Vitrophyre	<1	-
Oxidized Sandstorm Rhyolite	31	11.5
Unoxidized Sandstorm Rhyolite	1	0.37
Kendall Tuff	<1	-
Total	**100**	**37**

2.4.2 Waste Rock Disposal Areas and South Overburden Stockpile

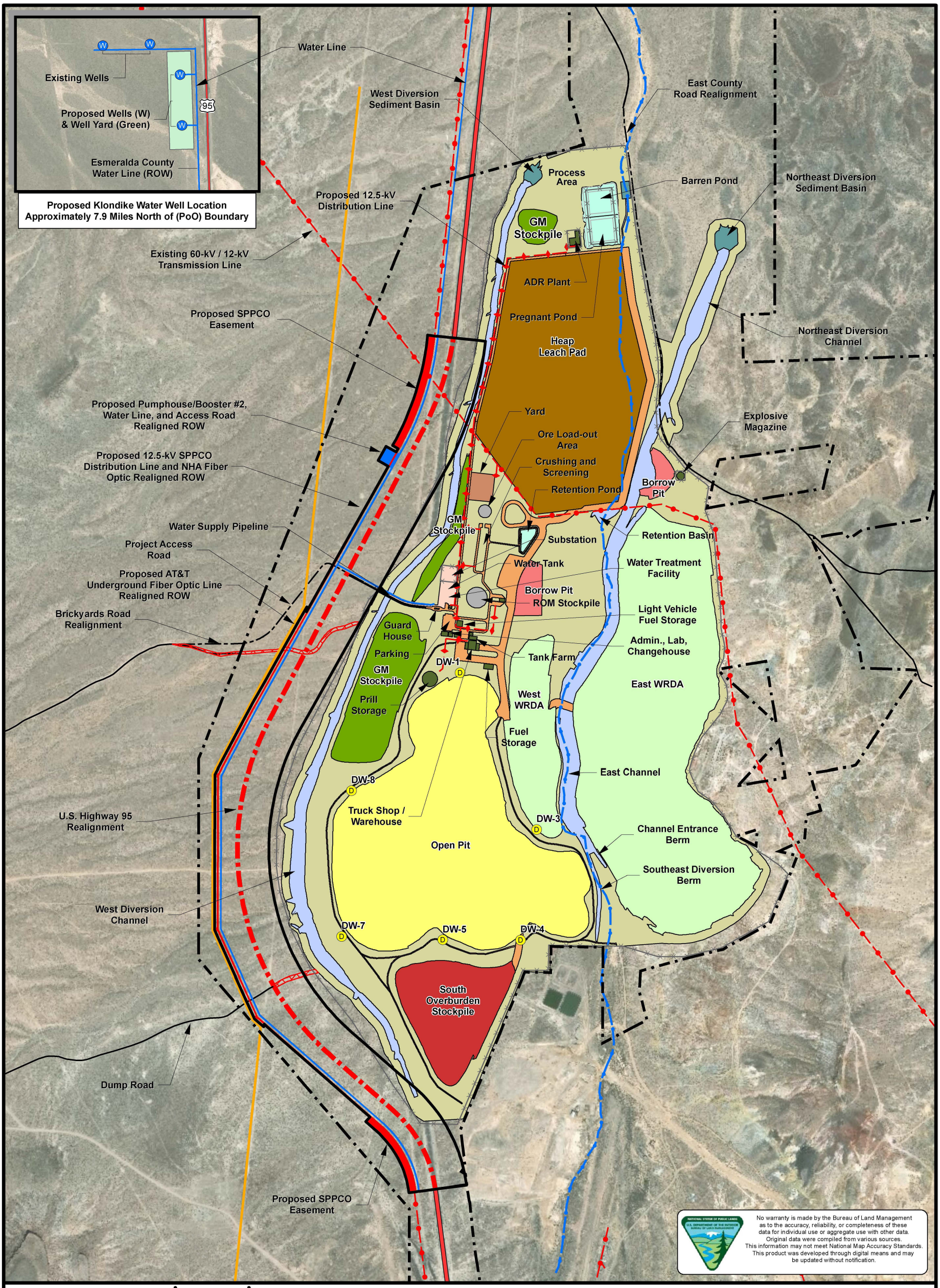
Backfilling activities would utilize approximately 37 Mt of waste rock that would be placed into the East WRDA during active mining operations, which would be subsequently removed, placed into the open pit, and reclaimed in accordance with the Proposed Action (**Table 2-9**). The footprint of the East WRDA would not change and thus, still be constructed over the top of the existing historic Goldfield Consolidated Mines Company (GCMC) tailings (historic tailings) located immediately east of Big Wash.

Table 2-9 Partial Backfill Alternative - Design Parameters and Dimensions of the East Waste Rock Disposal Area

WRDA	Inter-Bench Slope (Gradient)[1]	Overall Slope (Gradient)	Lift Height (feet)	Max Height Above Original Topography (feet)	Crest Elevation (feet)	Surface Area (acres)	Volume (Mt)
East WRDA	3H:1V	3H:1V	40	120	5,620	177.2	25.4[2]

[1] As-built slope is laid back to allow for a horizontal slope break on each bench.

[2] Capacity assumes a material density of 18.18 cubic feet per ton.



Gemfield
Mine Project

Figure 2-4

Partial Pit Backfill Alternative

Legend

- Borrow Pit
- Building
- Diversion Channel/Berm
- Growth Media (GM) Stockpile
- Heap Leach Pad (HLP)
- Inter-facility Disturbance
- Ore Stockpile
- Open Pit
- Pond
- Road
- Sediment Basin
- South Overburden Stockpile
- Utilities
- Waste Rock Disposal Area (WRDA)
- Yard
- Powerline Easement (SPPCO)
- Proposed Pumphouse/Booster #2
- Consolidated Transportation and Utility ROW Area
- Road to be Decommissioned
- Water Line (Esmeralda County) Reroute
- Access Road Realignment
- Fence
- Underground Fiber Optic Line
- Powerline
- Dewatering Well
- Monitoring Well
- U.S. Highway 95 Realignment

Other Features

- Powerline, Existing
- Access Road, Existing
- U.S. Highway 95, Existing
- Plan of Operations (PoO) Boundary
- Existing Big Wash

Source: GRL 2017.
Note:
1) Base topography provided in feet (NGVD 1929).

0 500 1,000 2,000 Feet

N

2.4.3 Water Needs and Uses

Water needs and uses associated with this alternative would be the same as described for the Proposed Action during operations. During closure, a reduction of 807 acre-feet or approximately 262,800,000 gallons of water would be realized since rapid filling of the pit lobes with water would not occur with this alternative.

2.4.4 Work Force and Schedule

Backfilling activities would extend the operational schedule by 2 years. It is not anticipated that the operational workforce numbers would reduce during this 2-year timeframe as residual leaching and reclamation activities also would be occurring during this period. Backfilling operations would occur 24 hours per day, 7 days a week. Blasting would cease with the end of active mining. During backfill activities, no change is anticipated to the mining equipment used for the alternative with the exception of the ammonium nitrate and fuel oil (ANFO)/slurry truck and drill rigs, which would no longer be in use.

2.4.5 Reclamation

The open pit and East WRDA are the facilities affected by this alternative. All other facilities remain unchanged from the Proposed Action.

2.5 Alternatives Considered but Eliminated from 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. Alternatives for the development of the known gold resources within GRL's landholdings and ROW alternatives were evaluated.

The mining alternatives considered but eliminated from detailed analysis include the following:

- Goldfield Main, McMahon Ridge and Gemfield Milling Alternative,
- Gemfield Stand-alone Heap Leach Facility Alternative,
- Gemfield Stand-alone Heap Leach with WRDAs Located Further to the East Alternative,
- Historic Goldfield Consolidated Mines Company Tailings placed on Heap Alternative,
- Gemfield Stand-alone Heap Leach with WRDAs Located Further to the East Alternative, and
- Complete Pit Backfill Alternative.

In addition, several U.S. Highway 95 Alternatives were considered and eliminated from detailed analysis including the following:

- U.S. Highway 95 Alternative 1, U.S. Highway 95 Alternative 2, U.S. Highway 95 Alternative 3, U.S. Highway 95 Alternative 4, U.S. Highway 95 Alternative 5, U.S. Highway 95 Alternative 6, and U.S. Highway 95 Alternative 7).

For full descriptions of these alternatives and rational for dismissal, see the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b), Chapter 6.0.

2.6 Comparative Analysis of Alternatives

Table 2-10 summarizes and compares the environmental impacts between the Proposed Action and the project alternatives. Detailed descriptions of impacts are presented in Chapter 4.0, Environmental Consequences.

2.7 BLM Preferred Alternative

The BLM Preferred Alternative will be determined between the draft and final and included in the Final EIS.

Table 2-10 Comparison of the Proposed Action and Other Alternatives

Resources	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Pit Backfill Alternative
Geology and Minerals				
Ore extraction and waste rock placement	Approximately 25 Mt of ore material containing approximately 600,000 ounces of gold would be mined	No ore extraction or waste rock would be generated.	Same as Proposed Project except 14.4 Mt of ore would be processed.	Same as Proposed Project except 37 Mt of waste rock would be placed in the open pit after mining.
Water Resources and Geochemistry				
Groundwater quantity	Reduction of groundwater levels (drawdown) modeling indicates a projected drawdown induced by pit dewatering with a maximum extent of the 3-foot drawdown contour at 1.1 miles northeast from the center of the mine pit. End of mining drawdowns of 2 feet or more are projected to extend out in a radial pattern from the center of the Klondike wellfield approximately 1.8 miles at the end of mining and expands to a radial distance of approximately 2.3 miles 20 years after mining ceases. No surface water resource impacts are expected.	Groundwater elevations are predicted to continue to re-equilibrate over the next several decades as a result of historic underground mining (and dewatering). This could result in an increase in groundwater elevations of up to approximately 100 feet in some areas. Residual drawdown would persist around the Klondike wellfield as long as the wellfield is pumped to supply the town of Goldfield.	Groundwater levels (drawdown) is localized around the two open pits such that the maximum extent of the 3-foot drawdown contour extends up to a maximum of approximately 0.5 mile to the northeast from the center of the Main Pit and 0.4 miles from the East Pit.	Same as proposed Project.
Pit lake development	Two separate pit lakes are predicted to develop after mining ceases as a result of passive inflow of groundwater.	A pit lake would not develop under this Alternative.	Development of two separate pits (Main Pit and East Pit). Three separate pit lakes are predicted to develop.	No pit lake would form under this Alternative with the backfilling of 37 Mt of waste rock into the pit.
Surface water and groundwater quality	Pit water quality is not predicted to result in impacts to surface or groundwater quality beyond the pit boundaries.	Surface water and groundwater quality may be affected by the continued exposure and erosion of historic mine tailings.	Same as the proposed Project.	Groundwater in the pit backfill material would migrate downgradient of the pit and potentially impact groundwater quality.
Watershed impacts	Drainage areas in the proposed Plan boundary would be affected by project components, as ephemeral drainages would be impacted.	The historic tailings would continue to erode and be transported and deposited along the Big Wash downstream from the study area.	Same as proposed Project.	Same as proposed Project.
WRDA impacts	Based on geochemical characterization results, no special handling or management of the waste rock is proposed. Placement of the waste rock over the historic tailings is expected to substantially reduce the potential for the historic tailings to impact surface water and groundwater quality in the future compared to existing conditions.	WRDAs would not be developed and existing historic tailings could continue to impact groundwater quality.	Same as proposed Project.	Same as proposed Project.

Resources	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Pit Backfill Alternative
Soil Resources				
Disturbance and degradation of soil function	Disturbance of 1,216.3 acres of soils, of which 509 acres would not be reclaimed.	No additional disturbance beyond the authorized and historic disturbance. Beneficial moderate effects from covering and reclaiming the historic tailings would not occur.	Approximately 87 fewer acres of disturbance to soils would occur as compared to the proposed Project.	Same as proposed Project.
Vegetation (Including Noxious Weeds, Invasive and Non-Native Species				
Removal of vegetation	Removal of approximately 1,067 acres of vegetation and 509 acres would not be reclaimed.	No new vegetation disturbance beyond the authorized and historic disturbance. Beneficial effects from covering and reclaiming the historic tailings and treating existing noxious weeds and invasive species populations would not occur.	Removal of approximately 980 acres of vegetation and 509 acres would not be reclaimed.	Same as proposed Project, except less reclaimed vegetation would become established on the East WRDA since the height of this Project component would be lower.
Establishment and spread of invasive, non-native species and noxious weeds	Indirect impacts from the spread and establishment of noxious weeds and invasive species could occur and result in decreased resilience in native plant communities and disturbance.	Indirect impacts from the spread and establishment of noxious weeds and invasive species could occur on existing disturbance.	Same as proposed Project.	Same as proposed Project.
Wildlife Resources (Including Migratory Birds)				
Loss of habitat	Reduction of 1,067.3 acres of wildlife habitat, including 1,026.5 acres of mixed desert shrub, 36.6 acres of fourwing saltbush association, and 4.2 acres of sagebrush shrubland 509 acres would remain unreclaimed.	No additional loss of habitat beyond the authorized and historic disturbance.	Same as proposed Project except 87 acres of less disturbance (85 acres of mixed desert shrub and 0.5 acres of fourwing saltbrush and 2 acres of existing historic disturbance) and 48 fewer acres of permanent disturbance. Reclamation would occur 1 year sooner.	Same as proposed Project except the duration of impacts would last approximately 2 years longer. In addition, less reclaimed vegetation (e.g., forage) would be established on the East WRDA.
Displacement of wildlife	Direct losses of smaller, less mobile species of wildlife 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. Incremental increase in habitat fragmentation in the study area until reclamation has been completed.	The level of human use would remain the same as the current levels.	Same as proposed Project.	Same as proposed Project.

Resources	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Pit Backfill Alternative
Ecological Risk Assessment (ERA) Associated with the Pit Lake	Potential impacts to mammalian species resulting from drinking exposure to antimony and molybdenum in the post-mining pit lakes. Potential long-term impacts in mammalian populations would occur through Year 100. Risk to avian species was not predicted for antimony or molybdenum but impacts in individual rough-winged swallows could occur from mercury exposures in Year 100. Potential long-term impacts were predicted for avian populations.	No impacts due to the absence of pit lakes under this alternative.	Overall, minor, long-term, and localized impacts would occur more slowly and affect fewer ecological receptors under this mitigated Alternative than under the proposed Project.	No impacts due to the absence of pit lakes under this alternative.
Special Status Species				
Impacts to special status species habitat	Long-term, localized reduction of approximately 1,067.3 acres of potential special status species habitat, including approximately 1,026.5 acres of mixed desert shrub, 36.6 acres of fourwing saltbush association, and 4.2 acres of sagebrush shrubland. Approximately 509 acres would not be reclaimed.	No additional loss of habitat beyond the authorized and historic disturbance.	Same as proposed Project except 87 acres of less disturbance (85 acres of mixed desert shrub and 0.5 acres of fourwing saltbrush and 2 acres of existing historic disturbance) and 48 fewer acres of permanent disturbance. Reclamation would occur 1 year sooner.	Same as proposed Project except the duration of impacts would last approximately 2 years longer. Less reclaimed vegetation would become established on the East WRDA.
Impacts to Joshua trees	Numerous Joshua trees potentially would be removed due to Project activities.	Impacts to Joshua trees would not occur.	Same as proposed Project but because fewer acres of disturbance fewer individual Joshua trees would be impacted.	Same as proposed Project.
Range Resources				
Loss of forage and animal unit months (AUMs)	Long-term, localized reduction of 1,067.3 acres of forage for livestock. However, the number of AUMs would not be reduced at this time but may be re-evaluated by the BLM in the future.	No reduction in AUMs within the Montezuma Grazing Allotment.	Same as proposed Project, except 87 fewer acres of forage would be disturbed except reduced timeline by 1 year.	Same as proposed Project except the perimeter fence would remain in place for 1 additional year.
Wild Horses and Burros				
Loss of wild horse and burro habitat and reduction in forage	Disturbance to 86.3 acres of the Goldfield Herd Management Area (HMA) and 143.8 acres of the Montezuma Peak HMA. Approximately 61.1 acres in the Montezuma Peak HMA would not be reclaimed.	No loss of wild horses and burros habitat or forage would occur.	Same as Proposed Project (disturbance acreage change not within HMAs). Reclamation would occur 1 year sooner.	Same as proposed Project except the duration of impacts would last approximately 2 years longer. Less reclaimed vegetation would become established on the East WRDA.
Paleontological Resources				
Loss of paleontological resources	Potential impacts to paleontological resources may occur with the high likelihood of encountering fossils in the Siebert Formation.	Impacts are not anticipated.	Same as Proposed Project.	Same as Proposed Project.

Resources	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Pit Backfill Alternative
Cultural Resources				
Disturbance to cultural resource sites	Within the direct effects area of potential effects (APE), impacts would occur to the Goldfield Historic Mining District and eight archaeological sites. Within the visual indirect impacts APE, which encompasses the auditory and vibrational APEs, indirect effects would occur to 16 cultural resources.	Impacts to cultural resource sites would not occur.	Same as proposed Project except indirect impacts would occur to the 16 architectural resources within the indirect APEs and would be 1 year shorter than the proposed Project.	Same as proposed project except indirect impacts to the 16 architectural resources within the indirect APEs would be 2 years longer than the proposed Project.
Native American Concerns				
Impacts to traditional cultural properties (TCPs), properties of traditional religious and cultural importance, or sacred sites	No properties of traditional religious and cultural importance, TCPs, or sacred sites occur in the study area. Therefore, no impacts would occur.	Same as Proposed Project.	Same as proposed Project.	Same as proposed Project.
Air Quality				
Impacts to air quality from mining, dust, and vehicle emissions	Air quality impacts would be localized near the Project site and dissipate with distance and below the National Ambient Air Quality Standards (NAAQS) and Nevada Ambient Air Quality Standards (AAQS) and would not exceed applicable air quality standards and would return to background levels after mine reclamation.	No air quality impacts would occur.	Same as proposed Project except fugitive particulate matter emissions and construction-related emissions would be reduced due to the smaller disturbed area.	Same as proposed Project except mine operation and reclamation activities and associated air emissions would increase by 2 years.
Noise and Vibration				
Noise levels	Maximum construction noise levels at residential locations would range from approximately 30 decibels (dB) on the A-weighted scale (dBA) to 50 dBA.	No additional noise beyond the existing environment would occur.	Same as proposed Project except mine-generated noise would be reduced by 1 year.	Same as proposed Project except mine-generated noise would occur for 2 additional years.
Vibration levels	Blast vibration damage from the proposed Project is not anticipated at the historic Goldfield High School.	No blast vibration impacts would occur.	Same as proposed Project except blast vibration would be reduced by 1 year.	Same as proposed Project.
Transportation and Access				
U.S. 95 and local road traffic and access effects	A reduction from nine U.S. 95 intersections to five intersections. Modest Project-related increase in traffic would remain within the existing capacity of the roadways.	No traffic and access impacts would occur.	Same as proposed Project except traffic effects would be reduced by 1 year.	Same as proposed Project except traffic effects would be 2 additional years.
Land Use and Realty				
Loss of public land for multiple uses with study area	Project-related disturbance of 1,337 acres would reduce the amount of land available for livestock grazing and dispersed recreation.	No impacts to land use or realty would occur.	Same as proposed Project except 87 fewer acres of land would be disturbed by mine development.	Same as proposed Project except the mine life would be extended an additional 2 years.
Impacts to ROWs and land use authorizations	The proposed Project would conflict with the existing ROWs in the Project vicinity. New or amended ROW authorizations would be required for the proposed realignments of U.S. 95, and utilities, and county roads.	No impacts to existing ROWs except Esmeralda County would likely replace and upgrade the existing pipeline from the Klondike wellfield to the town of Goldfield.	Same as proposed Project.	Same as proposed Project.

Resources	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Pit Backfill Alternative
Recreation				
Change in access to existing recreation opportunities or areas	Recreational use would be restricted from 1,210.9 acres of public land. Areas proposed for the relocation of U.S. 95 and realignment of local roads would not be available for recreational use. Potential impact on the annual "Vegas to Reno" race due to the relocation of U.S. 95; however, this would be a slight change to the highway alignment.	No impacts to recreational use.	Same as proposed Project.	Same as proposed Project except the perimeter fence would remain in place for an additional 2 years.
Social and Economic Values				
Income and employment	Employment of up to 200 contract workers for varying periods primarily during a 1-year construction period. Annual indirect earnings impact would add an additional $5.1 million in total combined wages.	No impacts to income and employment would occur.	Same as proposed Project except for the 1-year reduction in the Project life.	Same as proposed Project except for the 2-year increase in the Project life.
Population and housing	Demand for an estimated 145 housing units for the 10-year duration.	No impacts to population or housing would occur.	Same as proposed Project except for the 1-year reduction in the Project life.	Same as proposed Project except for the 2-year increase in the Project life.
Infrastructure, community services, and public finance	No significant capacity or service issues have been identified for most public facilities and services in the Tonopah-Goldfield area. The combination of property taxes and net proceeds taxes from the proposed Project would have a major beneficial impact on Esmeralda County revenues.	No impacts to infrastructure, community services, and public finance would occur.	Same as proposed Project except for the 1-year reduction in the Project life (reduction in total production of ore) and a reduction in net proceeds and ad valorem taxes generated.	Same as proposed Project except for the 2-year increase in the Project life.
Environmental Justice				
Disproportionate effects on minority or low-income populations	Potential impacts would not be expected to disproportionately affect any particular population.	No impacts on environmental justice would not occur.	Same as proposed Project.	Same as proposed Project.
Visual Resources				
Contrasting visual elements	Overall visual impacts during mining are week to moderate contrast. Following reclamation, views from all four Key Observation Points (KOPs) would not conflict with established BLM VRM Class IV objectives.	No impacts to visual resources would occur.	Same as proposed Project.	Same as proposed Project.
Night sky impacts	Minor increase in night sky impacts from project lighting.	No impacts would occur.	Same as proposed Project except a reduced timeline of 1 year.	Same as proposed Project except an increased timeline of 2 years.
Hazardous Materials and Solid Waste				
Accidental spills/releases during transportation or storage and solid waste generation	Based upon the small quantities of hazardous waste would be generated by the proposed Project, an accident resulting in a release to the environment during transportation is not anticipated.	No accidental spills/releases or generation of solid wastes would occur.	Same as proposed Project except lower amounts of hazardous materials and solid waste would be used/ generated due to a reduced timeline of 1 year.	Same as proposed Project except higher amounts of hazardous materials and solid waste would be used/generated due to a increased timeline of 2 years.

3.0 Affected Environment

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources that have the potential to be affected by activities related to the Proposed Action and alternatives described in Chapter 2.0. These resources include those that occur within, are adjacent to, or are associated with the Plan boundary and study areas as described below.

To comply with the NEPA, the BLM is required to address specific elements of the environment that are subject to requirements specified in statutes, regulation, or by executive order (EO). **Table 3-1** lists the supplemental authorities that must be addressed in all environmental analyses, as well as other resources deemed appropriate for evaluation by the BLM, and denotes if the Proposed Action, action alternatives, or No Action Alternative affects those elements. Supplemental authorities that may be affected by the Proposed Action or alternatives are discussed further in Chapters 3.0 and 4.0 and in the resource reports for each resource (BLM 2018c through 2018v). Those elements listed under the supplemental authorities that do not occur in the Plan boundary or study area and would not be affected are not discussed further in this EIS. The elimination of non-relevant issues follows CEQ policy, as stated at 40 CFR 1500.4.

Table 3-1 Supplemental Authorities

Supplemental Authority	Not Present	Present/May be Affected	Rationale/Section Reference
Floodplains		X	Section 3.2
Water Quality and Quantity		X	Section 3.2
Noxious Weeds/Invasive Non-native Species		X	Section 3.4
Migratory Birds		X	Section 3.7, 3.8
Cultural Resources		X	Section 3.10
Native American Concerns		X	Section 3.11
Air Quality		X	Section 3.12
Environmental Justice		X	Section 3.18
Hazardous Material/Solid Waste		X	Section 3.20
Human Health and Safety		X	Sections 3.2, 3.12, 3.13, and 3.20
Area of Critical Environmental Concern	X		Resource not present in or near the study area.
Farmlands Prime or Unique	X		Resource not present in or near the study area.
Forests and Rangelands (Healthy Forests Restoration Act only)	X		Resource not present in or near the study area.
Riparian/Wetlands	X		Resource not present in or near the study area.
Threatened, Endangered Species	X		Resource not present in or near the study area.
Wild and Scenic Rivers	X		Resource not present in or near the study area.
Wilderness	X		Resource not present in or near the study area.
Fish Habitat	X		Resources not present in or near the study area.

Other resources of the human environment that have been considered for this EIS are listed in **Table 3-2**. Elements that may be affected are further discussed in the EIS. Rationale for those elements that would not be affected by the Proposed Action and alternatives also are listed in the table.

Table 3-2 Additional Affected Resources

Other Resources	Not Present	Present/May be Affected	Rationale/Section Reference
Geology and Minerals		X	Section 3.1
Soil Resources		X	Section 3.3
Vegetation Resources		X	Section 3.4
Wildlife Resources		X	Section 3.5
Special Status Species		X	Section 3.6
Range Resources		X	Section 3.7
Wild Horses and Burros		X	Section 3.8
Paleontological Resources		X	Section 3.9
Noise		X	Section 3.13
Transportation and Access		X	Section 3.14
Land Use and Realty		X	Section 3.15
Recreation		X	Section 3.16
Socioeconomic Values		X	Section 3.17
Visual Resources		X	Section 3.19
Land with Wilderness Characteristics (LWC)	X		Currently the Tonopah RMP does not address LWC, they will be addressed in the upcoming Battle Mountain District RMP. In the interim, the Battle Mountain District manages LWC for multiple use.

3.1 Geology and Minerals

The study area for evaluating direct and indirect impacts to geologic and mineral resources encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignment or modifications) and ROW realignment or modification that occur outside of the Plan boundary (including Brickyards Road and underground fiber optic line).

The mining district contains remnants of historic mining activities including waste rock dumps, mineshafts, headframes, and foundations of mine facilities. The proposed Project vicinity includes the remnants of the foundation of the Goldfield Consolidated Mill located near the eastern margin of the Plan boundary, as well as related mill tailings generated from the Goldfield Consolidated Mill that cover the eastern portion of the Plan boundary. The mill was closed in 1919.

Site Geology. The geologic units that occur within the Plan boundary include (from oldest to youngest): Jurassic Granite, Tertiary Kendall Tuff, Sandstorm Rhyolite, Milltown Andesite, Siebert Formation, and Quaternary alluvium.

The oldest bedrock beneath the Project site is Jurassic Granite. The granite is unaltered to weakly altered and does not host gold mineralization. The elevation of the top of the granite is situated below the proposed pit surface and, therefore, would not be exposed by the proposed Project.

The Kendall Tuff was deposited on the irregular eroded surface of the Jurassic Granite. The unit consists of a moderately to densely welded lithic tuff. The tuff does not host gold mineralization except for occasional zones with weakly anomalous gold concentrations. The Kendall Tuff is situated below the proposed pit surface and would not be exposed by the proposed Project.

The Sandstorm Rhyolite was emplaced on the Kendall Tuff, or locally, where the Kendall tuff is absent, directly on the Jurassic Granite. The Sandstorm Rhyolite is divided into three subunits based on texture. All three subunits would be exposed in the pit walls at the conclusion of mining. The gold mineralization targeted for development by the proposed Project is stratigraphically constrained between the top of the Sandstorm Rhyolite formation and the top of the lower vitrophyre (crystal-bearing obsidian) (SRK 2013a).

The Milltown Andesite overlies the Sandstorm Rhyolite and consists of a sequence of volcanic and volcaniclastic rocks including debris lahars (mud flows), volcanic breccias, and pyroclastic rocks with minor thin lava flows. The unit is not a host for gold mineralization. It is absent in the center of the pit and ranges up to 500 feet thick immediately west of the open pit. The andesite would be exposed in the western wall of the open pit.

The Siebert Formation consists of poorly indurated (i.e., friable) sedimentary rocks that were deposited after emplacement of gold mineralization at Gemfield. The Siebert Formation would be extensively exposed in the west and south wall of the proposed open pit.

Alluvium consisting of loose gravel and cobbles mixed with sand and silt forms a thin veneer generally less than 20 feet thick across the Plan boundary.

Mineralization. The Project's ore deposit occurs within the Sandstorm Rhyolite and consists of silicified argillized, and hydrothermally altered sulfide zones in the flow-banded rhyolite member. The proposed Project would target the upper (i.e., oxidized) portion of the ore deposit that would be amenable to processing using a cyanide leaching process (SRK 2013a).

Historic Tailings Deposits. Tailings cover 150.7 acres in the east central portion of the Plan boundary. The tailings were generated as waste from the Goldfield Consolidated Mill (stamp mill) that operated for 11 years from 1908 to 1919 (Micro International Limited 2013). The tailings were deposited below the stamp mill on the low-lying area adjacent to Big Wash. The estimated volume of the original tailings deposit is 4 Mt (SRK 2013b). The thickness and geotechnical characteristics of the tailings deposit have been evaluated by information collected during a series of subsurface investigations conducted between February 2011 and February 2014. The results of the subsurface investigations indicate that the maximum thickness of the tailings is approximately 40 feet; however, the tailings thickness over most of the mapped historic tailings area is less than 20 feet (SRK 2014). Subsequent erosion of the tailings during storm events since the tailings were deposited has resulted in the transport and deposition of tailings material along Big Wash north of the main tailings deposit.

Faulting and Seismicity. The proposed Project is located in a seismically active region with active and potentially active faults and has historically experienced seismic activity. No active or potentially active faults that have been identified in the vicinity of the Plan boundary.

3.2 Water Resources and Geochemistry

The Project is located in the southern part of Alkali Spring Valley in west-central Nevada near the town of Goldfield, Nevada. The study area for evaluating direct and indirect impacts to water resources from the Proposed Action and the Alternatives consists of the Project area (i.e., area within the proposed Plan boundary) and the adjacent areas within the southern part of Alkali Spring Valley.

Surface Water Resources

There are no perennial or intermittent streams or ponds within the Project area. The main drainage in the Project area is an ephemeral wash that flows from south to north through the Plan boundary referred to as Big Wash on the U.S. Geological Survey (USGS) topographic map and in Project reports and maps. This wash has flow during periods of prolonged heavy rainfall and has been affected by past mining activity that allowed the erosion and transport of mill tailings down the wash. There are no springs or seeps within the Plan boundary, but there are four springs within the study area that are fed by perched aquifers. There are no waters of the U.S. within the Plan boundary.

Surface water quality has been measured in the four springs near the Plan boundary. Three springs located south-southwest of the town of Goldfield (Slaughterhouse, West, and Rabbit springs) have similar water quality dominated by calcium and sodium alkali metals and chloride and sulfate anions. These springs contain high concentrations of calcium sodium, chloride, and sulfate and exceed Nevada drinking water standards for aluminum, arsenic, iron, and manganese. TDS is the range of 300 milligrams per liter (mg/L) to 400 mg/L and the water generally is dominated by calcium-sodium bicarbonate. The spring that lies west

of the town of Goldfield (Indian Spring) has TDS in the range of 560 to 610 mg/L, and the water is dominated by calcium sulfate with arsenic concentrations that exceed Nevada drinking water standards. All four springs exhibit flow rates less than 3 gpm and are often dry. Rabbit Spring is used for irrigation by the town of Goldfield, and the other three springs are used for livestock watering.

Groundwater Resources

Proposed Mine and Adjacent Areas – Groundwater in the Project area is found in bedrock lithologic units and in the overlying Quaternary alluvium that covers Alkali Spring Valley. Although surface water flows to a playa in Alkali Spring Valley because the valley is a closed basin topographically, groundwater flows regionally from east to west across the valley in the bedrock lithologic units. Groundwater in the valley alluvium flows toward the playa. In the Project area, groundwater in both the Quaternary alluvium and the bedrock lithologic units flows from south to north across the Project area and the Plan boundary. Locally, near the Goldfield Waste Water Treatment Plant (GWWTP) and also near ponds associated with Big Wash south of the Plan boundary, there are groundwater highs due to local seepage of water from the treatment plant and from the ponds during accumulation of water in the ponds during heavy rainfall.

There are five bedrock hydrogeological units identified in the Project area. From stratigraphic top to bottom these are: 1) the Siebert Formation sediments and lake beds; 2) the Milltown Andesite; 3) the Sandstorm Rhyolite (host to the gold mineralization); 4) the Kendall Tuff; and 5) the Jurassic Granite. Hydraulic conductivity in the Jurassic Granite is very low and this unit forms a base for groundwater flow in the Project area. Hydraulic conductivity in the volcanic units overlying the granite ranges up to 1.9 feet/day but is usually around 0.1 feet/day. The Siebert Formation sediments have a mean hydraulic conductivity of 0.05 feet/day. Thus, groundwater flow rates in the bedrock units are relatively low, while groundwater flow in the overlying Quaternary alluvium can be quite varied and is generally much higher than that found in the bedrock units.

The groundwater budget for the Alkali Spring Valley hydrographic area consists of an input of about 100 acre-feet of water from precipitation and 5,500 acre-feet from regional inflow in the bedrock from Ralston Valley. Outflow consists of about 400 acre-feet of water from phreatophyte evapotranspiration, 100 acre-feet from pumping, and 5,000 acre-feet of outflow downgradient to the west to Clayton Valley in the bedrock units. The perennial yield of the valley is 3,000 acre-feet as administered by the NDWR (NDWR 2018).

Groundwater quality in the Project area varies depending on the location and the lithologic type screened by the monitoring well. In the area of the proposed open pit within the Plan boundary, the groundwater in the Jurassic Granite has a pH of 5.2 and is sodium sulfate water with exceedances of Nevada drinking water standards for aluminum, beryllium, cadmium, iron, manganese, sulfate, and thallium. Monitoring wells screened in the overlying volcanic tuff units (Kendall Tuff, Sandstorm Rhyolite, Milltown Andesite) show groundwater dominated by calcium-sodium bicarbonate or sulfate with elevated chloride near the GWWTP, and exceedances of Nevada drinking water standards for arsenic, beryllium, iron, lead, manganese, sulfate, antimony, and chloride (locally). The TDS of the groundwater ranges from around 400 mg/L to high values around 2,000 mg/L. Groundwater quality is affected by seepage from the GWWTP and mineralization in the Sandstorm Rhyolite.

Groundwater quality near the Goldfield Municipal Leach Plant has TDS values in the range of 800 to 2,000 mg/L with elevated sulfate, chloride, and sodium. Near the former ARC leach pad, groundwater is dominated by sodium chloride or sodium bicarbonate. TDS ranges up to 1,100 mg/L. The Rock Point Well downgradient from the proposed Plan boundary has elevated TDS in the range of 2,000 to 2,700 mg/L with elevated chloride and the water is dominated by sodium-calcium sulfate. Groundwater in all these areas exceeded Nevada drinking water standards for one or more constituents consisting of arsenic, manganese, iron, selenium, sulfate, aluminum, cadmium, or chloride.

Regional wells screened in the Siebert Formation or the Milltown Andesite have TDS in the range of 700 to 900 mg/L, with elevated sulfate and sodium. Bicarbonate ranges from 150 to around 400 mg/L. Exceedances of Nevada drinking water standards is common for arsenic, aluminum, iron, sulfate, and manganese.

Klondike Wellfield – There are two existing wells in the Klondike Wellfield (Klondike Well No. 1 and Klondike Well No. 2) that are used to supply the town of Goldfield. Both wells are completed within sedimentary units that are part of the Quaternary basin fill deposits. Klondike Well No. 1 was constructed in 1981 to a depth of 412 feet bgs with a static water level of approximately 196 feet bgs. Klondike Well No. 2 was constructed in 1992 to a depth of 410 feet bgs with a static water level of approximately 193 feet bgs.

Water quality samples were collected from Klondike Well No. 1 during to 10-day pump testing. The samples were analyzed for the NDEP Profile I list of constituents. For these samples, the pH ranged from 7.99 to 8.15 s.u.; and, TDS ranged from 350 to 370 mg/L. With the exception of arsenic, the water quality results indicate that concentrations were below the state and federal drinking water standards. Arsenic concentrations were consistently 0.035 mg/L which exceeds the 0.01 mg/L state and federal drinking water standard for arsenic.

Waste Rock and Pit Wall Geochemistry

Lithologic units expected to be included in either waste rock or remain in post-mining pit walls were tested geochemically to determine their potential for acid generation and their potential to generate effluent seepage elevated in metals and sulfate. Rock units were grouped into the following material types based on the lithologic unit, alteration, and mineralization: 1) Siebert Formation oxide and non-oxide; 2) Mira Basalt oxide; 3) Milltown Andesite oxide; 4) Sandstorm Rhyolite oxide and non-oxide; 5) Vitrophyre non-oxide; 6) Kendall Tuff non-oxide; and Jurassic Granite non-oxide. Non-oxide implies the material type is sulfide-bearing.

Standard geochemical tests consisting of multi-element analyses, static acid base accounting (ABA) tests, net acid generating tests, and meteoric water mobility procedure tests required by the NDEP were completed on all material types. Kinetic humidity cell tests were completed on material types that fell into the "uncertain category" in the static ABA tests. Only the Sandstorm non-oxide (i.e., sulfide-bearing) material type was found to be PAG. For the Siebert Formation material types, the pH of leachate was circum-neutral and arsenic and mercury had the potential to be released during leaching. Sulfate, selenium, and fluoride were released during the early stages of leaching but were below NDEP reference values by week four. The Sandstorm Rhyolite oxide material types had circum-neutral pH values with low metals release. Arsenic and antimony were released early in leaching but were below NDEP reference values by week four. Sandstorm Rhyolite non-oxide samples showed release of aluminum, beryllium, cadmium, iron, lead, manganese, nickel, and sulfate above NDEP reference values for samples that were acid generating. The Vitrophyre samples showed potential for metals release early in the leaching cycle, but leachates were below NDEP reference values by week 10. Although non-oxide material types have the potential for leaching of selected metals, this potential is greatly reduced during the later stages of leaching. Waste rock is expected to consist mainly of the Siebert Formation oxide and the Sandstorm Rhyolite oxide material types, which are not acid generating and exhibit limited potential for metals leaching. The Project mine plan is to mine down to the oxide/non-oxide boundary to avoid sulfide-bearing material types that would interfere with cyanide leaching. This would limit the amount of sulfide-bearing material that would be left in the pit walls or involved in waste rock.

Historic GCMC Tailings

The historic GCMC mill tailings would underlie the proposed East WRDA. The tailings were generated as waste from the Goldfield Consolidated Mill (stamp mill) that operated for 11 years from 1908 to 1919.These mill tailings are up to 40 feet in thickness and contain approximately 4 Mt of tailings. The tailings contain pyrite that can oxidize and generate acid when exposed to air and water. Geochemical testing of these tailings using the same methods as used for waste rock have shown the tailings to be acid generating with the potential to leach metals. The leachate has an average TDS of 7,200 mg/L and numerous elevated metals that exceed NDEP reference values. Historically, rain water leaching of the tailings has resulted in leachate with elevated metals entering the substrate beneath the tailings and contaminating groundwater. This leaching is expected to continue as long as the tailings remain uncovered.

3.3 Soil Resources

The area of analysis for direct and indirect effects to soil resources for the Proposed Action and the Reduced Mine Plan, Partial Pit Backfill, and No Action alternatives is the study area. The study area for soil resources encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line) and contains eight soil map units based on a soil survey completed by the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) (USDA SCS 1991; USDA 2012).

Soils within the study area formed in place within residuum, and within colluvium and alluvium derived from mixed and volcanic rocks. Landforms within the area include drainageways, inset fans, fan remnants, hillsides, hills, mesas, piedmonts, and mountainsides. Soil profiles consist of deep, coarse-textured, gravelly soils and shallow, coarse-textured soils over weathered and un-weathered bedrock.

The study area lies within the Great Basin Section of the Basin and Range Province of the Intermountain Plateaus. The study area is located within an internally drained valley with broad alluvial fans, bordered by steep mountain ranges and smaller locally isolated mountains and hills.

Soil depths in the study area are highly variable ranging from shallow soils (less than 20 inches) in the eastern portion of the study area to deep soils (greater than 60 inches) in the western portion. Soils along ridge tops and slopes tend to be shallow with coarse textures. The alluvial fans and drainages tend to contain deep, fine- to coarse-textured gravelly soils. The study area is dominated by soils that are droughty, alkaline, sandy, and have low organic matter content and high stone and cobble content, representing poor reclamation material suitability.

3.4 Vegetation (Including Noxious Weeds, Invasive, and Non-Native Species)

The study area for vegetation resources encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignment or modifications) and ROW realignment or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line) and the projected maximum 10-foot groundwater drawdown contour related to mine dewatering, and drawdown associated with the Klondike wells.

Vegetation and Land Cover Types

Vegetation and land cover types and community characterizations were compiled based on the results of site-specific vegetation studies were conducted in April and May 2012, and June 2017, for the proposed Project (Reynolds 2013, 2012; SWCA 2017). Vegetation field surveys were completed to determine plant composition and estimate foliar cover, forage production, and other vegetative parameters. As field surveys did not delineate vegetation boundaries, Southwest Regional Gap Analysis Project (SWReGAP) vegetation cover type data were used to determine the locations of each vegetation type. Species composition was based on survey reports and transects randomly located in each community type. The land cover type boundary for the existing tailings was delineated during field surveys conducted in May 2015 (Metallic Goldfield Inc. 2015). Associated ecological site descriptions were determined using Natural Resources Conservation Service (NRCS) soil survey data (NRCS 2016), the assessments in the field survey reports (Reynolds 2013, 2012), and professional judgement.

Three vegetation types and one land use type occur in the study area. The vegetation types include mixed desert shrub, fourwing saltbush association, and sagebrush shrubland; the land cover type is tailings/disturbed areas. Distribution of vegetation types in these areas is strongly influenced by variations in soil type, historic disturbance, and topography.

Mixed desert shrub is the predominant vegetation type within the study area, occurring on upland low elevation areas. Substrates are often saline and calcareous, medium to fine-textured alkaline soils, but often include some coarse-textured material (USGS 2005). This vegetation type is the dominant vegetation cover type for the study area and it has several ecological sites associated with the varying soil types in the study

area. Species composition is extremely similar to the potential natural vegetation community for each ecological site; however, percentages of composition are skewed toward shrub dominance, especially Nevada jointfir. The vegetation community appears to be more shrub dominant than the potential natural vegetation community described for the ecological site, which can have 30 to 45 percent grasses. Based on the 2012 field surveys, observed production for shrubs is higher than the potential natural vegetation community predicted production (Reynolds 2013, 2012).

The fourwing saltbush association is found primarily in the drainages and lowland portions of the study area (Reynolds 2013, 2012). Based on the NRCS soil surveys and ecological site descriptions associated with this vegetation community, the species composition is similar to the potential natural vegetation community. However, there is increased dominance of shrubs, with the sparse cover of forbs and grasses observed. Potential vegetation composition is about 45 percent grasses and 5 percent forbs. However, based on the 2012 field surveys, observed production for shrubs is only slightly higher than the potential natural vegetation community predicted production (Reynolds 2013, 2012).

Sagebrush shrubland predominantly occurs in the higher elevations and on slopes within the study area. Based on the NRCS soil surveys and ecological site descriptions associated with this vegetation community, the species composition is similar to the potential natural vegetation reference community species. There is an increased dominance of shrubs within the vegetation community, with the sparse cover of forbs and grasses observed. Potential vegetation composition is about 50 percent grasses and 5 percent forbs. Based on the 2012 field surveys, observed production for shrubs is higher than the potential natural vegetation community predicted production (Reynolds 2012).

Noxious Weeds and Invasive Species

Additionally, multiple noxious weeds and invasive species were found during the 2012 survey. Two invasive species were observed in the Klondike well area, saltlover and Russian thistle. These weedy species were most concentrated along access roads bounding the north and east of the study area, as well as the power line access road running across the Klondike well area (SWCA 2017).

3.5 Wildlife Resources (Including Migratory Birds)

The study area for wildlife resources encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line) and the projected maximum 10-foot groundwater drawdown contour related to mine dewatering, and drawdown associated with the Klondike wells.

As discussed in the *Vegetation Resource Report for the Gemfield Mine Project* (BLM 2018f), three vegetation types and one land use type are located within the study area. The vegetation types are consistent with SWReGAP vegetation descriptions and include mixed desert shrub, fourwing saltbush association, and sagebrush shrubland. Mixed desert scrub is the most common vegetation type within the study area. In addition, Joshua trees are fairly common in the mixed desert scrub vegetation type and provide additional wildlife habitat, particularly for nesting migratory bird species.

Wildlife species and habitats found within the study area are typical of the northern Mojave Desert region (BLM 2004a, 1997; Wildlife Resource Consultants [WRC] 2012). Water sources, particularly those that maintain open water and riparian vegetation, support a greater diversity and population density of wildlife species than any other habitat types occurring in the study area. However, the amount of available water for wildlife consumption and associated riparian habitat is limited and is found near springs that occur immediately adjacent to the study area. Springs that occur adjacent to the study area include West Spring, Tognoni Spring, and Slaughterhouse Spring (WRC 2012).

Big Game Species

Mule deer and pronghorn are the primary big game species within the Project region (NDOW 2013a,b). The study area occurs entirely within NDOW Management Area 21 for big game, specifically wildlife management units 212 and 251.

Mule deer use of the study area is limited to seasonal use. A small herd may occur within and near the western portion of the study area, particularly during the winter months when deep snow at the higher elevation force mule deer to move to the valley bottoms in search of improved browse conditions (WRC 2012). The study area does not contain NDOW mapped habitat.

Pronghorn antelope use of the study area has been documented during field surveys, particularly in the northeastern portion of the study area (two bucks and one doe in May 2012) (WRC 2012).

Small Game Species

Several upland game bird species are found within the study area. Species that occur within the area include chukar and mourning dove (NDOW 2012; WRC 2012).

Furbearer species that may occur within the study area include gray fox, kit fox, and bobcat (NDOW 2012; Wildlife Action Plan Team 2012). Other mammal species that may occur within the study area or have been observed during field surveys include coyote, badger, and black-tailed jackrabbit (NDOW 2012; WRC 2012).

Due to the lack of suitable open water habitat, no waterfowl concentrations are found within the study area.

Nongame Species

A diversity of nongame species (e.g., small mammals, passerines, raptors, reptiles, and amphibians) occupy the study area. Nongame mammals found within the study area during field surveys in 2012 and 2013 include the white-tailed antelope squirrel, deer mouse, little pocket mouse, Great Basin pocket mouse, northern grasshopper mouse, chisel-toothed kangaroo rat, desert kangaroo rat, Merriam's kangaroo rat, and desert woodrat (WRC 2013a, 2012).

Habitat and detection surveys for bat species were conducted within the study area in 2012 (Sherwin 2012). During the survey, over 300 historic mine workings or caves within the study area were surveyed and a total of 43 bats were identified, all of which were Townsend's big-eared bats found in a single mine shaft (GF-89) (Sherwin 2012). Mine shaft GF-154-A was identified as having historical warm season use (i.e., day and night roosting) by Townsend's big-eared bats, pallid bats, and several species of myotis (Sherwin 2012). As of November 2011, exclusion materials (i.e., 1-inch-diameter chicken wire or similar netting materials) were installed on mine shafts containing bat habitat and all surveyed mine shafts were cleared of bats (Sherwin 2012). In addition to the surveyed mine shafts, the old cement mill structure within the study area has been identified as a pallid bat roost (BLM 2004a; NDOW 2013c). This structure has not had exclusion materials installed and still provides roosting habitat for bats.

In addition, due to the presence of mixed desert scrub habitat, the study area contains suitable foraging habitat for several other bat species including the pallid bat, Townsend's big-eared bat, big brown bat, spotted bat, silver-haired bat, hoary bat, California myotis, western small-footed myotis, fringed myotis, long-legged myotis, Yuma myotis, canyon bat, and Brazilian free-tailed bat (Bradley et al. 2006; Nevada Natural Heritage Program [NNHP] 2013; Sherwin 2012; WRC 2012). Pallid bat, Townsend's big-eared bat, big brown bat, silver-haired bat, hoary bat, western small-footed myotis, fringed myotis, canyon bat, Yuma myotis, and Brazilian free-tailed bat have been detected acoustically within or near the study area (WRC 2004).

Passerines

Several Partners in Flight priority bird species have been documented within the study area and five Birds of Conservation Concern species are known to occur within the study area and include Brewer's sparrow, loggerhead shrike, and sage sparrow. Several baseline biological surveys have been conducted within the

study area since 2012 (WRC 2013b,c, 2012). In total, 27 avian species have been documented as occurring within the study area.

Golden Eagles and Other Raptors

Raptor species that potentially occur as residents or migrants within the study area include golden eagles, red-tailed hawk, falcons (e.g., peregrine falcon, prairie falcon, and American kestrel), owls (e.g., great horned owl and burrowing owl), and turkey vulture (Floyd et al. 2007; Herron et al. 1985; WRC 2012). Field surveys have documented 16 raptor nests within 10 miles of the study area including two golden eagle nests, two red-tailed hawk nests, four prairie falcon nests, one screech owl, two common raven nests, and five unknown nests (WRC 2013c, 2012). Additional details on survey methodology and results by year for raptor nests is presented in the Project's Bird and Bat Conservation Strategy, which is Appendix B of the *Wildlife Resource Report for the Gemfield Mine Project* (BLM 2018g).

Reptiles and Amphibians

Several species of reptiles are known to occur within the study area including the Great Basin whiptail, Great Basin rattlesnake, striped whipsnake, desert spiny lizard, Great Basin collared lizard, long-nosed leopard lizard, side-blotched lizard, desert horned lizard, and western fence lizard (BLM 2004a; WRC 2012). No amphibians were observed during field surveys within the study area (BLM 2004a; WRC 2012).

3.6 Special Status Species

The study area for special status species encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line) and the projected maximum 10-foot groundwater drawdown contour related to mine dewatering, and drawdown associated with the Klondike wells.

Information regarding special status species and habitat within the study area was obtained from a review of existing published sources, site-specific surveys conducted in 2012, 2013, 2014, 2015, and 2017 (e.g., small mammal, bats, raptor nests, migratory birds, and plants) (CH2MHill 2014; Reynolds 2013, 2012; Sherwin 2012; Soil-Tech 2015; SWCA 2017; WRC 2013a,bc, 2012, 2004), BLM, NDOW, and USFWS file information, as well as NNHP database information. As a result of the data review, a total of 56 special status species have been identified as potentially occurring within the study area. Occurrence potential within the study area was evaluated for each species based on their habitat requirements and/or known distribution. Based on these evaluations, 28 special status wildlife species have been eliminated from detailed analysis based on their habitat requirements and/or known distributions. No special status plant species have been eliminated from detailed analysis. Wildlife species eliminated from detailed analysis for the Project include the pygmy rabbit, western red bat, long-eared myotis, little brown myotis, cave myotis, big free-tailed bat, greater western mastiff bat, Allen's lappet-browed bat, California leaf-nosed bat, pika, fish springs pocket gopher, San Antonio pocket gopher, northern goshawk, ferruginous hawk, Swainson's hawk, Greater Sage-Grouse, western snowy plover, southwestern willow flycatcher, pinyon jay, bald eagle, Lewis' woodpecker, black-rosy finch, Amargosa toad, Columbia spotted frog, Railroad Valley springfish, Fish Lake Valley tui chub, Hot Creek Valley tui chub, Railroad Valley tui chub, and Monitor Valley speckled dace. The remaining 21 special status wildlife species and 7 special status plant species identified as potentially occurring within the study area have been analyzed for the proposed Project (**Appendix C**, **Table C-1**).

3.7 Range Resources

The study area for range resources encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line) and the projected maximum 10-foot groundwater drawdown contour related to mine dewatering, and drawdown associated with the Klondike wells. The study area is entirely located within the Montezuma Grazing Allotment. The Montezuma Grazing Allotment consists of 388,211 acres of BLM-managed land with a current average stocking rate of 154.1 acres/AUMs based on a

total of 2,519 AUMs (BLM 2016). An AUM represents the quantity of forage necessary to sustain 1 cow-calf pair for 1 month. The Plan boundary covers approximately 2,071 acres of rangeland located in the central portion of the Montezuma Grazing Allotment. There is one leasee that utilizes the Montezuma Grazing Allotment. The current lease allows for year-round use; however, the leasee prefers to graze cattle from approximately October through June. There are four pastures within the allotment: 1 North, 1 South, 2, and 3 North. Pastures 1 South, 2, and 3 North are used as a forage reserve, but the leasee occasionally grazes in those areas. Areas within the 1 North pasture are grazed yearly with cattle dispersed across the pasture throughout the grazing season.

3.8 Wild Horses and Burros

The study area for wild horses and burros encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line) and the projected maximum 10-foot groundwater drawdown contour related to mine dewatering, and drawdown associated with the Klondike wells.

HMA information for the study area was sourced from the 1997 Tonopah RMP and from monitoring data collected by the BLM. The Goldfield HMA occupies the eastern portion of the study area and the Montezuma Peak HMA occupies the western portion of the study area.

Field surveys in May 2012 documented up to 12 burros in various locations throughout the study area within the Goldfield HMA (WRC 2012). No wild horses were observed during the 2012 field surveys within the Goldfield HMA (WRC 2012).

Field surveys in May 2012 documented up to 12 burros and 5 wild horses in various locations throughout the Montezuma Peak HMA portion of the study area (WRC 2012).

3.9 Paleontological Resources

The study area for paleontological resources encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modifications that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line).

PaleoResource Consultants and F&F GeoResource Associates, Inc. conducted background research to identify geologic units within the study area and determine their paleontological sensitivity. The research included review of published and available unpublished geological and paleontological literature; record searches at the Nevada State Museum at Carson City; online review of the University of California Museum of Paleontology, Natural History Museum of Los Angeles County, and University of Nevada at Las Vegas databases; and communication with geologists and paleontologists knowledgeable of the geology and paleontology of the study area. Based on the background research, there are no previously known fossil localities directly within or in the immediate vicinity of the study area.

In addition to the background research, a field survey was conducted on October 25 through 27, 2011, to document the presence of sediments suitable for containing fossil remains and the presence of any previously unrecorded fossil sites in the study area and vicinity. The field survey included visual inspection of exposures of potentially fossiliferous strata. During the field survey, stratigraphic units were observed in many locations, including cliffs, gullies, mine openings, and road cuts. No subsurface exploration was conducted as part of the survey. As a result of the field survey, five previously unknown fossil localities and ichnofossils (trace fossils) at two other localities were discovered within 2 miles of the study area; no fossil localities were discovered within or in the immediate vicinity of the study area.

Results of the background research and field survey were compiled and presented in a paleontological baseline technical report prepared by PaleoResource Consultants and F&F GeoResource Associates, Inc. (Fisk and Haasl 2012). The report summarizes the potential for paleontological resources as determined by:

1) the 2011 field survey; 2) the presence of fossil material recorded in the literature within and near the study area; 3) the presence of fossils elsewhere within a stratigraphic unit mapped or recorded as present within and near the study area; and 4) the favorability of a stratigraphic unit to contain fossil material based on its assumed depositional environment.

According to Figure 3 in the report, the study area is situated within areas that contain igneous and sedimentary formations ranging in age from Ordovician to Quaternary. Major geologic units within and near the study area include (from oldest to youngest):

- The Ordovician Palmetto Formation;
- An unnamed Jurassic quartz monzonite;
- Oligocene volcanics;
- Early Miocene volcanics;
- Miocene Basalt of Blackcap Mountain;
- The Miocene Siebert Formation;
- Quaternary pediment gravels; and
- Quaternary colluvium and alluvium.

The Miocene-age Siebert Formation contains known paleontological resources including vertebrate fossils and was given a Potential Fossil Yield Classification (PFYC) rating of 4 (High), and the Ordovician-age Palmetto Formation and the Quaternary pediment gravels were assigned a Low PFYC rating (PYFC 2). The remaining formations discovered in the study area received a Very Low rating (PFYC 1) due to being volcanic in nature or due to a lack of significant fossils.

3.10 Cultural Resources

The study area also is referred to as the APE. For the proposed Project, there is a direct effects APE and indirect effects APEs. These APEs are described below.

Direct Effects APE: Encompasses an area sufficient to accommodate all of the Project components under consideration. The direct effects APE for cultural resources encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line).

Indirect Effects APE: The indirect effects APE would take into account the following potential impacts: visual, audible, vibrational, and atmospheric.

- For visual effects, the APE would encompass an area from which the Project facilities (including ROW realignments and modifications) would be visible within a 7-mile radius from the Project area, as defined by the viewshed analysis conducted for the proposed Project.
- For audible effects, the APE would encompass an area extending 2,000 feet from the proposed facilities.
- For vibrational effects, the APE would encompass an area extending approximately 1,600 feet from the proposed pit.
- Impacts to cultural resources as a result of changes in air quality are not anticipated; therefore, no APE was developed for atmospheric effects.

Class III Inventories in the Study Area or Direct Effects APE

Several Class III pedestrian field inventories were conducted between 2011 and 2014 that covered a total of 6,364 acres. The results of these surveys were compiled into a single report that summarizes the identified resources and management recommendations (Kautz 2017).

As a result of the Class III pedestrian inventories, 719 cultural resource sites were documented in the study area or direct effects APE. Of these 719 sites, 133 are prehistoric, 452 are historic, and 134 are multi-component containing both prehistoric and historic components (Kautz 2017). BLM has determined forty-six of the recorded sites are eligible for the NRHP; 640 are not eligible, and 33 remain unevaluated. Of the 46 NRHP-eligible sites, 34 contribute to the significance of the proposed Gemfield Historic Mining District (GHMD), and 1 additional site is individually eligible but remains unevaluated as to whether it contributes to the significance of the proposed GHMD. The 46 NRHP-eligible sites include historic railroad grades, prehistoric lithic scatters/historic mining complexes, historic prospecting sites, the historic Las Vegas and Tonopah Railroad Yard, the historic Tonopah and Goldfield railroad depot, the historic GCMC Railroad, the historic Goldfield Consolidated Mill Complex, an historic water conveyance system, the historic Great Bend Mine, the historic Florence Mill and Mine, the historic Diamondfield townsite, and the historic North Goldfield/Columbia townsite.

Class I Inventory of the Indirect Effects APEs

In July 2015, Kautz conducted a Class I (file search) inventory to identify previously recorded cultural resources within the indirect visual effects APE, which encompasses the auditory and vibrational indirect effects APEs. Based on the files search, a total of 602 cultural resources, including 151 prehistoric sites, 372 historic sites, 75 multi-component sites containing both prehistoric and historic components, and four sites with unknown cultural affiliation, were identified within the indirect visual effects APE (Kautz 2015). Of these resources, 2 are listed on the NRHP, 41 have been determined eligible for the NRHP, 470 have been determined not eligible, 85 are unevaluated, and the eligibility status of the remaining 4 sites is unknown. The two NRHP-listed resources include the Goldfield Hotel and Goldfield Historic Architectural District.

Of the 41 previously recorded resources determined to be eligible for the NRHP, 25 contribute to the significance of the proposed GHMD, 7 do not contribute to the significance of the proposed GHMD, 1 is unevaluated, and the contributing status of the remaining 8 resources is either unknown (6) or not applicable (2). For the 470 previously recorded resources determined to be not eligible for the NRHP, 6 contribute to the significance of the proposed GHMD, 347 are non-contributing elements of the proposed GHMD, and the contributing status of the remaining 117 resources is either unknown (61) or not applicable (56). The majority of the previously recorded resources include prehistoric lithic scatters, historic mining complexes, historic debris scatters, and historic prospecting sites.

3.11 Native American Concerns

The study area for analysis of Native American Concerns encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line)

The Native American people who lived within the region encompassing the study area were, and still are, primarily Western Shoshone. Steward (1938) listed Western Shoshone families living at Lida, Stonewall Mountain, Clayton Valley, Montezuma, and at three springs several miles east of Goldfield. To meet their highly mobile lifestyle, the Western Shoshone constructed dwellings that tended to be temporary and easily-constructed (Thomas et al. 1986). In the past, they were hunter-gatherers utilizing seasonal migration patterns and subsistence methods based on the environment and ecology of specific areas.

Previous ethnographic studies conducted within the region encompassing the study area have not identified any TCPs within the area. Although it has not been documented, the annual Mother's Day Run from Silver Peak to a ceremonial site near Mercury is still in use by Western Shoshones and other Native American

people. The route extends along U.S. 95 and is marked by periodic willow branches that have been stuck upright in the ground and bear colored flagging.

3.12 Air Quality

Air quality can be affected by emissions from anthropogenic sources as well as those that occur naturally. Southwestern Nevada air emissions occur from natural sources such as windblown dust and wildfires and anthropogenic air emissions from industrial facilities, vehicle exhaust, and residential activities such as wood-burning fireplaces. The proposed Project is located in a rural area with few industrial emission sources. The industrial activities in southwestern Nevada include mining, military operations, and limited agriculture and grazing. Because of the limited industrial activity in the area, background pollutant concentrations are expected to be low. Air monitoring was conducted at the proposed Project site for fine particulate matter (PM) less than 2.5 microns in diameter ($PM_{2.5}$) and showed that current concentrations in air at the project site are low. The 98th percentile 24-hour $PM_{2.5}$ concentration measured at the Project site was 8.4 micrograms per cubic meter (µg/m^3), compared with the NAAQS of 35 µg/m^3. The measured annual mean $PM_{2.5}$ concentration was 3.1 µg/m^3, compared with the NAAQS of 12 µg/m^3 (see *Air Quality Resource Report for the Gemfield Mine Project*, Table 2-2). No other monitored pollutant data exists in the vicinity of the mine site. In Nevada, air pollutant concentrations of carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) generally are only measured in urban areas such as Las Vegas and Reno. Because the Project setting is rural and with the lack of significant stationary and mobile air pollutant sources in the area, the Nevada Bureau of Air Quality Planning (NBAQP) recommends using zero as the background value for CO, NO_2, and SO_2 (NDEP 2017).

Nevada has considerable variation in climate due to the significant differences in latitude, elevation, and mountain barrier features throughout the state. This region of southwestern Nevada has an arid climate with average precipitation between 5 and 7 inches per year (Western Region Climate Center [WRCC] 2014). Additionally, the low humidity and abundant sunshine in the region produces rapid evaporation. The area experiences large diurnal and seasonal temperature variations that are typical for the arid continental climates. Temperature extremes for Goldfield over the last 30 years range from -13 degrees Fahrenheit (°F) to 103°F (WRCC 2014). Temperature inversions are common for the study area due to the local topography that consists of mountain ranges and low-lying basins. Temperature inversions can trap pollutant emissions near the ground and minimize dilution. As a result, pollutant concentrations can increase during inversion conditions.

The wind patterns at the project site are predominantly from the south, with secondary winds from the north. This wind pattern would transport pollutant emissions from the mine site toward the north and south of the mine site, Northerly winds would transport pollutant emissions toward the town of Goldfield while south winds would carry air pollutants away from Goldfield. The highest wind speeds typically occur when winds are from the 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 pollution in amounts that exceed the NAAQS can cause health concerns for humans as well as adverse effects on vegetation, wildlife, water bodies, and visibility. The USEPA has defined air quality classifications for geographic areas that describe whether the area complies with the NAAQS. If a geographic area is in compliance with the NAAQS, it is considered 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 study area is classified as attainment or unclassifiable/attainment for all criteria air pollutants (40 CFR 81.329). The closest nonattainment area to the study area is in Washoe County, Nevada

(within which the city of Reno is located), which is nonattainment for PM less than 10 microns in diameter (PM_{10}). However, this nonattainment area is greater than 150 miles from the study area.

USEPA has designated certain areas as Class I areas that are afforded special air quality and visibility protection. Class I areas include national parks, wilderness areas and certain Native American tribal lands. The nearest Class I area is the John Muir Wilderness area, which is located approximately 81 miles southwest of the study area.

3.13 Noise and Vibration

The study area for noise effects encompasses an area within a 5-mile radius of the approximate center of the Plan boundary. The spatial extent of the study area is based on the anticipated level of noise emissions from the Project and the rate at which noise levels decay over distance. The study area for vibration effects is focused on a historic structure in Goldfield, the Goldfield High School building.

The primary source of ambient noise in the Project vicinity is traffic on U.S. 95, which carried an average of 2,200 vehicle trips per day in 2014 (NDOT 2016). Natural sounds, including wind, insects, and birds, are notable contributors to ambient noise throughout the study area. Variations in wind speeds in particular can have a dramatic effect on noise levels. In the southern portion of the study area, nearest the town of Goldfield, a variety of human activities related to vehicle traffic and general daily commerce add to ambient noise levels.

Ambient (i.e., baseline) noise levels in the study area were determined from measurements taken at four locations in the Project vicinity (J.C. Brennan & Associates, Inc. 2014).

- Site 1 is located 0.36 mile west of U.S. 95. This site is 0.3 mile northeast of the Goldfield Cemetery. There are two-track roads 400 feet to the west and 900 feet to the east. The nearest vertical relief is 0.6 mile west of the monitoring site.
- Site 2 is located 0.71 miles outside of the southern Plan boundary in the center of Goldfield, Nevada, at the corner of U.S. 95 and Columbia Avenue behind the Goldfield Gift Shop. The nearest vertical relief is 1.02 miles to the west of the monitoring site. The monitoring site is surrounded by urban development including structures and paved roads.
- Site 3 is located approximately 200 feet outside of the southern Plan boundary. This site is approximately 100 feet north of the corner of Grand Avenue and 5th Street in Goldfield. The nearest vertical relief is 0.65 mile to the west of the monitoring site. Site 3 is on the north edge of the town of Goldfield.
- Site 4 is located 0.13 mile west of U.S. 95. This site is located 1.25 miles north of the town of Goldfield and 0.25 mile north of the entrance to the Goldfield landfill. There are two-track roads approximately 100 feet to the north and west of the monitoring location. The nearest vertical relief is approximately 1 mile northwest of the monitoring site.

Recorded ambient noise levels in the study area represented only moderate variation among the four monitoring sites. Average noise levels ranged from 44 dBA at Site 4 to 51 dBA at Site 2. As would be expected, noise levels at the most remote location (Site 4) were the lowest, though not dramatically lower than at the other three sites, perhaps because Site 4 is in close proximity to U.S. 95. Noise levels were consistently low during the middle of the night and highest during the middle of the day at all four sites. The principal concern regarding vibration from the proposed Project is the potential for adverse effects on the historic Goldfield High School. The high school, located at the corner of Ramsey Street and Euclid Avenue, was built in 1907. It is a two-story structure with an attic and a partly above-ground basement. It has a brick exterior above a cinderblock basement level.

3.14 Transportation and Access

The study area for transportation and access includes the Plan boundary (including the U.S. 95 realignment, and utility and road ROW realignments or modifications), the Brickyards Road ROW modification, and the

main transportation route north on U.S. 95 to Coaldale, east on U.S. Highway 6 to Tonopah, and south on U.S. 95 to Beatty.

Traffic volumes on U.S. 95 in the study area remained constant or decreased slightly through 2013 but increased by 15 percent from 2014 to 2016 (NDOT 2016). NDOT data indicate average daily traffic (ADT) volumes on this segment of U.S. 95 were at approximately 2,000 vehicles in 2011 (Atkins 2013). NDOT estimated the ADT had risen to 2,500 vehicles per day by 2017 (NDOT 2018), the most recent data available. The 2011 data in the NDOT (2015) report were used to evaluate roadway capacity and level of service (LOS) at the intersections within the study area.

The highest traffic volumes on this section of U.S. 95 occur mid-day with a peak hour between 12:00 p.m. and 1:00 p.m. Traffic on the minor, local roads intersecting U.S. 95 is infrequent and difficult to quantify. Therefore, traffic on local roads was estimated at specific intersections for purposes of analysis where no specific count data were available and little, or no traffic was observed during field investigations (Atkins 2013).

Methods from the "Highway Capacity Manual (HCM) 2010" were used to evaluate the current operations and LOS of the intersections near the Project (Atkins 2013).

3.15 Land Use and Realty

The study area is located within the administrative boundaries of the BLM Battle Mountain District, TFO and are managed under the guidance of the Tonopah RMP (BLM 1997). The BLM is in the process of preparing a comprehensive update to the RMP and an associated EIS. Private land ownership in the study area is partially attributable to patented mining claims. The study area contains 202,950 acres (317.1 square miles [mi^2]) defined by the Alkali Spring Valley Watershed. At its eastern extremity, the study area extends approximately 2.4 miles beyond the Esmeralda County boundary into Nye County. Therefore, land use and realty are discussed to some extent for both Esmeralda and Nye counties.

The generalized land use category surrounding the study area is classified as Multiple Use reflecting the existing development, ownership, and patented mining claims throughout the area. The Public Lands Policy Plan for Esmeralda County was updated in 2013 and provided guidance regarding public land areas that are planned for disposal.

Esmeralda County

Esmeralda County has a land area of approximately 3,589 mi^2, nearly all of which is land (water accounts for less than 0.5 square mile of area in the entire county). Over 97 percent of the county is administered by the federal government including the BLM (3,375 mi^2); USFS (104.2 mi^2); Bureau of Indian Affairs (4.7 mi^2); and National Park Service (NPS) (5.1 mi^2). A small part of the Death Valley National Park lies within the southeast corner of Esmeralda County, but that portion of the park is more than 40 miles from the study area. Private land holdings in Esmeralda County total 95.6 mi^2 or just 2.7 percent of the total land area. The largest private land holdings are located in the communities of Goldfield, Silver Peak, and Dyer. These communities represent some of the oldest mining areas in Nevada with much of the private land ownership derived from patented mining claims.

According to mapping included in the Esmeralda County Public Land Policy Plan (2013), approximately 22,607 acres of public land in the study area have been identified as disposal areas and are available for sale or exchange to private entities. Any future disposal of public lands would occur under the guidance of the BLM's Tonopah RMP (1997), or the currently in-process RMP revision when it is completed. The POD for Disposal Areas in Goldfield (Area 10) targets commercial activities on U.S. 95 frontage and residential expansion. Area 10 also indicates that 22,607 acres of public land may be disposed for six other actions, including: 1) for purposes of rectifying encroachment; 2) conveyance of land to Esmeralda County; 3) disposal for public airports; 4) disposal for commercial or other economic development activities; 5) disposal for industrial purposes; and 6) disposal for renewable or nonrenewable energy purposes. The intended use of land for the Project is consistent with Esmeralda County Public Lands Policy Plan (2013).

Nye County

Nye County has a land area of approximately 18,159 mi^2, nearly 98 percent of which is administered by federal government agencies including the BLM (10,221 mi^2), Department of Defense Nevada Test and Training Range (NTTR) (2,877 mi^2, units of the Humboldt-Toiyabe National Forest (3,060 mi^2), and U.S. Department of Energy test sites (1,364 mi^2). Approximately 2 percent of the county is privately owned and a small portion, less than 0.1 percent, is owned by the State of Nevada. The Big Smoky Valley contains nearly 25 mi^2 of private land, much of it attributable to the availability of water for agriculture.

Nye County adopted its Comprehensive Master Plan also in 2011 (Nye County 2011). A stated purpose of the plan is to provide input into the land management and disposal process to define Nye County's public land-related issues and needs. The land use plan is an inventory and classification of the types of natural land and existing land cover and uses, as well as an identification of the most desirable utilization of the land. Information contained in the Nye County Comprehensive Plan indicates that while the solar suitability is classified as 'Best' within the study area, there is no approved renewable energy project. The Nye County Future Land Use Map illustrates the classifications established to serve as a guide for the management of public lands. According to Map 2, Nye County Future Land Use, the future land use for the area of Nye County within the study area is classified as 'Multiple Use'.

Similar to Esmeralda County, the Multiple Use Classification on Nye County land within the study area defines this land area as suitable for renewable and non-renewable resources including recreational activities, timber, energy, minerals, wildlife, scenic, and historic areas all without permanent impairment of the lands' productivity and surrounding environmental quality. According to Map 3, BLM Lands Suitable for Disposal in Nye County, none of the lands managed by the BLM within the study area are planned for disposal. The proximity to, and the land area associated with the NTTR (managed by the BLM, Las Vegas Field Office), airspace, and military training airspace, likely accounts a non-listing of these BLM lands for disposal.

Existing land use within the study area includes the unincorporated town of Goldfield, an elementary school, post office, numerous mine sites, and several historical sites. BLM land is used for open space, grazing, and mining. There is no prime or unique farmland within the study area. The study area does include HMAs for both horse and burro. Existing ROWs and other land use authorizations also occur within the study area. Information regarding these authorizations was derived from BLM Master Title Plats. Most of the authorizations are for utilities ROWs, either electric transmission lines or telephone/fiber optic communication lines, but also include U.S. 95 and minor access roads.

3.16 Recreation

The study area is located in Esmeralda County, Nevada, and encompasses the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line) and the immediate surrounding land. The county encompasses 3,589 mi^2, smaller than all but two of Nevada's 16 counties. Approximately 97.3 percent of the county is federal land with the largest acreages administered by the BLM (94.1 percent) and the USFWS (3.0 percent), followed by the NPS (0.2 percent) and Bureau of Indian Affairs (0.1 percent). Only 2.7 percent of the county is privately owned. Public lands in the Project vicinity are primarily BLM-administered. There are USFS and NPS lands on the western edge of Esmeralda County, which are connected to the Inyo National Forest and the Death Valley National Park in California; they are more than 30 miles from the study area. There are no state parks, designated wilderness areas, or wilderness study areas within approximately 30 miles of the study area.

Developed recreation facilities in the study area are located in Goldfield and include a community park with a tennis court, picnic shelter, and playground equipment, a BMX bicycle track with night lighting located on a repurposed baseball field, and the Goldfield Elementary School gymnasium and outdoor basketball court that receive some public use in addition to school use.

BLM-managed public lands in the study area generally are open for dispersed recreation. The study area and surrounding lands accommodate hunting, sightseeing, mountain biking, photography, rockhounding, and off highway vehicle (OHV) use. The "Vegas to Reno" road race, beginning in Las Vegas and ending in Reno, is the longest off-road race in the U.S. (over 500 miles) and occurs annually in August within the study area. There is a rock collecting area for minerals (jasper and agate) approximately 3 miles northwest of Goldfield. Other than hunting, no statistics are available to describe usage of the study area for dispersed recreation, although use generally is believed to be light for all activities noted. There are no state parks, designated wilderness areas, or wilderness study areas within the study area, and the nearest are over 30 miles away.

The study area is located in NDOW wildlife management unit 212 with a portion in management unit 251. Hunting statistics show mule deer are the most common big game animal hunted in the area, accounting for a 2015 harvest of 28 deer in units 211, 212, and 213 (NDOW 2016). Eight bucks were harvested in unit 212. Pronghorn also are hunted in units 211, 212, and 213, with five harvested in 2017 (NDOW 2018). The 2015 harvest of desert bighorn sheep included 28 ewes and 17 rams in unit 212. The tally for the three hunt units combined included 56 ewes (56.5 percent of the statewide total) and 46 rams (18.5 percent of the state total). Hunting for upland birds, including chukar, dove and quail, is reported to occur in the county (Esmeralda County 2011).

3.17 Social and Economic Values

The study area for social and economic values includes Nye and Esmeralda counties, with particular focus on the community of Tonopah, Nevada. The rationale for the study area is that the proposed Project would be located in Esmeralda County; however, the largest community in the Project vicinity is Tonopah, which is just inside the Nye County line, approximately 25 miles north of the Plan boundary. The proposed Project would generate public revenue directly for Esmeralda County and indirectly for Nye County. It is anticipated that the majority of the Project workforce would reside in the Tonopah area of Nye County because of a combination of proximity, housing availability, and availability of a broader range of public and private services in Tonopah than in Goldfield.

Population and Demography

Approximately 75 to 80 percent of the population of the immediate vicinity of the proposed Project is centered at Tonopah. Nye and Esmeralda counties are less ethnically and racially diverse than Nevada as a whole, with substantially fewer Black, Asian, and Hispanic residents. Both counties have a higher percentage of Native Americans than the State. Esmeralda County's 3.7 percent American Indian population would be considered "meaningfully greater" than the 0.9 percent statewide and, as such, would qualify as an identified minority population for environmental justice purposes (see *Environmental Justice Resource Report for the Gemfield Mine Project* [BLM 2018s]).

Income

Average mining wages and salaries are the highest for any industry in Nevada, averaging $83,989 in 2015, more than 83 percent higher than the all industries average of $45,725 (Nevada Department of Employment, Training and Rehabilitation 2016). The differential holds true for the study area, with average natural resources and mining wages reported at $66,941 in Esmeralda County and $80,160 in Nye County. Although mining wages and salaries typically are higher than average, per capita personal incomes (PCPI) in the study area indicate the relatively high mining wages are not sufficiently distributed to substantially raise county-wide income levels. Estimates for 2015 indicate that PCPIs in the study area exceed the $41,889 state average by 8.2 percent in Esmeralda County ($45,315) but lag the state average by 16.8 percent in Nye County ($34,871) (Bureau of Economic Analysis 2016).

Economy and Employment

The two-county study area contributes more than a proportionate share of Nevada's mining industry employment. Natural resources and mining sector employment in the two counties combined to account for approximately 9.3 percent of the total state employment in that economic sector, a large majority of which is

attributable to metal mining state-wide. The natural resources and mining sector and the government sector are the two dominant employers of Esmeralda County residents.

The combined labor force in the two study area counties currently is estimated at 16,783; approximately 15,696 of whom are employed. The remaining 987 unemployed individuals represent a 5.9 percent unemployment rate. A potentially important consequence of the current unemployment rate is the possible availability of 987 workers for the proposed Project, although it is likely that many of the unemployed are located in southern Nye County, more than 100 miles from the Project area. Daily commuting at this distance would be arduous, but mine workers have been known to commute long distances on a weekly basis when job opportunities arise.

Housing

The 2010 census found 23,200 housing units within the two counties in the study area: 22,350 units (over 96 percent) were in Nye County and 850 units were in Esmeralda County. At the time of the census, 18,421 of the housing units were occupied, leaving 4,779 (20.6 percent) vacant. Given the Project location, it is more relevant to evaluate the Tonopah area together with Esmeralda County, rather than all of Nye County. A majority of Nye County is too distant from the Project area to provide meaningful housing resources for potential Project workers. Combining Esmeralda County and the Tonopah Census Designated Place yields a total of 2,426 total housing units, 1,442 (59.4 percent) of which were occupied, and 984 (40.6 percent) of which were vacant. Short-term housing opportunities in the study area are available.

Community Facilities and Services

Public Utilities

The town of Tonopah municipal water system includes 10 shallow wells in two wellfields in the Ralston Valley approximately 15 miles east of town. Wells #1 through #4 in the “lower field” currently are inactive. Wells #5 through #8, also in the lower field, were rehabilitated in 2013 and together are capable of producing 700 gpm. Wells #9 and #10, newly drilled in the “upper field” in 2012, are capable of producing 800 gpm separately, or 1,200 gpm if operated simultaneously. Water is pumped from the Ralston Valley wellfields via three booster pump stations to nine storage tanks in four separate tank farms that feed the municipal distribution system by gravity feed. The tank system has a total storage capacity of slightly over 3.6 million gallons. The pump stations each have a standby pump in the event there is a problem with the primary pump.

In Esmeralda County, there are community water systems in the towns of Goldfield and Silver Peak. Residents throughout the rest of the county obtain domestic water from private wells. The Goldfield system serves approximately 350 people. It obtains water from a set of wells in Alkali Spring Valley, which is fed by local recharge from higher elevations in the northeastern portion of the basin and by groundwater from the Ralston Valley. The Goldfield water system has a treatment facility to address elevated arsenic concentrations and the water quality meets current standards. The water system produces 300 gpm for storage in two tanks with capacities of 200,000 gallons and 366,000 gallons (Anderson 2016).

Both Tonopah and Goldfield have community wastewater treatment systems. The Goldfield system dates from approximately 1903. A new treatment plant was constructed in 1988 and extensive repairs and replacement have been required for the collection system.

Solid Waste

Both Nye and Esmeralda counties operate permitted Class II landfills for disposal of solid waste in the study area. Esmeralda County’s facility is located approximately 1.5 miles northwest of Goldfield with transfer stations in other communities in the county. The facility has a permitted volume of 406,465 cubic yards and a total disposal capacity of 282,815 cubic yards. Closure is not anticipated until the end of 2097. The Nye County facility is located approximately 4 miles east of Tonopah (or approximately 31 road miles from

Goldfield). It has a total permitted volume of 67,750 cubic yards and a total disposal capacity of 54,200 cubic yards.

Public Safety

Law Enforcement

Law enforcement, detention, and emergency dispatch services for the Tonopah area are provided by the Nye County Sheriff's Office, which has three command centers: North Area Command in Tonopah, Central Area in Beatty, and South Area in Pahrump. In addition to the elected sheriff, the North Area Command has a lieutenant, 2 sergeants, and 13 additional sworn patrol officers. There are also eight sworn detention officers, three detention technicians, and three support staff. Similarly, the Esmeralda County Sheriff is based in Goldfield with a staff of 11 sworn officers and 5 support personnel. Both communities have detention facilities for their respective counties. There is a Nevada Highway Patrol substation in Tonopah with primary responsibility for motor vehicle accident investigation and law enforcement on state and federal highways.

Fire Protection and Emergency Medical Services

Fire protection services are provided by numerous agencies throughout the study area. Both Tonopah and Goldfield have volunteer fire departments with good quality equipment, facilities, and training. The BLM and the Nevada Division of Forestry have primary responsibility for fighting wild fires on public lands. Esmeralda County has eight volunteers with one engine and one rescue vehicle in Goldfield. Additional volunteers and equipment are located in Silver Peak (7 volunteers) and Gold Point (4 volunteers).

Health Care

The Nye Regional Medical Center in Tonopah had been the primary provider of medical care in the study area until it closed in the summer of 2015. The Nye County commissioners subsequently negotiated with Renown Health, a not-for-profit provider, to re-establish medical care services in Tonopah. Renown operates a telemedicine office in Tonopah and provides laboratory services. A community health nurses' clinic also provides services to the study area under the auspices of the Nevada Division of Public and Behavioral Health. There are no medical facilities in Esmeralda County.

Education

Elementary and secondary schools in the study area are operated by the Esmeralda and Nye county school districts. With the reduction in enrollment over the past decade, school capacity exceeds utilization. The primary provider of higher education opportunities to residents in the study area is Great Basin College.

Local Government

Nye County and Esmeralda County are the two primary general governmental entities with jurisdiction in the study area.

Public Finance

Local government finance in Nevada is a complex admixture of locally derived and state-shared revenues. Local revenues primarily are derived from *ad valorem* property taxes on real property, personal property (e.g., business equipment, agricultural equipment, etc.), and the net proceeds of mines in the jurisdiction, in this case, Esmeralda County. They also collect revenues from fines, licenses and permits, and fees for services. State-shared revenues, designated as intergovernmental resources include sales, motor vehicle, fuel, and gaming taxes. State revenue sharing addresses significant economic disparities between the relatively wealthy urban centers of Reno and Las Vegas and the often less affluent rural agricultural and mining communities (Nevada Department of Taxation 2013).

Social Conditions and Affected Publics

This section generally describes existing social conditions in Esmeralda County and groups that could be affected by the proposed Project.

Esmeralda County's population grew by 73 percent between 1980 and 1990 but declined over the following two decades to within 1 percent of its 1980 population in 2010. In contrast, Nye County's population grew dramatically from 1980 through 2000 and continued to grow from 2000 to 2010. The study area does possess a stable core employed by the agricultural, recreation, and tourism that supports Tonopah as a commercial center.

Public lands are a major factor in the study area, providing economic resources for mining, ranching, and energy as well as for recreation. Public lands influence on the economy is notable in the area's employment patterns (BLM 2011).

The proposed Project is large relative to the population base in Esmeralda County. Consequently, virtually everyone in eastern Esmeralda County likely would be affected by the proposed Project to some degree.

Specific public comments identified during scoping and interviews as potentially affected by development and operation of the mine include:

- Individuals and businesses that provide goods and services to the mining and construction industries and to the population at large;
- Esmeralda County residents who are unemployed or underemployed and families with children who might otherwise leave the community to seek employment;
- Esmeralda County residents who have low or fixed incomes, such as senior citizens and individuals and families who receive public assistance; and
- Recreation users of the area around the proposed Project. These users mainly include hunters, some OHV users (all-terrain vehicles), and visitors.

3.18 Environmental Justice

The study area for environmental justice includes Nye and Esmeralda counties; with particular focus on the community of Tonopah, Nevada. The rationale for the study area is that the proposed Project would be located in Esmeralda County, but the largest community in the Project vicinity is Tonopah, which is just inside the Nye County line, approximately 25 miles north of the proposed Project.

The two counties in the study area are notably less ethnically and racially diverse than the state as a whole. Nye County is 78 percent white/non-Hispanic, compared with 79 percent for Esmeralda County and 52 percent for Nevada. Both counties have higher percentages of American Indian, Eskimo, or Aleut population than the state's 0.9 percent (U.S. Census Bureau 2017).

No racial or ethnic group exceeds 50 percent of the population in either county. Nye County's 1.8 percent American Indian population would not be considered "meaningfully greater" than for the state as a whole; however, Esmeralda County's 3.7 percent would be over 4 times as high as the statewide 0.9 percent. Therefore, for the purpose of identifying environmental justice concerns, a minority American Indian population, as defined by the CEQ guidance, exists in the study area.

Poverty status is determined by comparing annual income to poverty thresholds, which vary by family size, number of children, and age of the householder, although not geographically. Poverty thresholds are updated annually based on changes in the Consumer Price Index. Weighted average poverty thresholds for 2015 ranged from $11,367 for a single individual 65 years and over to $49,177 for a household of nine or more people. For comparison, the statewide median household income in Nevada was estimated at $52,544 in 2015 (U.S. Census Bureau 2016). Median household incomes for Esmeralda County and Nye County in 2015 were $49,057 and $43,819, respectively (U.S. Census Bureau 2016).

Census estimates indicated 14.9 percent of the people in Nevada had incomes below the poverty level in 2009; a number that rose to 16.2 percent by 2012 but fell slightly to 15.8 percent by 2013 before returning to 14.9 percent in 2015 (U.S. Census Bureau 2016, 2014). An estimated 14.1 percent of Esmeralda County residents had incomes below the poverty thresholds in 2012, somewhat lower than the statewide percentage and nearly the same percentage as the county had in 2009. The Esmeralda County rate rose to 14.7 percent in 2015 (U.S. Census Bureau 2016). In 2012, the percentage of Nye County residents with annual income below the poverty threshold was slightly higher than the state figure at 16.6 percent of the population, which was an increase from 14.1 percent in 2009. The percent below the poverty level continued rising to an estimated 18.5 percent in 2013 but dropped to 17.5 percent in 2015 (U.S. Census Bureau 2016, 2014). Based on these estimates, Esmeralda County's poverty rate is below the statewide level, but Nye County would be considered to have a meaningfully greater low-income population under EO 12898.

3.19 Visual Resources

The study area for visual resources encompasses an area within 15 miles of the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line). This geographic region was selected as the study area because beyond 15 miles from the proposed Plan boundary, the proposed Project facilities would either not be visible or would be considered as a minor element in the visual landscape.

The Tonopah RMP (BLM 1997) provides goals and objectives for visual resources within the visual resources study area. In this document the BLM has identified one VRM class (i.e., IV) that is dominant within the visual resources study area. This is due to the visibility of existing mining activities within the landscape (BLM 1997). Small areas of VRM Class III occur within the visual resources study area, which are located on high elevations of the Clayton Ridge and Montezuma Range near the visual resources study area outer boundary. A Visual Resource Inventory was completed in 2012 in support of the ongoing BLM Battle Mountain District RMP revision, which has not been completed.

Stantec conducted a visual resources study to evaluate the visual contrast rating for the potential effects of the Proposed Action and Alternatives of the project using the BLM VRM – visual contrast rating procedure (BLM Manual 8431 – Visual Resource Contrast Rating). Visual Resource Contrast Rating Worksheets used to evaluate the visual resources of the proposed action and alternatives can be found in the *Visual Resource Report for the Gemfield Mine Project* (BLM 2018t). The VRM system provides the basic approach for evaluating direct visual impacts as well as potential cumulative visual impacts associated with the Project.

Four KOPs have been identified in the visual resources study area. The existing landscape characteristics were used to develop Section B: Characteristic Landscape Descriptions in the Visual Contrast Rating Worksheets for each KOP.

Factors considered in selecting KOPs include angle of observation, number of viewers, length of time the Project is in view, relative Project size, season of use, and light conditions (BLM 1986).

- KOP 1 is located at the intersection of Peak Road and U.S. 95 and represents travelers approaching the study area from the north.
- KOP 2 is located approximately 0.5 mile west of U.S. 95 approximately 2.5 miles north of Goldfield, Nevada, and represents travelers approaching the study area from the west.
- KOP 3 is located just south of the intersection of U.S. 95 and Aluminum Street in Goldfield, Nevada, and represents travelers entering the study area from the south exiting Goldfield.
- KOP 4 is located approximately 1 mile south of Goldfield, Nevada, on U.S. 95 and represents travelers approaching the study area from the south before entering Goldfield.

3.20 Hazardous Materials and Solid Waste

The study area for hazardous materials and solid waste includes the Plan boundary (including the U.S. 95 realignment, and utility and road ROW realignments or modifications), the Brickyards Road ROW modification, and the main transportation route north on U.S. 95 to Tonopah, and continuing west on U.S. 95 to Coaldale, and south on U.S. 95 to Beatty.

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 transportation to and from the study area and during storage and use within the study area.

Historic mining began in the study area in 1903. Due to this previous activity, there is potential for uncontrolled releases of hazardous materials to have occurred. A Phase I Environmental Site Assessment completed by SRK (2013c) and a Technical Memorandum providing Supplemental Information by SRK (2017b) noted the following environmental conditions involving historical use of hazardous materials within or near the proposed Plan boundary:

1. Historical GCMC mill tailings: These tailings currently are capable of generating an effluent seepage through the base of the tailings that is acidic and elevated in some metals above NDEP drinking water standards. The characterization of the historical tailings is discussed in detail in the *Geology and Minerals Resource Report for the Gemfield Mine Project* (BLM 2018c).
2. Goldfield Operations Project heap leach pad: This facility lies to the south of the proposed Plan boundary. This HLP currently is undergoing closure.
3. Abandoned open pit mine and heap leach facility: This historical site was recognized by the Comprehensive Environmental Response, Compensation and Liability Information System and lies outside the eastern boundary of the proposed Project. Information regarding this old mine pit was archived in 1988 when it was determined that no further action would be needed for site remediation (SRK 2013c).
4. Historical leach operation west of proposed Plan boundary: Acid drainage apparently has occurred at a historical leach operation located 2.5 miles west of the proposed Plan boundary. The site is 5 acres in size and contains abandoned mine workings, waste rock piles, historical tailings, a small unlined pond, and two 10,000-gallon tanks with bullet holes (SRK 2013c). The pH of the standing water in the unlined pond was measured at 2.31 standard units in 2013. The site is located in T3S, R42E, Section 5.
5. Recorded diesel spills: Three recorded diesel spills were noted by SRK (2017b, 2013c). These spills occurred in 2009 (2 spills) and 2012 (1 spill) along U.S. 95 near the town of Goldfield and were cleaned up and closed within 3 months of the incident.

Two of the historical facilities with hazardous material potential, the GCMC tailings and the Goldfield Operations Project HLP, are within or very near the proposed Plan boundary and have current potential for continued release of hazardous materials to the environment. These have been addressed in the SRK Phase I Environmental Site Assessment (2013c) and as discussed in the SRK Technical Memorandum (2017b), should not present a potential environmental problem in the future for the following reasons:

1. The GCMC tailings would be covered by waste rock generated by the proposed mining and thus should not be capable of leaching hazardous materials to the subsurface once mining is completed and the waste rock is reclaimed.
2. The Goldfield Operations Project HLP currently is undergoing closure and is under the control of Decommissioning Services LLC. and under the supervision of the NDEP BMRR.

The historical leach operation 2.5 miles west of the Plan boundary is not associated with the Proposed Action or any of the alternatives and is not a matter of concern for the proposed Project. All historic spills have been remediated and are not an environmental issue of concern.

4.0 Environmental Consequences and Cumulative Effects

This chapter describes the anticipated short-term and long-term impacts (direct and indirect) of the Proposed Action and the alternatives. The analysis of potential impacts from the proposed Project to the environmental resources in Sections 4.1.1 through 4.1.20 assumed the implementation of GRL's EPMs (BLM 2018b). The cumulative impacts are discussed in Section 4.2.

4.1 Direct and Indirect Impacts

The Proposed Action and alternatives outlined in Chapter 2 may cause, directly or indirectly, changes in the human environment. This EIS assesses and analyzes these potential changes and discloses the effects to the decision-makers and public. This process of disclosure is one of the fundamental aims of NEPA. There are many concepts and terms used when discussing impacts assessment that may not be familiar to the average reader.

A direct effect, caused by the action, occurs at the same time and place as the action (40 CFR 1508.8(a)). Direct and indirect effects are discussed in combination under each affected resource.

Indirect effects are reasonably foreseeable effects, also caused by the action, that occur later in time or are removed in distance from the action (40 CFR 1508.8(b)). Direct and indirect effects are discussed in combination under each affected resource.

The word "significant" has a very particular meaning when used in a NEPA document (40 CFR 1508.27). Significance is defined by CEQ as a measure of the intensity and context of the effects of a federal action on, or the importance of that action to, the human environment. Significance is a function of the beneficial and adverse effects of an action on the environment.

Intensity refers to the severity or level of magnitude of impact. Public health and safety, proximity to sensitive areas, level of controversy, unique risks, or potentially precedent-setting effects are all factors to be considered in determining intensity of effect. This EIS primarily uses the terms major, moderate, minor, or negligible in describing the intensity of effects.

Context means that the effect(s) of an action must be analyzed within a framework, or within physical or conceptual limits. Resource disciplines; location, type, or size of area affected (e.g., local or regional); and affected interests are all elements of context that ultimately determine significance. Both long- and short-term effects are relevant. For definition impacts specific to each resource, see the resource reports for the proposed Project (BLM 2018c through 2018v).

4.1.1 Geology and Minerals

Primary issues related to geology and minerals include: 1) geologic hazards created or exacerbated by development of the proposed Project; 2) stability of the open pit, WRDAs, and HLP under static and earthquake loads; and 3) exclusion of future mineral resource availability caused by the placement of WRDAs and HLPs.

4.1.1.1 Proposed Action

Direct impacts on geologic and mineral resources from the proposed Project would include: 1) the mining of approximately 25 Mt of ore material containing approximately 600,000 ounces of gold; and 2) the generation and permanent disposal of approximately 50 Mt of waste rock and approximately 25 Mt of heap leach material.

The Proposed Action would result in an estimated total new disturbance of approximately 1,337 acres. Disturbance associated with open pits that are not backfilled, and construction of WRDAs and the HLP would change the topography and geomorphology within the Plan boundary. The proposed open pit

would encompass approximately 160 acres and would not be backfilled or reclaimed. The disposal of waste rock generated during the proposed mining would result in approximately 209 acres of disturbance associated with the construction of East and West WRDAs; and construction of the HLP would result in approximately 127 acres of disturbance. Although the WRDAs and HLP would be reclaimed, including grading to simulate natural slopes in the surrounding area, construction of WRDAs and HLP would permanently alter the natural topography of the area.

The open pit design in combination with the 1) planned pit dewatering, 2) implementation of the recommended geotechnical monitoring system (Golder 2017), and 3) reevaluation and revisions to the pit design, as necessary, during the project life to address slope stability concerns that develop during mining are expected to minimize the potential risk of large-scale slope failures during operations.

Stabilization of the pit walls is not proposed as part of reclamation or closure. Although localized slope failures are likely to occur over time during the post-closure period, the final pit slopes are designed with reasonable factors of safety with respect to potential large-scale failures; therefore, significant impacts associated with the slope instability that would impact adjacent facilities are not anticipated during the operation and post-closure periods.

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

Conventional drilling and blasting techniques would be used to facilitate the proposed open pit mining. Benches would be drilled and shot with ANFO as the blasting agent. A study was conducted to estimate the level of blast vibration and air blast from mining at the proposed open pit that would occur at the historic Goldfield High School in Goldfield (Tierra Group International, Ltd. [TGI] 2013). The study estimated the ground motion (vibration) generated from pit blasting that would reach the structure. The results of the study indicate that structural damage due to either blasts vibration or air blast is not likely to occur at the historic Goldfield High School.

Existing geologic information and condemnation drilling results indicate the placement of the proposed facilities would not conceal known or inferred mineable ore. The mineralization below the facilities is low grade and presently constitutes non-minable ore.

Recommended Mitigation and Monitoring

Potential impacts to geology and minerals would be reduced by the following recommended mitigation measures.

Issue: There is uncertainty regarding the geotechnical conditions that would be encountered in the open pit during mining and the potential for slope instability.

Mitigation Measure GM-1: The potential for large-scale failure of the open pit, and failure of the pit wall to affect adjacent facilities would be reduced by implementing the recommendations provided in Golder (2017). These recommendations include: 1) pit slope monitoring; 2) routine geologic and geotechnical pit mapping; 3) additional investigation of the Lower Vitrophyre and Paleosol during development of the initial phase of mining to optimize the slope design; 4) refinement of the geologic model as new data is collected; and 5) reevaluation and refinement of the final pit design, as necessary.

Effectiveness: Implementation of mitigation measure GM-1 is expected to effectively reduce the potential risk of large-scale slope failures developing both during operation and the post-closure period.

4.1.1.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to geology and mineral resources would not occur. Under this alternative, GRL would be permitted to

continue exploration activities under existing approved authorizations including exploration activities on up to 23.84 acres of BLM-administered land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. This project would be within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Mitigation and Monitoring

No mitigation or monitoring measures are recommended.

4.1.1.3 Reduced Pit Mine Plan Alternative

Direct impacts on geologic and mineral resources from the Reduced Mine Plan Alternative would be the same as the Proposed Action, except with reduced impacts to the resources.

The Reduced Mine Plan Alternative would result in an estimated disturbance of approximately 972 acres. The proposed open pit would encompass approximately 112 acres and would not be backfilled or reclaimed. The disposal of waste rock generated during the proposed mining would result in approximately 178 acres of disturbance associated with the construction of the West WRDAs; and construction of the HLP would result in approximately 72 acres of disturbance.

In summary, the proposed open pit mining and construction of the WRDAs and HLP would result in a total of approximately 362 acres of area where the natural topographic and geomorphic features would be permanently altered. Compared to the Proposed Action, the Reduced Mine Plan Alternative would result in an approximate 28 percent reduction of the area where the natural topography would be permanently altered.

The general design parameters for the open pit, HLP, and WRDAs would be the same as the Proposed Action. The results of the slope stability evaluation indicate adequate factors of safety for both static and pseudo-static (i.e., seismic) conditions for the pit slopes, HLP, and WRDAs. Therefore, significant impacts associated with instability of the pits, HLP, or WRDAs are not anticipated during operation or post-closure conditions. Impacts associated with blasting vibration also are expected to be essentially the same as described under the Proposed Action.

Recommended Mitigation and Monitoring

Mitigation and monitoring would be the same as the Proposed Action.

4.1.1.4 Partial Pit Backfill Alternative

Direct impacts on geologic and mineral resources for the Partial Pit Backfill Alternative would be the same as described for the Proposed Action.

Future exploration activities potentially could identify ore deposits in the vicinity of the Project that would justify expansion of the mining operation. Placing backfill in the open pits would limit the potential to expand the pits or conduct underground operations from the backfilled pit areas.

Potential impacts associated with long-term stability of the pit walls is anticipated to be similar to the Proposed Action. Although stabilization of the pit walls is not proposed as part of reclamation or closure, the partial backfill is expected to act as a buttress for the lower (i.e., backfilled) slopes. The buttressing effect would further improve the long-term stability of the pit walls and likely reduce the size of potential failures that potentially could occur in the post-closure period.

Recommended Mitigation and Monitoring

Mitigation and monitoring would be the same as the Proposed Action.

4.1.2 Water Resources and Geochemistry

Primary issues related to water resources include: 1) reduction in surface water and groundwater quantity for current users from groundwater withdrawal for water supply and mine dewatering; 2) impacts to surface and groundwater quality from mining and mine related facilities; 3) impacts associated with stormwater management; and 4) impacts to groundwater quality from development of post-mining pit lakes. Further details on impacts for each alternative including figures showing predicted groundwater drawdown are provided in the *Water Resources and Geochemistry Resources Report for the Gemfield Mine Project* (BLM 2018d).

4.1.2.1 Proposed Action

The proposed open pit would extend below the water table and therefore require a system to capture and remove groundwater that seeps into the pit as mining progresses. Calibrated three-dimensional numerical groundwater flow models were developed to estimate effects to groundwater and surface water resources from the open pit mining under the Proposed Action, the Reduced Mine Plan Alternative, and the Partial Pit Backfill Alternative, and changes in groundwater elevation projected to occur in the future under the No Action Alternative. Specifically, a groundwater flow model was developed for the mine site to evaluate the following: 1) passive inflow rates to the open pit throughout the mine life; 2) drawdown and recovery of groundwater levels resulting from passive inflow to the proposed open pit; 3) potential for pit lake(s) to develop in the post-mining period; and 4) groundwater recovery after mining.

Groundwater Quantity Impacts: For the Proposed Action, the results of the modeling indicate a projected drawdown induced by pit dewatering with a maximum extent of the 3-foot drawdown contour at 1.1 miles northeast from the center of the mine pit (SRK 2017a). The model simulations also predict continued recovery of groundwater levels in the area of historic mining located southeast of the Project area at the end of mining and continuing into the 100-year post-mining time frame. At the 100-year post-mining period, the model simulations predict a second drawdown area would develop southeast of the Project adjacent to the area of historic underground mining due to equilibration of groundwater elevations as the depression in the groundwater elevation surface over the historic mining area recovers. In addition, the model simulations project two localized areas located adjacent to Big Wash at the north end of the town of Goldfield where the groundwater elevations are predicted to increase from continued municipal recharge.

Operation of the proposed Project is projected to require raw water supplied at a constant flow rate of approximately 500 gpm over the 9-year mine life (Schlumberger 2014). The proposed sources of water to supply the project include: 1) water captured as part of the open pit mine dewatering and water management operations; and 2) pumped groundwater from water supply wells in the Klondike wellfield located approximately 7.9 miles north of the Plan boundary. Water captured from pit dewatering operations is projected to increase over the mine life from an average annual flow rate ranging from 24 gpm to 71 gpm (SRK 2017a). The balance of the water requirements for the mine (429 to 476 gpm) would be provided by pumping from the Klondike wellfield owned and operated by Esmeralda County. Water would be provided under a water provisions agreement (Interflow Hydrology Inc. [IHI] 2016). The projected change in groundwater elevations (i.e., drawdown) resulting from the pumping required to supply both the proposed Project and the Town of Goldfield was evaluated using the Klondike wellfield groundwater flow model (IHI 2016). At the end of mining, the area projected to experience drawdowns of 2 feet or more is projected to extend out in a radial pattern from the center of the Klondike wellfield approximately 1.8 miles at the end of mining and expands to a radial distance of approximately 2.3 miles 20 years after mining ceases. The groundwater levels are anticipated to partially recover after pumping required to supply the Gemfield Mine Project is no longer required. However, residual drawdown would persist as long as the wellfield is pumped to supply the town of Goldfield.

No surface resources would be impacted by pumping of water at the Klondike wellfield or by mine dewatering. Seven groundwater rights (Map IDs 1, 26, 32, 33, 34, 42, and 43) occur within the model projected drawdown area resulting pumping the Klondike Wellfield (**Figure 3-6** and **Figure 3-7**). Water rights with Map IDs 26, 32, 34, 42, and 43 are owned by Esmeralda County with listed beneficial uses as municipal and quasi-municipal, and therefore, are assumed to be associated with the Klondike wellfield. The water right with Map ID 1 is a certificated water right for stock watering with a priority date of July 20, 1933, that is owned by a private party. Results of the modeling project that this water right would experience drawdown on the order of 18 feet by the end of mining and more than 6 feet of drawdown 20 years after the cessation of mining. Potential effects to specific water rights would be localized, and impacts could range from negligible to major. Any measurable impact to a water right likely would be long-term.

Pit Lake Development: The numerical groundwater flow model developed for the Project was used to predict the rate of recovery and pit lake development for the final open-pit configuration. The proposed pit would include two lobes incorporated into the overall open-pit boundary that are referred to as the West lobe and East lobe. Two separate pit lakes are predicted to develop after mining ceases as a result of passive inflow of groundwater (SRK 2017a). Without active pumping to accelerate pit lake filling, both pit lakes are predicted to begin to form in the first year after mining ceases and continue to rise until the maximum lake water level elevation is reached at approximately 33 years (West lobe) to 35 years (East lobe) post-mining (SRK 2017a).

Under the Proposed Action, water would be pumped from the Klondike wellfield water supply system into the two pit lobes to cause rapid filling of the pit lakes as part of closure operation. This active pumping (or rapid infilling) would consist of delivering water into each lobe of the pit at an average annual rate of 250 gpm (i.e., total of 500 gpm to supply both pit lobes) until the pit lakes reach and maintain hydraulic equilibrium. The groundwater model results predict that hydraulic equilibrium would be reached in both pit lakes within 1 year. The simulations also predict that once filled to the equilibrium level, passive groundwater inflow to the pit is sufficient to maintain the water levels such that further addition of pumped groundwater would not be necessary. At 100 years post-mining, the West lobe pit lake is predicted to have a groundwater inflow rate is 9.6 gpm and net evaporation rate of 10.6 gpm; whereas, the East lobe pit lake is projected to have a groundwater inflow rate of 4.7 gpm and net evaporation rate of 11.6 gpm. The estimated total net evaporation rate for all of the pit lakes is approximately 22.1 gpm. Because the evaporation rate is projected to be greater than the inflow rate, the pit lakes are expected to behave as a strong hydraulic sink (SRK 2017a).

Groundwater would continue to flow into the pits to replace water lost by evaporation, and the solutes in the water would accumulate. As a result, the TDS concentrations (i.e., salinity) of the pit lakes is predicted to increase overtime in response to evaporation. For example, the TDS concentrations are predicted to steadily increase from approximately 1,200 mg/L at Year 1 to approximately 73,000 mg/L at Year 100 in the West lobe pit lake; and from approximately 800 mg/L at Year 1 to approximately 53,000 mg/L at Year 100 in the East lobe pit lake. The salinity of the pit lakes is expected to continue to increase over time in response to evaporation after 100 years. In addition to TDS, the water quality predictions indicate that most of the trace element concentrations are expected to increase over time as a result of evapoconcentration effects. However, the pit lakes are expected to behave as hydraulic sinks so that the pit lake water would be fully contained within the pit and would not discharge to groundwater or surface water resources outside the pit boundaries. Therefore, pit water quality is not predicted to result in impacts to surface or groundwater quality beyond the pit boundaries.

Profile III reference values were developed by NDEP to screen pit lake water quality for possible further evaluation for possible risk of adverse impacts to avian or terrestrial life through ingestion (NDEP 2018). Comparison of the predicted pit lake water quality to NDEP Profile III reference values indicates concentrations of antimony, fluoride, mercury, molybdenum, sodium, selenium, TDS, and zinc are projected to exceed their respective reference values in both the west and east lobe pit lakes over the 100-year post-mining simulation period. An ERA was used to evaluate risk to terrestrial and avian life from consumption and interaction with the pit lake water quality. The results of the ERA and the evaluation

of potential impacts to terrestrial and avian life are summarized in the *Wildlife Resource Report for the Gemfield Project* (BLM 2018g).

Watershed Impacts: No springs or seeps would be covered by proposed components. Therefore, impacts to springs and seeps associated with surface disturbance from the proposed Project would not occur. The stormwater control system for the Project consists of diversion channels and berms, inlet channels, sediment basins, and a retention basin to protect process and non-process facilities from storm runoff. Under the Proposed Action, drainage areas in the Plan boundary would be affected by project components, such that runoff from areas of open pits, WRDAs, and the HLP would be eliminated. These local impacts to watershed areas would be relatively minor compared to the overall contributing watershed and would occur in ephemeral drainages. It is anticipated that during the proposed 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 to the ephemeral watershed areas associated with the construction, operation, and closure of the mine are expected to be minor, localized, and long-term.

ROW Actions: Surface disturbance would be required along existing and proposed ROWs for the development and operation of the mine. The ROW actions are summarized in Section 2.1.12. One of the most significant ROW actions includes the development of two new water supply wells in the Klondike wellfield and constructing a water pipeline from the Klondike Wellfield to the proposed mine site. In addition, a piezometer and monitoring well would be installed in the wellfield area within proposed disturbance areas. Other ROW actions include roads, transmission lines, and fiber-optic lines.

Construction, operation, and maintenance of the ROW actions would be conducted in accordance with the POD (GRL 2017a). BMPs would be used to limit erosion, trap sediment, and control stormwater from the effects of wind, precipitation, and stormwater runoff from the proposed disturbed ROWs. No springs or seeps of perennial waters have been identified along or adjacent to the ROWs. All of the streams crossed are ephemeral. Therefore, impacts to surface water resources are expected to be minor. Implementation of required erosion control measures and are expected to generally limit these to short-term, localized effects.

All of the proposed mine facilities and associated diversion and stormwater detention structures are located downgradient and to the east of the proposed U.S. 95 realignment ROW. Therefore, stormwater runoff during construction, operation, and closure of the mine facilities would not affect NDOT's MS4 permit requirements.

The stormwater control system for the proposed Project is designed for a storm event with a 24-hour duration and 100-year recurrence interval (SRK 2017b). Stormwater from the proposed project facilities area resulting from the design storm event would be retained in a retention pond. Therefore, stormwater is not expected to affect the proposed realignment or existing U.S. 95 roadway located to the west or north of the proposed Project.

WRDA Impacts: The proposed Project would generate approximately 50 Mt of waste rock and alluvial overburden. The waste rock would be stored in the East and West WRDAs; the alluvium overburden would be stored in the South Overburden Stockpile. During reclamation, the slopes would be regraded to blend with the surrounding topography and covered with an average of 12 inches of growth medium and revegetated.

The results of the geochemical characterization indicate that most (i.e., estimated 99 percent) of the waste rock is classified as non-acid generating and presents a low risk of acid rock drainage/metals leaching (SRK 2013b, GRL 2017c). Based on the geochemical characterization results, no special handling or management of the waste rock is proposed and some of the material may be used as fill for construction of roads, mine facilities, or for reclamation purposes (SRK 2013b, GRL 2017c). Monitoring and testing of waste rock generated by the proposed Project would be conducted on a quarterly basis in accordance with the WRMP and NDEP WPCP requirements. If the ongoing monitoring program indicates that greater quantities of acid-generating material are encountered than originally predicted, then GRL would investigate best

practices for management of the waste material at that time and update the WRMP accordingly with BLM approval.

Under the Proposed Action, the East WRDA would be constructed over the existing historic GCMC tailings. Results of laboratory testing of a sample of the historic tailings indicated a low hydraulic conductivity (i.e., approximately 2 x 10^{-6} centimeters per second) (GRL 2018a). The low permeability of the tailings would limit infiltration of seepage from the overlying waste rock material. Results of geochemical characterization sampling and testing indicate that the historic tailings material have the potential to generate acid rock drainage and leach metals. Placement of waste rock with a low potential for acid generation and metals leaching over the historic tailings area would limit the exposure of the tailings to air and water and thereby minimize potential future impacts to surface or groundwater resources (SRK 2013b, GRL 2017c). Therefore, placement of the waste rock over the historic tailings is expected to substantially reduce the potential for the historic tailings to impact surface water and groundwater quality in the future compared to existing conditions. Impacts from the WRDAs is expected to be negligible.

HLP and Other Facilities Impacts: The HLP would be designed as a zero-discharge facility that incorporates liners and leak detection systems to prevent leakage during operations. At closure, draindown from the HLP would be routed to the process ponds for evaporation. The Pregnant process pond and possibly the Barren solution pond would be converted to E-cells to allow for the long-term passive management of residual flows from the HLP. Final details of heap stabilization and closure would be developed at least 2 years prior to closure pursuant to the requirements of NAC 445A.446 and 445A.447.

The Heap Leach Draindown Estimator model was used to estimate draindown flow rates for the proposed HLP. The results of the analysis estimate average flow rates of approximately 12 gpm after 1 year, that would reduce to approximately 1.6 gpm after 10 years, and 1 gpm after 30 years. These estimates are based on an assumed infiltration rate of 2 percent of the average annual precipitation for covered (reclaimed) facility.

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. Under standard design, operation, and monitoring requirements required by NDEP, the passive management of leachate generated from the heap leach facilities is expected to prevent the solution from infiltrating to the groundwater system or impacting surface water resources. Therefore, impacts to groundwater or surface water quality from operation and closure of the proposed HLP are not anticipated.

Recommended Monitoring and Mitigation Measures

Monitoring WR-1, Monitoring Plan Development: Because construction, operation, and closure of the mine could impact surface or groundwater resources. A comprehensive water resources monitoring plan for the proposed mine operations and expansion of the Klondike wellfield (to supply water for the project) would be developed for the project by GRL. The mine owner/operator would be responsible for the development of a comprehensive water resources monitoring plan for the Project. The plan would include surface water, groundwater, and meteorological monitoring requirements for the Project. This would include monitoring of Project facilities that may have the potential to affect waters of the State or pose a risk to the environment and human health. Water quantity measurements would include diversion rates from groundwater pumping, water levels in monitoring wells and piezometers, and flow rates of surface water monitoring locations associated with stormwater controls. Water quality monitoring of groundwater resources would consist of quarterly measurements of field parameters and collection and analysis for the NDEP Profile II list of constituents. Monitoring results would be provided to NDEP and BLM on a quarterly basis and summarized in an annual report. The mine owner/operator would be responsible for continued monitoring and reporting of changes in groundwater levels and surface water flows, and surface and groundwater quality prior to and during operation, and for a period of time in the post-reclamation period. The plan would be reviewed and approved by NDEP and BLM and implemented at least 6 months prior to the commencement of mining.

Monitoring WR-2, Water Rights: Monitoring would be implemented since **m**ine-induced drawdown and wellfield pumping potentially could reduce water levels and impact the use of water supply wells with water rights located within the projected drawdown areas. The mine operator would be responsible for monitoring groundwater levels between the mine, groundwater rights within the projected mine-related, and wellfield-related drawdown area as part of the water resources monitoring program (Monitoring Measure WR-1). Adverse impacts to water rights would be identified and mitigated, as required by the NDWR. Mitigation for impacts to water rights would depend on the actual impact and site-specific conditions and could include a variety of measures. Methods for addressing impacts to water supply wells could include lowering the pump, deepening an existing well, drilling a new well, or providing a replacement water supply of equivalent yield and general water quality.

Monitoring WR-3, Groundwater Modeling Recalibration and Updated Geochemical Modeling: Since there is uncertainty regarding the numerical groundwater model developed for the Gemfield Mine Project and the water supply from the Klondike Wellfield, it would be updated and recalibrated on an annual basis (after mining is initiated and intercepts the water table) through the life of the project based on the actual observed changes in groundwater elevation and additional hydrogeological or groundwater related data collected during operation. Geochemical modeling would be updated as necessary (if requested by the BLM or NDEP) if different results are predicted from the updated groundwater modeling or different results are obtained through the ongoing geochemical characterization during mining required as part of the WRMP and WPCP.

It is anticipated that BLM's annual review of monitoring results combined with the updated groundwater modeling and updated geochemical modeling (if warranted) predictions would provide early warning of potentially unanticipated undesirable impacts to water-dependent resources to allow for implementation of appropriate management measures to mitigate their effects. Implementation of these measures likely would reduce or eliminate potential impacts to water dependent resources.

4.1.2.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed, and impacts to water resources associated with the Proposed Action would not occur. Although drawdown associated with the open pit mining would not occur, comparison of groundwater simulation for the No Action Alternative and Proposed Action indicates that under the No Action Alternative, the groundwater elevations are predicted to continue to re-equilibrate over the next several decades or longer as a result of historic underground mining (and dewatering) that occurred in the mining district in the early 1900 (SRK 2017a). The predicted re-equilibration would result in an increase in groundwater elevations of up to approximately 100 feet in the area affected the historic underground mine dewatering located immediately southeast of the proposed Plan boundary (SRK 2017a).

The historic GCMC mill tailings would not be covered with WRDA that would limit exposure to the tailings to air and water. The historic tailings would continue to erode and be transported and deposited along the Big Wash downstream from the facility (and downstream from the Plan boundary) during major storm events. The GCMC historic mill tailings are acid-generating and can leach metals. The leachate indicated average TDS concentrations of 7,200 mg/L and elevated concentrations of aluminum, antimony, arsenic, beryllium, cadmium, chromium, copper, fluoride, iron, lead, manganese, nickel, selenium, sulfate, thallium, and zinc. Available information indicates that the native sediment and bedrock material beneath the tailings have been affected by leachate seeping from the historic tailings. The seepage has impacted the native materials beneath the tailings exhibit elevated arsenic, antimony, manganese, selenium, and sulfate concentrations (SRK 2013b). Therefore, not covering the historic tailings with the East WRDA is expected to result in moderate, long-term, and localized to regional impacts on surface water and groundwater quality.

Recommended Monitoring and Mitigation Measures

No mitigation or monitoring measures are recommended.

4.1.2.3 Reduced Pit Mine Plan Alternative

The primary differences between the Proposed Action and the Reduced Mine Plan Alternative include: 1) smaller open pit area with the development of two separate pits; 2) active mine life would be reduced by 2 years; and 3) pit lakes would develop from passive inflow of groundwater (i.e., water would not be pumped into the pits to accelerate pit lake filling). These changes in the mine plan would result in changes to the predicted groundwater inflow into the pits to be managed during mining; extent and magnitude of drawdown; and size, volume, depth, and final water surface elevation of the pit lakes.

Groundwater Quantity Impacts: The area predicted to experience a reduction of groundwater levels (or drawdown) resulting from this alternative is localized around the two open pits such that the maximum extent of the 3-foot drawdown contour extends up to a maximum of approximately 0.5 mile to the northeast from the center of the Main Pit and 0.4 miles from the East Pit (SRK 2017c).

Surface Water Impacts: Surface water impacts would be the same as under the Proposed Action.

Water Rights Impacts: Impacts to water rights would be the same as described for the Proposed Action.

Watershed and Drainage Impacts: Impacts would be the same as under the Proposed Action.

HLP and Other Facilities Impacts: These would be the same as under the Proposed Action.

Pit Lake Development: The numerical groundwater flow model developed for the proposed Project was used to predict the rate of recovery and pit lake development for the final open-pit configuration under the Reduced Mine Plan Alternative. Mining under this alternative would result in the development of two separate pits (Main Pit and East Pit). Three separate pit lakes are predicted to develop after mining ceases as a result of passive inflow of groundwater (SRK 2017c). The pit lakes are predicted to begin to form in the first year after mining ceases and continue to rise until the maximum lake water level elevation is reached at approximately 50 years.

At 100 years post-mining, the pit lake in the Main Pit is predicted to have a groundwater inflow rate of 11.5 gpm and net evaporation rate of 11.5 gpm; whereas, the East Pit would have two smaller pit lakes and is projected to have a groundwater inflow rate of 8.3 gpm and net evaporation rate of 8.4 gpm. The estimated total net evaporation rate for all of the pit lakes is approximately 19.9 gpm. As with the Proposed Action, the Reduced Mine Plan Alternative pit lakes are expected to behave as hydraulic sinks (SRK 2017c).

The predicted water quality of the pit lakes was evaluated using the same methodology developed for prediction of the Proposed Action pit lakes (SRK 2017c). The predicted water quality results indicate that both the Main Pit and East Pit lakes are predicted to be moderately alkaline (approximately pH 8.0 to 8.4). The alkaline conditions are attributable to the alkalinity of the inflowing groundwater and negligible quantities of acid-generating materials exposed in the final pit walls (SRK 2017c). Groundwater would continue to flow into the pits to replace water lost by evaporation, and the solutes in the water would accumulate. As a result, the TDS concentrations (i.e., salinity) of the pit lakes are predicted to steadily increase over time in response to evaporation. For example, the TDS concentrations are predicted to increase over time from approximately 2,900 mg/L at Year 1 to approximately 49,000 mg/L at Year 100 in the Main Pit lake; and from approximately 3,800 mg/L at Year 1 to approximately 15,000 mg/L at Year 100 in the East Pit lake. The salinity of the pit lakes is expected to continue to increase over time in response to evaporation after 100 years. In addition to TDS, the water quality predictions indicate that most of the trace element concentrations are expected to increase over time as a result of evapoconcentration effects. As with the Proposed Action, the Reduced Mine Plan Alternative pit lakes are expected to behave as a groundwater sinks (SRK 2017c). The pit lake water would be contained within the pit and would not discharge to surface water resources outside the pit boundaries. Therefore, pit water quality is not predicted to result impacts to surface or groundwater quality.

An ERA was used to evaluate risk to terrestrial and avian life from consumption and interaction with the pit lake water quality. The results of the ERA and the evaluation of potential impacts to terrestrial and avian life are provided in Section 4.1.5, Wildlife Resources (Including Migratory Birds).

Recommended Monitoring and Mitigation Measures

The potential monitoring and mitigation measures identified for the Proposed Action also would apply to the Reduced Mine Plan Alternative. The following additional monitoring and mitigation measures would apply if the Reduced Mine Plan Alternative is authorized by the BLM.

Issue: After mining ceases, pit lakes would develop in both the Main and East pits due to passive inflow of groundwater. The pit lake water quality is predicted to have elevated concentrations of antimony, fluoride, mercury, molybdenum, sodium, selenium, and TDS and are projected to exceed their respective reference NDEP Profile III values in both the Main Pit and East Pit lakes over the 100-year post-mining simulation period. There is uncertainty regarding the water quality that would develop in the pit lake and the potential risk to wildlife.

Mitigation WR-4, Rapid Fill: The Reduced Mine Plan Alternative would be modified to include a plan for rapid filling of the pit lake at closure. The rapid filling would be achieved by using the Klondike wellfield water supply and delivery pipeline system into each lobe of the pit at an average annual rate of 250 gpm (i.e., total of 500 gpm to supply both pit lobes) until the pit lakes reach and maintain hydraulic equilibrium. The groundwater model results predict that with rapid filling, hydraulic equilibrium would be reached in both pit lakes within 1 year. The simulations also predict that once filled to the equilibrium level, passive groundwater inflow to the pit is sufficient to maintain the water levels such that further addition of pumped groundwater would not be necessary.

Effectiveness: A hydrogeochemical evaluation was performed to evaluate the projected change in the pit lake water quality that likely would result from implementation of the rapid filling scenario for the Reduced Mine Plan Alternative (SRK 2018a). Predicted pit lake water quality at selected time intervals over the 100-year post-mining period for the Main Pit and East Pit for the Reduced Mine Plan Alternative rapid fill scenario show that the TDS concentrations (i.e., salinity) of the pit lakes are predicted to steadily increase overtime in response to evaporation. However, the results of the evaluation indicate that the concentrations of most chemical constituents of concern would be reduced compared with the Reduced Mine Plan Alternative passive inflow scenario. Although the concentrations are reduced under the rapid fill scenario, the predicted concentrations of antimony, fluoride, mercury, molybdenum, sodium, selenium, and TDS are projected to exceed their respective reference NDEP Profile III values in both the Main Pit and East Pit lakes over the 100-year post-mining simulation period.

An ERA was used to evaluate risk to terrestrial and avian life from consumption and interaction with the pit lake water quality. The results of the ERA and the evaluation of potential impacts to terrestrial and avian life are provided in Section 4.1.5, Wildlife Resources (Including Migratory Birds).

4.1.2.4 Partial Pit Backfill Alternative

Under the Partial Pit Backfill Alternative, the open pit mining and water management would be the same as described for the Proposed Action through end of mining. As a result, the potential impacts to groundwater levels, and impacts to surface water resources and water rights at the end of mining under the Partial Pit Backfill Alternative would be the same as described as the Proposed Action. The placement of backfill in the pits would eliminate pit lake development. Therefore, the long-term evaporative loss from the pit lake surface at an estimated rate of approximately 22.1 gpm (after the lakes reach equilibrium under the Proposed Action) would not occur. Also, water required for rapid filling of the pit lakes included under the Proposed Action would not be used under the Partial Pit Backfill Alternative. Impacts to the watershed area and drainage area would be similar to those described for the Proposed Action. As with the Proposed Action, the overall impacts to the ephemeral watershed areas associated with the construction, operation, and closure of the mine are expected to be minor, localized to regional, and long-term.

Groundwater Quantity Impacts: Under the Partial Pit Backfill Alternative, the open pit mining and water management would be the same as described for the Proposed Action through end of mining. As a result, the potential impacts to groundwater levels, surface water resources, and water rights at the end of mining under the Partial Pit Backfill Alternative would be the same as described as the Proposed Action. The placement of backfill in the pits would eliminate pit lake development.

The calibrated groundwater model developed for the Gemfield Project was used to evaluate the groundwater flow through the backfilled pit area under the Partial Pit Backfill Alternative scenario (SRK 2017e). The results of the model simulations indicate that during the post-mining period, the groundwater levels would recover within the backfill material to approximate pre-mine conditions. As the groundwater elevations recover, a general south to north groundwater flow-through system would re-establish across the pit area (SRK 2017e). The model simulations indicate that the groundwater inflow and outflow stabilize at approximately 50 years closure. From this point on through the end of the 100-year simulation, the groundwater inflow and outflow are approximately 15 gpm.

Groundwater Quality Impacts: Geochemical modeling was conducted to predict the water quality within the backfill material over the post-closure period (SRK 2018b). The modeling results predict that the groundwater quality would be moderately alkaline (pH 8.4 to 9.0) with concentrations of chloride, fluoride, mercury, nickel, antimony, selenium, sulfate, and TDS that would exceed the NDEP Profile II reference values.

Solute transport modeling was used to estimate the changes in water quality that likely would occur as the groundwater within the backfill material migrates downgradient from the pit (SRK 2018b). The solute modeling was used to evaluate two scenarios: 1) dispersion only; and 2) dispersion with absorption along the flow path. The second scenario that included both dispersion and absorption process along flow path demonstrates that concentrations of antimony, selenium, nickel, and mercury would remain below NDEP Profile II reference values at all downgradient observations point (SRK 2018b). These results predict that the elevated antimony, selenium, nickel, and mercury constituents in the backfill would be effectively attenuated from solution by absorption processes as groundwater migrates away from the pit. Conversely, fluoride and sulfate would not be attenuated through absorption processes. As a result, fluoride and sulfate are predicted to exceed the NDEP Profile II reference values for groundwater extending greater than 500 meters downgradient of the northern edge of the pit (SRK 2018b). These downgradient groundwater quality impacts are considered moderate to major, long-term, and regional.

Surface Water Impacts: Surface water impacts would be the same as under the Proposed Action.

Water Rights Impacts: Impacts to water rights would be the same as described for the Proposed Action.

Watershed and Drainage Impacts: Impacts would be the same as under the Proposed Action.

WRDA Impacts: These impacts would be the same as under the Proposed Action.

HLP and Other Facilities Impacts: These would be the same as under the Proposed Action

Recommended Monitoring and Mitigation Measures

The potential monitoring and mitigation measures identified for the Proposed Action also would apply to the Reduced Mine Plan Alternative. The following additional monitoring and mitigation measures would apply if the Partial Pit Backfill Alternative is authorized by the BLM.

Monitoring WR-5, Backfill Monitoring and Analysis Plan: There is uncertainty regarding the assumptions assumed for the properties of the pit backfill material. For example, the reactive mass analysis is based on assumed properties derived from literature research on similar materials rather than site-specific data. Verification testing and analysis would be required to verify and refine the results of the geochemical modeling used to predict the groundwater quality that would develop both within and

immediately downgradient of the pit. A comprehensive monitoring plan would be developed that would include site-specific sampling and analyses of backfill material. The plan would specify the sampling and analysis methods and procedures. The sampling and analysis would include a schedule for commencement of sampling that would occur as soon as possible upon initiation of mining and would continue on a regular basis until the end of mining or until the BLM (in consultation with the NDEP) determines that ongoing sampling and analysis is no longer necessary. This sampling and analysis would be accomplished by a BLM-approved third-party consultant who would be required to provide their results of the sampling and analysis to the BLM within 90 days of sample collection. The results of this analysis would be used to more accurately determine the reactive mass characteristics, update the geochemical modeling predictions, and refine the capture and treat mitigation measure outlined below if necessary. Conducting the additional sampling and analysis combined with updating the geochemical modeling as outlined in the above monitoring measure is expected to effectively reduce (but not entirely eliminate) the uncertainty associated with the geochemical modeling.

Issue: The estimated long-term steady-state groundwater outflow of approximately 15 gpm from the pit backfill material is predicted to degrade downgradient groundwater quality. Specifically, fluoride and sulfate are predicted to exceed the Nevada Secondary Enforceable Drinking Water Standards in groundwater extending greater than 500 meters downgradient of the northern edge of the pit.

Mitigation WR-6, Groundwater Management Plan (Capture and Treat): The mine operator would be responsible for development of a detailed, long-term management plan to capture and treat groundwater flowing out of the pit backfill material. The plan would specify the construction, operation, and maintenance of capture wells and water quality treatment and management system or other demonstrated technologies designed to prevent downgradient groundwater degradation (i.e., exceedance of Nevada Drinking Water Standards). The plan would provide plans for installation and operation of a compliance monitoring system that would include monitoring wells located downgradient of the capture wells (if installed). The plan also would include a cost estimate for construction and long-term operation of the system (including monitoring) during the closure and post closure. This plan would be submitted for approval by the BLM and NDEP prior to final authorization to commence mining.

Effectiveness: Implementation of the BLM and NDEP long-term management plan would effectively mitigate impacts to groundwater quality downgradient from the capture wells or alternative approved water quality treatment and management system.

4.1.3 Soils

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 proposed Project components.

4.1.3.1 Proposed Action

Surface Disturbance

Direct effects would include the disturbance of 1,216.3 acres including approximately 1,072.9 acres of new surface disturbance and 143.4 acres of existing disturbance. In addition, approximately 121 acres would be disturbed by exploration activities to support the proposed Project. However, the location(s) of additional exploration activity and therefore future disturbance is not known at this time.

The effect of removing native soil causes the mixing of soil horizons that can result in the degradation or loss of soil function. This disturbance, as well as long-term storage in stockpiles, can alter soil productivity by affecting its permeability, structure, and microbial activity. Indirect effects would include dispersion and mobilization of soils via wind and water erosion. These effects to soils would be considered localized, moderate, and long-term.

Approximately 509 acres of permanent disturbance would result from the removal of native soils with construction of the open pit, West and Northeast diversion channels, East Channel, Southeast Diversion

Berm, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East County Road realignment, ROW access roads, water wells and road access, and Booster Station #2, as these mine and ROW components would not be reclaimed resulting in moderate, permanent, localized effects.

The historic tailings would be buried underneath the East WRDA. Burying the historic tailings would isolate the tailings from exposure to meteoric water and atmospheric oxygen, and limit seepage infiltration into the underlying soil and groundwater. This activity would represent a moderate beneficial impact to the study area by limiting underlying soil and groundwater exposure to the contaminants present in the historic tailings. Additionally, moderate beneficial effects to the study area would result from the reclamation and revegetation of approximately 150 acres of historic tailings, which primarily includes barren land with sparse vegetation in localized areas.

Approximately 828 acres of existing surface disturbance would be reclaimed using growth salvaged from the study area. Available growth media quantities by major facilities are provided in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b), which lists that approximately 5.4 million cubic yards of suitable growth media is available for salvage from the open pit and Heap Leach Facility areas and approximately 1 million cubic yards of growth media would be needed for reclamation.

Applicant-committed EPMs as outlined in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b) and BMPs (BLM 2013) would be implemented to limit erosion, trap sediment, and control stormwater from the effects of wind, precipitation, and stormwater run-off from Project facilities and on disturbed areas during construction, operation, and initial stages of reclamation. Effects to soils from Project-related activities would be localized, moderate, and long-term.

Revegetation of disturbed areas would reduce the potential for wind and water erosion. Upon reaching final grade 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. Revegetation concurrent with construction activities would be maximized to the extent practicable to accelerate revegetation of newly disturbed areas and areas currently covered by historic tailings. Revegetation monitoring and ongoing maintenance and inspection of BMPs during the required reclamation monitoring period would facilitate successful control of accelerated erosion. Such monitoring and any necessary corrective practices would be implemented as described in an approved Reclamation Plan. Stormwater and erosion control BMPs would include regular inspections, performance evaluations, and would be repaired, as needed.

Overall site productivity primarily is a vegetation measure. Productivity varies according to vegetation type, but more importantly, with land management objectives as they relate to desirable or productive vegetation types. In contrast, soil quality is an inherent soil resource characteristic involving aeration, permeability, texture, salinity and alkalinity, microbial populations, fertility, and other physical and chemical characteristics that are accepted as beneficial to overall plant growth and establishment. Based on this concept, there would be moderate effects to the existing quality of native soils from Project-related disturbance. Growth media salvage, transport and storage, and redistribution would modify existing soil structure, which would affect aeration and permeability. It is likely that some mixing of textural zones would occur, as well as mixing of saline or alkaline materials with relatively salt-free materials, which may result in chemical effects to soil quality for seedbeds. In addition, microbial populations that currently exist in the growth media likely would decrease during stockpiling and storage resulting in minor, long-term, localized effects.

Effects to soil would be reduced by GRL's commitment to reclaim Project facilities and successfully restore lands to pre-mining productivity and land uses. These objectives would be attained through the implementation of BMPs and applicant-committed EPMs, and the use of site-adapted plant species for reseeding. In addition, state and federal reclamation requirements would require revegetation monitoring in comparison with established quantitative standards for the locale. A period of overall reclamation monitoring (and maintenance as necessary) is required prior to BLM approval of reclamation bond release. Based on these requirements, it is likely that long-term (e.g., up to 10 years or more) decreases

in soil quality would not limit the attainment of overall post-mining land use objectives. Over time, soil quality on reclaimed and revegetated sites would resemble pre-mining conditions. ROWs would be reclaimed per BMPs and applicant-committed EPMs, as outlined in the POD.

Water Management Activities

The groundwater drawdown effects associated with pit dewatering activities is not expected to affect soils inside the predicted mine-related 10-foot groundwater drawdown contour or hydric soils associated with springs, which are located outside of the predicted mine-related 10-foot groundwater drawdown contour.

Recommended Monitoring and Mitigation Measures

No mitigation or monitoring measures are recommended for soils.

4.1.3.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated effects to soil resources would not occur and the beneficial moderate effects from covering and reclaiming the historic tailings would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations. Under the No Action Alternative, GRL currently is authorized to conduct exploration activities on 23.84 acres of BLM-administered land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. This project would be within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Monitoring and Mitigation Measures

No mitigation or monitoring measures are recommended for soils.

4.1.3.3 Reduced Pit Mine Plan Alternative

Surface Disturbance

Effects to soils under the Reduced Pit Mine Plan Alternative would be similar to those identified for the proposed Project. However, this alternative would result in approximately 48 fewer acres of permanent disturbance, as compared to the proposed Project because of a reduced open pit configuration. This alternative also would result in approximately 87 fewer acres of disturbance to soils as compared to the proposed Project. Two of the 87 acres would be associated with existing historic tailings/disturbed areas within the Plan boundary.

Under this alternative, mine-related activities would be reduced approximately 1 year resulting in a corresponding reclamation schedule to achieve reclamation goals. No changes to the construction of ROWs would occur under this alternative.

Water Management Activities

Effects to soils from water management activities would be the same as described for the Proposed Action.

Recommended Monitoring and Mitigation Measures

No mitigation or monitoring measures are recommended for soils.

4.1.3.4 Partial Pit Backfill Alternative

Surface Disturbance

Effects to soils would be the same as described for the proposed Project, except that less salvaged growth media would be required for reclamation of the East WRDA since the height of this Project component would be lower and it would have less surface area than the proposed Project.

Water Management Activities

Effects to soils from water management activities would be the same as described for the Proposed Action.

Recommended Monitoring and Mitigation Measures

No mitigation or monitoring measures are recommended for soils.

4.1.4 Vegetation (Including Noxious Weeds, Invasive, and Non-Native Species)

4.1.4.1 Proposed Action

Surface Disturbance

Direct effects of the proposed Project would include the removal of approximately 1,067 acres of vegetation. The surface disturbance associated with Project-related activities would result in the conversion of shrub-dominated vegetation cover types to grass/forb-dominated vegetation cover types in the short-term. The loss of shrub-dominated vegetation would represent a localized, moderate, long-term effect as it would take up to 25 years following reclamation for mature shrubs to become re-established.

Approximately 509 acres of permanent effects would result from the construction of the open pit, West and Northeast diversion channels, East Channel, Southeast Diversion Berm, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East County Road realignment, ROW access roads, water wells and road access, and Booster Station #2, as these mine and ROW components would not be reclaimed. Therefore, direct impacts to vegetation from disturbance are anticipated to be minor, long-term (permanent for the 509 acres associated with the facilities described above), and localized.

Reclamation would be completed on approximately 828 acres (approximately 62 percent) of the total proposed surface disturbance area. To minimize effects to vegetation, reclamation would be conducted as soon as practical, with concurrent reclamation implemented to the maximum extent possible, as discussed in the EPMs in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b). Reclamation activities may include, but are not limited to, grading of final slopes, ripping of compacted soil, application of growth media, and broadcasting of seed. Seed mixes, as described in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b), would be used for reclamation. The revegetation of disturbance areas is anticipated to occur approximately 10 to 15 years following reclamation. After Year 25, the reclaimed plant communities likely would consist of a mixture of herbaceous plants and shrubs would provide adequate vegetative cover and species diversity to substantially reduce the potential for soil erosion and provide forage for use by livestock and wildlife.

The historic tailings would be buried underneath the East WRDA. Burying the historic tailings would isolate the tailings from exposure to meteoric water and atmospheric oxygen, and limit seepage infiltration into the underlying soil and groundwater. This activity would represent a major beneficial impact to the study area by limiting exposure to the underlying contaminants present in the historic tailings. Additionally, major beneficial effects to the study area would result from the reclamation and revegetation of approximately 150 acres of historic tailings, which is currently barren of vegetation.

Indirect impacts from the spread and establishment of noxious weeds and invasive species include decreased resilience in native plant communities. This means native plant communities would be less resilient to disturbance (e.g., wildland fire, drought) with the presence of weedy species, which increases

susceptibility for transition to a less desirable vegetative state and makes restoration of the invaded communities more difficult.

Impacts from the proposed Project from the spread and establishment of noxious weeds and invasive species are expected to be localized, long-term, and negligible, given the implementation of the Noxious Weed Management Plan (GRL 2018a).

Water Management Activities

The groundwater drawdown effects associated with pit dewatering activities is not expected to affect upland vegetation inside the predicted mine-related 10-foot groundwater drawdown contour or wetland or riparian vegetation associated with springs, which are located outside of the predicted mine-related 10-foot groundwater drawdown contour.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for vegetation beyond the post reclamation monitoring required prior to bond release.

4.1.4.2 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated effects to vegetation resources would not occur and the beneficial effects from covering and reclaiming approximately 150 acres of the historic tailings as well as treating existing noxious weeds and invasive species populations would not occur. Under the No Action Alternative, GRL currently is authorized to conduct exploration activities on 23.84 acres of BLM-administered land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would be analyzed separately and developed under ROW authorization N-31308.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for vegetation.

4.1.4.3 Reduced Pit Mine Plan Alternative

Surface Disturbance

Effects to vegetation under the Reduced Pit Mine Plan Alternative would be similar to those identified for the proposed Project. However, this alternative would result in approximately 48 fewer acres of permanent disturbance, as compared to the proposed Project because of a reduced open pit configuration. This alternative also would result in approximately 87 fewer acres of disturbance including approximately 84 acres of mixed desert shrub and 0.5 acre of fourwing saltbush, as compared to the proposed Project. The remaining 2 acres would be associated with existing historic tailings/disturbed areas within the Plan boundary. Therefore, impacts to vegetation from the Reduced Mine Plan Alternative are anticipated to be minor, long-term, and localized to the study area.

Under this alternative, mine-related activities would be reduced approximately 1 year resulting in a corresponding reclamation schedule to achieve reclamation goals. No changes to the construction of ROWs would occur under this alternative.

Water Management Activities

Effects to vegetation from water management activities would be the same as described for the proposed Project.

Recommended Monitoring and Mitigation Measures

Same as the Proposed Action.

4.1.4.4 Partial Pit Backfill Alternative

Surface Disturbance

Effects to vegetation would be similar to those described for the proposed Project, except less reclaimed vegetation would become established on the East WRDA since the height of this Project component would be lower and have less surface area than the proposed Project. Therefore, impacts to vegetation from the Partial Pit Backfill Alternative are anticipated to be minor, long-term, and localized to the study area.

Water Management Activities

Effects to vegetation from water management activities would be the same as described for the proposed Project.

Recommended Monitoring and Mitigation Measures

Same as the proposed Project.

4.1.5 Wildlife Resources (Including Migratory Birds)

4.1.5.1 Proposed Action

The proposed Project (including ROW authorizations) would result in the long-term localized reduction of 1,067.3 acres of wildlife habitat, including 1,026.5 acres of mixed desert shrub, 36.6 acres of fourwing saltbush association, and 4.2 acres of sagebrush shrubland. The disturbance associated with the proposed Project would be reclaimed following completion of project-related activities except for approximately 509 acres that would not be reclaimed. Proposed Project components that would not be reclaimed include the open pit, West and Northeast diversion channels, East Channel, diversion berms, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East Access County Road realignment, ROW access roads, water wells and road access, and Booster Station #2. Therefore, direct impacts to wildlife habitat from disturbance are anticipated to be minor, long-term (permanent for the 509 acres associated with the facilities described above), and localized.

Effects to wildlife from proposed surface disturbance activities would include the long-term localized reduction or loss of habitat. 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 re-established.

The historic GCMC tailings would be buried underneath the barren Gemfield waste rock in the East WRDA. Burying the historic GCMC tailings would isolate the tailings from exposure to meteoric water and atmospheric oxygen, and limit seepage infiltration into the underlying soil and groundwater. This would benefit the surrounding habitat for wildlife species in the area by limiting vegetation exposure to the underlying contaminants present in the historic tailings and providing approximately 150 acres of additional habitat following successful reclamation.

Big Game Species: Potential direct effects to mule deer and pronghorn would include the incremental long-term reduction of 1,067.3 acres of potential forage and the incremental increase in habitat fragmentation from vegetation removal associated with proposed Project activities. In addition, big game may experience increased mortality rates due to increased vehicle traffic on the haul roads associated with the proposed Project. Vehicular traffic may injure or kill individuals and local populations may experience higher levels of mortality due to increased use of roads in the immediate Project vicinity.

Therefore, potential effects to big game species from the proposed Project would be considered minor, long-term, and localized.

Small Game Species: Direct effects to small game species (i.e., chukar, mourning dove) would include the incremental long-term reduction of 1,067.3 acres of potentially suitable habitat. Effects also would include displacement from the disturbance areas and increased habitat fragmentation, until reclamation has been completed and vegetation is re-established. In most instances, suitable habitat adjacent to disturbance areas would be available for use by these species. However, displacement would increase competition and could include some local reductions in wildlife populations if adjacent habitats are at carrying capacity. Potential effects also could include nest abandonment or loss of eggs or young. However, potential effects to small game from the proposed Project activities are expected to be minor, long-term, and localized. These temporary losses would reduce productivity for that breeding season.

Nongame Species: Effects to nongame species would be similar to small game species and are expected to be minor, long-term, and localized. These temporary losses would reduce productivity for that breeding season.

Bats

Of the 13 bat species that could occur in the study area, 10 species (i.e., pallid bat, Townsend's big-eared bat, big brown bat, silver-haired bat, hoary bat, fringed myotis, western small-footed myotis, Yuma myotis, Brazilian free-tailed bat, and canyon bat) have been documented within the study area (BLM 2004a; Bradley et al. 2006; NDOW 2013c; WRC 2012, 2004). Although not documented acoustically within or near the study area, potentially suitable habitat for the remaining three species (i.e., spotted bat, California myotis, and long-legged myotis) occurs within the study area. Implementation of the proposed Project could result in direct and indirect effects to local bat species and their habitat. Direct effects would include the long-term loss of foraging habitat, including 1,067.3 acres of potentially suitable habitat from the development of the proposed Project. In addition, a Bird and Bat Conservation Strategy has been developed for the proposed Project and would be updated as necessary in consultation with BLM, NDOW, and USFWS. Therefore, potential effects to these species from the proposed Project would be considered minor, long-term, and localized.

Passerines

Potential direct effects to these bird species would include the temporary loss of 1,067.3 acres of potentially suitable breeding, roosting, and foraging habitat. However, this temporary loss is expected to have little effect on local bird populations based on the amount of suitable breeding and foraging habitat in the surrounding area. In addition, a Bird and Bat Conservation Strategy has been developed for the proposed Project and would be updated as necessary in consultation with BLM, NDOW, and USFWS.

As discussed in GRL's EPM in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b), land clearing and surface disturbance would be scheduled to prevent destruction of active bird nests or chicks during the avian breeding season as determined by the BLM to comply with FLPMA 43 U.S.C. 1701(a) Sec. 102 (8), NEPA requirements for a description of baseline conditions and anticipated Project-related impacts, as well as BLM BMPs for wildlife use of habitat. With implementation of these measures, effects to nesting migratory bird species within the study area would be limited primarily to temporary habitat loss. This loss is anticipated to have little effect given the extent of native habitats in the surrounding region. Therefore, potential effects to these species from the proposed Project would be considered minor, long-term, and localized.

Golden Eagles and Other Raptors

Potential direct effects to raptor species would include the temporary loss of 1,067.3 acres of potentially suitable breeding, roosting, and foraging habitat. However, this temporary loss is expected to have little effect on local raptor populations based on the amount of suitable breeding and foraging habitat in the surrounding area. In addition, a Bird and Bat Conservation Strategy, which includes protection strategies for golden eagles and other raptor species, has been developed for the proposed Project and would be updated as necessary in consultation with BLM, NDOW, and USFWS.

As discussed for passerines, land clearing and surface disturbance would be timed to prevent destruction of active bird nests or chicks during the avian breeding season as determined by the BLM to comply with FLPMA 43 U.S.C. 1701(a) Sec. 102 (8), NEPA requirements for a description of baseline conditions and anticipated Project-related impacts, as well as BLM BMPs for wildlife use of habitat. With implementation of these measures, effects to nesting golden eagles and other raptor species within the study area would be limited primarily to temporary habitat loss. This loss is anticipated to have little effect given the extent of native habitats in the surrounding region.

As described in ROW Authorizations, Actions, and Relinquishments in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b), new power transmission lines would be constructed to accommodate the proposed Project. Power transmission lines may pose an electrocution hazard for raptor species attempting to perch on the structures, as well as incrementally increase the collision potential for migrating and foraging bird species. However, collision potential typically is dependent on variables such as the location in relation to high-use habitat areas (e.g., nesting, foraging, and roosting), line orientation to flight patterns and movement corridors, species composition, visibility, and line design (APLIC 2006). As discussed in GRL's EPMs in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b), GRL has committed to design and construct power lines in accordance with APLIC (2012) guidelines to minimize raptor electrocutions and collision potential.

Therefore, potential effects to these species from the proposed Project would be considered minor, long-term, and localized.

Human Presence and Noise

The most common wildlife responses to noise and human presence are avoidance or accommodation. Avoidance would result in displacement of animals from an area larger than the actual disturbance area. The total extent of wildlife avoidance from Project-related activities is impossible to predict since the degree of responses varies from species to species and can even vary between individuals of the same species. Also, after initial avoidance of human activity and noise-producing areas, certain wildlife species may acclimate to the activity and begin to re-occupy areas formerly avoided. In addition to avoidance response, increased human presence intensifies the potential for wildlife/human interactions ranging from harassment of wildlife to illegal harvest (i.e., poaching).

Applicant-committed EPMs would be implemented to minimize the potential effects related to increased human presence in the study area. First, wildlife protection policies would be developed that would prohibit hunting, feeding, or harassment of wildlife unless attempting to move wildlife off the site. Second, GRL employees would be trained to monitor the mining and process areas for the presence of larger wildlife (such as deer) and sensitive species (such as avian wildlife) protected under the Migratory Bird Treaty Act. Mortality information would be collected and reported on a quarterly basis in accordance with the NDOW industrial artificial pond permit. Therefore, potential effects to wildlife from the proposed Project would be considered minor, long-term, and localized.

Water Management Activities

The groundwater drawdown effects associated with pit dewatering activities is not expected to affect upland habitat inside the predicted mine-related 10-foot groundwater drawdown contour or wetland or riparian habitat associated with springs, which are located outside of the predicted mine-related 10-foot groundwater drawdown contour. Potential effects to groundwater and surface water features in the Project vicinity as a result of water management activities are provided in the *Water Resources and Geochemistry Resource Report for the Gemfield Mine Project* (BLM 2018d).

Wildlife populations within the study area could be affected by exposure to mine-related process solutions, which could contain potentially toxic levels of cyanide. Potential sources for wildlife exposure to these solutions would include the proposed HLP, absorption, desorption, and refining plant, and associated process solution ponds.

To minimize potential wildlife mortalities from exposure to adverse cyanide concentrations in the heap leach processing solution, GRL would implement the following applicant-committed EPMs as discussed in GRL's EPMs in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b). An 8-foot-tall chain link fence would be installed around each process ponds, and solution ditches and ponds would be covered with netting, pond covers, or floating "bird balls" to minimize wildlife access to process solutions. In addition, the HLP, absorption, desorption, and refining plant, and process ponds would be designed and constructed as zero-discharge facilities to minimize the potential for release of process solutions outside of the appropriately protected containment areas as discussed in the Ore Processing section of the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b). Based on the applicant-committed EPMs, potential effects to wildlife resources from cyanide ingestion would be minor, long-term, and localized.

Pit Lake: It is anticipated that the proposed Project would result in the formation of two separate, but hydraulically connected, pit lakes in the West and East lobes of the open pit.

Per BLM guidelines (BLM 2004b), an ERA is required to assess potential risks resulting from open pit expansion to determine if predicted (modeled) concentrations of chemicals in the pit lake water reach levels that present a potential toxicological hazard to ecological receptors. Chemicals of Potential Ecological Concern (COPECs) include antimony, fluoride, mercury, molybdenum, selenium, sodium, uranium, and TDS.

Overview: In the ERA, predicted concentrations of COPECs were modeled for each of the future pit lakes at 1, 2, 5, 10, 25, and 100 years' post-closure, providing insights on changes in toxicity to receptor species as changes in water quality occur over time (SRK 2018c). These concentrations were then compared with Toxicity Reference Values (TRVs) derived for each receptor based on the estimated exposure from the pit lakes.

The predicted post-mining pit lakes could provide a water resource that might attract mammal and bird species typical of the arid and semi-arid environments of central Nevada. Due to steep pit walls (10 percent to near vertical slopes) and small size of the pit lakes, coupled with the predicted depth of the pit lakes (more than 30 meters) and anticipated oligotrophic characteristics (low primary productivity), the development of an appreciable littoral habitat and associated aquatic community and littoral habitat is assumed to be limited.

Conceptual Site Model: As part of the evaluation, a simplified conceptual site model (CSM) was developed, identifying viable pathways through which species likely would be exposed to COPECs.

The CSM was based on several critical assumptions regarding the use of pit lakes as drinking water sources. Because these assumptions are fundamental to the results of the ERA, the assumptions were evaluated to determine if they were reasonable.

- Assumption 1: Elevated salinity levels would render the water unpalatable by mammals when TDS >10,000 mg/L, therefore mammalian exposure to pit lake water would cease at Year 25.
- Assumption 2: Alternative drinking water sources in existence today (e.g., springs) would continue to exist in perpetuity and offer a viable alternative drinking water supply for mammals.
- Assumption 3: Avian species often do not reject high salinity drinking water and therefore use of the proposed pit lakes as a drinking water source continues at least through Year 100.
- Assumption 4: Animals are known to derive water for metabolic needs from the ingestion of both food and drinking water. The ERA adjusted drinking water exposure as a function of: 1) water derived from food for each species, and 2) annual use of the proposed pit lakes for migratory and volant species.
- Assumption 5: Drinking water was assumed to be a more significant route of exposure than dietary, particularly in the absence of a long-term substantive aquatic community. As a result,

biomagnification of some COPECs (mercury, selenium) was not considered a viable exposure pathway.

- Assumption 6: No USEPA TRVs available for avian species (USEPA 2005). The ERA evaluated the available literature and developed a TRV based on the best available data.

Receptor Species. Selected receptor species included little brown bat (*Myotis lucifugus*), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), wild horse (*Equus ferus*), kit fox (Vulpes macrotis), antelope ground squirrel (*Ammospermophilus leucurus*), Great Basin pocket mouse (Perognathus parvus), spotted sandpiper (*Actitis macularius*), pronghorn (*Antilocapra americana*), golden eagle (*Aquila chrysaetos*), American kestrel (*Falco sparverius*), rough-winged swallow (*Stelgidopteryx serripennis*), turkey vulture (*Cathartes aura*), American avocet (*Recurvirostra americana*), red-tailed hawk (*Buteo jamaicensis*), mallard (*Anas platyrhynchos*), and mourning dove (*Zenaida macroura*).

Exposure Pathways. The ERA considered several exposure pathways that would contribute to exposure and uptake of COPECs. In comparison to the other exposure pathways, the ERA concluded that drinking pit lake water was the most relevant, direct, and complete exposure pathway.

Analysis: The potential exposure to proposed pit lake COPECs was based on exposure pathways for individual species. Drinking proposed pit lake water was the only viable exposure route, given the lack of a substantive habitat and associated aquatic community (SRK 2018c). Because most mammals would reject highly saline water when freshwater alternatives are available and because ingestion of high salinity water causes dehydration, nausea, diarrhea, and other symptoms, terrestrial species are expected to begin avoiding pit lake water as salinity increases and completely stop using the proposed pit lake water as a source of drinking water when TDS reaches 10,000 mg/L in the East Lobe pit lake at Year 25.

Avian species do not exhibit the same avoidance of highly saline water as observed in mammalian species. Migrating birds would use artificial waterbodies even when the water is hazardous or highly saline, particularly when alternative fresh waterbodies are unavailable. Contact with highly saline pit lake water may adversely affect plumage of birds, potentially resulting in loss of buoyancy and hypothermia. As a result, exposure of avian species to COPECs was continued through Year 100.

Critical input variables, such as body weight and water ingestion rates, were taken directly from the literature or calculated using standardized equations available from risk assessment documents. Adjustment factors were used to account for water requirements met by dietary intake, availability of alternative water sources, and seasonal presence of receptors to provide a more accurate site-specific risk estimate. Exposure assumptions and adjustment factors for all receptors were presented in detail in the ERA (SRK 2018c).

TRVs represent concentrations below which adverse effects are not expected to occur. The TRVs used in this ERA were selected from studies chosen as best representing the receptors being evaluated. For wildlife receptors, two TRVs were developed for each COPEC, as available, based upon (study) ingested dose and appropriate toxicological effect endpoint(s) (e.g., reproduction and growth):

- A No Observed Adverse Effects Level (NOAEL) TRV, assumed protective of individuals of a given representative species
- A Lowest Observed Adverse Effects Level (LOAEL) TRV, assumed protective of populations of a given representative species.

TRVs were derived from recognized literature sources including (e.g., USEPA 2005; Sample et al. 1996). The literature data were adjusted, as appropriate, by the application of uncertainty factors to a chronic (study duration) and toxicological endpoint (e.g., NOAEL). The NOAEL and LOAEL TRVs for the ERA provide a lower- and upper-bound of predicted effects, respectively.

Once appropriate uncertainty factors were applied to NOAELs and LOAELs, and TRVs derived, the exposure and toxicity assessments were integrated for the purposes of the risk characterization. In the

risk characterization, risk was quantified by calculating the ratio of the COPEC dose received by a given wildlife receptor and the corresponding TRV. Hazard quotients (HQs) were calculated by dividing the calculated dose for each receptor species by the TRV. HQ's were derived from NOAEL TRVs and, if the NOAEL HQ exceeded 1.0, then a HQ was derived from the LOAEL TRV. Results were quantified and implications to receptor populations were discussed qualitatively in the risk characterization.

Results

Results of the ERA for the proposed Project are presented in *Technical Memorandum: ERA for the Gemfield Pit Lake Analysis, Rapid Fill Scenario* (SRK 2018c). The ERA evaluated COPEC concentrations at multiple intervals up to 100-years post-closure of the proposed Project. When the calculated HQ was less than or equal to 1.0, adverse effects from the proposed pit lake water are not anticipated for the receptor species and COPECs. This included all COPECs except antimony, mercury, and molybdenum.

Antimony

For antimony, the HQ_{NOAELs} were exceeded (HQ>1) for all mammalian receptors in the 25-year post-closure scenarios with HQs ranging from 1.2 (black-tailed jackrabbit) to 4.2 (Great Basin pocket mouse). This suggests potential risk to mammalian organisms from exposure to water from both proposed pit lakes. Predicted antimony concentrations in the proposed East lobe pit lake suggest risk from antimony as early as Year 10 (pallid bat, kit fox, antelope ground squirrel, and Great Basin pocket mouse) and exceedances by Year 25 for all mammalian receptors. In the West lobe pit lake, exceedances are predicted by Year 25 for several receptors (pallid bat, kit fox, antelope ground squirrel and Great Basin pocket mouse). HQ_{NOAEL} values were less than 1.0 for black-tailed rabbit, pronghorn antelope, coyote and wild horse exposed to West lobe pit lake water at Year 25. While predicted concentrations of antimony in both pit lakes at Year 100 indicate potential risk for all mammals, the risk of toxicity from antimony in the East lobe pit lake to mammalian receptors is expected to decline after Year 25, since mammals would avoid using this drinking water source due to high salinity, thereby preventing or minimizing exposure. Therefore, impacts to mammalian receptors are anticipated to be minor, long-term, and localized.

Based on HQ_{NOAEL} values, no elevated risk was calculated for avian receptors from exposure to antimony. Therefore, negligible, long-term, and localized impacts are expected in avian individuals from exposure to antimony.

When the HQ_{NOAEL} exceeded a value of 1.0, the predicted concentration was compared to a LOAEL TRV. The LOAEL is the lowest concentration where adverse effects were observed. Based on HQ_{LOAEL} values, no elevated risk was calculated for any mammalian receptors from exposure to antimony during any year, including Year 100. Therefore, negligible, long-term, and localized impacts are expected in mammalian populations from exposure to antimony.

Mercury

The HQ_{NOAEL} for mercury in the proposed pit lakes was less than 1.0 for all mammalian receptors but exceeded 1.0 for the rough-winged swallow at Year 100. The HQ_{NOAEL} values that exceeded 1.0 ranged for the rough-winged swallow are 1.5 (East lobe pit lake) and 1.6 (West lobe pit lake). While TRVs from mercury are derived from toxicity studies with organic mercury that is more toxic than the inorganic mercury, mercury concentrations are based on inorganic mercury in the proposed pit lake water, which indicates that the TRVs are conservative (i.e., over-estimate risk).

Since two avian HQ_{NOAEL} values exceed a value of 1.0, the predicted concentrations were subsequently compared to LOAEL TRVs. Mercury HQ_{LOAEL} values did not exceed 1.0 for any avian receptor, indicating that negligible, long-term, localized impacts are anticipated in avian populations from exposure to mercury through Year 100. However, the proposed pit lake water quality model had not reached chemical equilibrium at Year 100 and mercury concentrations are likely to increase in subsequent years.

Molybdenum

A molybdenum HQ_{NOAEL} value for one mammalian receptor exceeds 1.0 by Year-10 of the proposed East lobe pit lake, whereas HQ_{NOAEL} values did not exceed 1.0 until Year 25 in the proposed West lobe pit lake. For molybdenum, the HQ_{NOAEL} value exceeds 1.0 beginning in Year 10 (wild horse) in the proposed East lobe pit lake. As molybdenum concentrations continue to increase over time, additional mammalian receptors have HQ_{NOAEL} values greater than 1.0 by Year 25 in the East lobe pit lake (HQ_{NOAEL} values range 2.0 to 2.7). In the proposed West lobe pit lake, HQ_{NOAEL} values exceed 1.0 for two mammalian receptors (pronghorn antelope and wild horse) by Year 25. By Year 100, mammalian HQ_{NOAEL} values exceeded 1.0 for six of eight mammalian receptors in both of the proposed pit lakes, though this over-estimates risk since mammals are expected to avoid drinking the proposed pit lake water after Year 25.

Based on HQ_{NOAEL} values, no elevated risk was calculated for avian receptors from exposure to molybdenum. Therefore, negligible, long-term, and localized impacts are expected in avian individuals from exposure to molybdenum.

Since some mammalian HQ_{NOAEL} values exceed a value of 1.0, predicted molybdenum concentrations were compared to LOAEL TRVs. Molybdenum HQ_{LOAEL} values did not exceed 1.0 for any mammalian receptors, indicating negligible, long-term, and localized impacts are anticipated in mammalian populations from molybdenum exposures through Year 100.

Conclusion

The NOAEL represents a conservative threshold where no toxicological effects are expected to occur to individuals. In contrast, the LOAEL represents the threshold where no adverse effects are anticipated to occur to populations of organisms. However, there is an area of uncertainty between NOAEL and LOAEL values. Adverse effects to individuals predicted based on HQ_{NOAEL} values do not necessarily imply adverse effects at the population or community level. In general, the goal of the ERA is to protect communities and populations (except in the case of threatened and endangered species), and not each individual in a population. Risk estimates derived as HQ_{NOAEL} values tend to overestimate risk at the population level.

Based on calculated HQ_{NOAEL} values for the mammalian species evaluated in the proposed Project ERA, there is possible risk of minor, long-term, and localized impacts to mammalian species resulting from drinking exposure to antimony and molybdenum (but not mercury) in the post-mining pit lakes. Antimony and molybdenum concentrations may cause minor, long-term, and localized impacts to individuals in one or more mammalian species as early as Year 10 in the East lobe pit lake, and by Year 25 in the West lobe pit lake. However, comparison of antimony and molybdenum concentrations with LOAEL values suggests that negligible, long-term, and localized impacts in mammalian populations would occur through Year 100 in either pit lake.

Based on HQ_{NOAEL} values, risk to avian species was not predicted for antimony or molybdenum, but minor, long-term, and localized impacts in individual rough-winged swallows could occur from mercury exposures in Year 100. In contrast, negligible, long-term, and localized impacts were predicted for avian populations based on HQ_{LOAEL} values. Recognizing that TDS is a poor indicator of toxicity, the ERA noted that birds show less behavioral avoidance of high saline water, which has occasionally lead to bird mortality, either through ingestion or via salt encrustation of plumage, which reduces buoyancy and can cause hypothermia, though the presence of alternative water sources may reduce this risk for birds. While TDS may result in occasional mortality to individuals or small groups of birds, it does not typically result in adverse impacts to avian species at the population level. Consequently, negligible, long-term, and localized impacts to avian populations are anticipated from exposures to any of the COPECs.

The assumption that mammals would reject proposed pit lake water as a drinking water source when TDS is 10,000 mg/L or more is a reasonable assumption (National Academy of Science 1972; University of Wyoming Extension 2017). However, if TDS concentrations do not increase as quickly as predicted, then HQ_{LOAEL} values suggest that minor, long-term, and localized impacts to mammalian populations from COPECS would not occur until after Year 100.

As part of the NDEP BMRR permanent closure requirements, pursuant to NAC 445A.446 and 445A.429, post-closure monitoring for the proposed pit lakes would occur for up to 30 years until the pit lakes have been shown to be chemically stabilized with no potential to degrade groundwater or adversely affect human, terrestrial, or avian life. If the NDEP BMRR determines that the pit lake has the potential to degrade groundwater or adversely affect human, terrestrial, or avian life, additional closure actions would be required after which a new post-closure monitoring period would begin. As part of post-closure monitoring for the proposed pit lakes, sampling and analysis for NDEP Profile III parameters would be required.

Hazardous Materials Spill

The potential for wildlife exposure to toxic chemicals from a transportation-related spill would be greatest if an accident were to occur near aquatic habitats (e.g., springs). Spills in dryland habitat would pose only minimal risk to most wildlife species since these spills would be adjacent to highways and could be rapidly contained and cleaned up. In general, the materials of greatest concern would be sodium cyanide, sodium hydroxide, and diesel fuel. The effects of a sodium cyanide or sodium hydroxide release would be highly variable and would depend on the quantity released, the location of the release (e.g., dry upland area, wet meadow area, or flowing stream area), the species exposed, and the chemical conditions at the release location. The most likely effect of a potential release of sodium cyanide would be the poisoning of terrestrial or aquatic species. Animal species that drink contaminated water could suffer severe effects or death depending on the concentration of sodium cyanide and the volume of the water consumed. Sodium hydroxide has the potential to cause minor to extensive burns to exposed animals. A diesel spill has the potential to contaminate soil, surface water, and groundwater in addition to harming aquatic life and vegetation. Although unlikely, such a spill also could ignite from the accident and cause a range fire. Since clean-up actions would take place rapidly, diesel contamination has a minor potential to result in long-term effects to soil, surface water, and possibly groundwater. Hazardous chemicals would be transported via USDOT-certified containers and transporters, and transportation of sodium cyanide and other chemical reagents would be in accordance with all applicable rules and regulations. In addition, as discussed in the Plan, GRL would implement their Spill Contingency Plan that establishes procedures for responding to accidental spills or releases of hazardous materials to minimize environmental risks. Therefore, potential effects to wildlife from the proposed Project would be considered minor, long-term, and localized.

Recommended Monitoring and Mitigation Measures

No mitigation or monitoring measures are recommended for wildlife.

4.1.5.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated effects to wildlife resources would not occur. Under this alternative, 1,067.3 acres of wildlife habitat would not be disturbed or lost, as described for the proposed Project. Additional habitat fragmentation and animal displacement would not occur, limiting the effects to wildlife resources to existing conditions. In addition, the benefit to wildlife and their habitat from covering and reclaiming approximately 150 acres of the historic tailings as described under the Proposed Action would not occur under the No Action Alternative. The level of human use would remain the same as the current levels. Completion of closure and reclamation activities associated with existing disturbance, and mineral exploration activities within the study area would be conducted under existing authorizations. Under the No Action Alternative, GRL is currently authorized to conduct exploration activities on 23.84 acres of BLM-administered land in the Plan boundary. Therefore, impacts to wildlife from the No Action Alternative are anticipated to be negligible, long-term, and localized.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD for the Project. The anticipated construction activities associated with this utility upgrade would be developed under ROW authorization N-31308.

Recommended Monitoring and Mitigation Measures

No mitigation or monitoring measures are recommended for wildlife.

4.1.5.3 Reduced Pit Mine Plan Alternative

Surface Disturbance

Effects to wildlife under the Reduced Mine Plan Alternative would be similar to those identified for the proposed Project. However, this alternative would result in approximately 48 fewer acres of permanent disturbance, as compared to the proposed Project because of a reduced open pit configuration. This alternative also would result in approximately 87 fewer acres of disturbance including approximately 85 acres of mixed desert shrub and fourwing saltbrush habitat, as compared to the proposed Project. The remaining 2 acres would be associated with existing historic tailings/disturbed areas within the Plan boundary. Therefore, potential effects to wildlife would be considered minor, long-term, and localized.

Under this alternative, mine-related activities would be reduced approximately 1 year resulting in a corresponding reclamation schedule to achieve reclamation goals. No changes to the construction of ROWs would occur under this alternative.

Human Presence and Noise

Effects to wildlife from human presence and noise would be the same as described for the proposed Project, except the duration of impacts would be reduced due to the Project life decreasing by 1 year under this alternative.

Water Management Activities

The Reduced Mine Plan Alternative results in a smaller overall mine plan that also would result in a Main lobe pit lake and an East lobe pit lake with smaller infill areas than the pit lakes included for the proposed Project. An ERA was prepared for this alternative, as presented in the *Technical Memorandum: ERA for the Gemfield Alternative Two: Smaller Pit Mine Plan* (SRK 2017d). In this ERA, minor, long-term, and localized ecological impacts are predicted to occur in the Main lobe pit lake by Year 2 and in the smaller, East lobe pit lake by Year 25. Based on HQ_{NOAEL} values, antimony is predicted to result in adverse effects in two mammalian receptors (pallid bat and Great Basin pocket mouse) by Year 2, and in all eight mammalian receptors by Year 25. Mammalian HQ_{NOAEL} values for antimony by Year 100 ranged 1.3 to 8.8. Based on HQ_{NOAEL} values, molybdenum is predicted to result in minor, long-term, and localized impacts to one mammalian receptor (wild horse) by Year 5, in four mammalian receptors (pronghorn, coyote, wild horse and kit fox) by Year 25, and in six of eight mammalian receptors by Year 100. Mammalian HQ_{NOAEL} values for molybdenum in excess of 1.0 by Year 100 ranged 1.3 to 2.7. Mercury was predicted to result in minor, long-term, and localized impacts to the rough-winged swallow, and selenium was predicted to result in minor, long-term, and localized impacts to the American kestrel and rough-winged swallow, at Year 100 based on HQ_{NOAEL} values.

Overall, minor, long-term, and localized impacts would occur sooner and impact more ecological receptors under the Reduced Mine Plan Alternative than under the proposed Project.

Hazardous Materials Spill

Effects to wildlife from a hazardous materials spill would be the same as described for the proposed Project.

Recommended Monitoring and Mitigation Measures

Issue: Wildlife exposure to potentially harmful pit lake water by Year 2 for the Main lobe pit lake and Year 25 for the East lobe pit lake.

Mitigation Measures W-1: An additional mitigation scenario involving rapid infilling of the pit lakes for the Reduced Mine Plan Alternative has been developed by GRL and is described in further detail in the

Project Alternatives Resource Report for the Gemfield Mine Project (BLM 2018b) and *Water Resources and Geochemistry Resource Report for the Gemfield Mine Project* (BLM 2018d). An ERA was prepared for this scenario, as presented in the *Technical Memorandum: ERA for the Gemfield Pit Lake Analysis, Alternative 2 Rapid Fill Scenario* (SRK 2018d).

Effectiveness: In the *Technical Memorandum: ERA for the Gemfield Pit Lake Analysis, Alternative 2 Rapid Fill Scenario* (SRK 2018d), minor, long-term, and localized ecological impacts aren't predicted to occur in the Main lobe pit lake until Year 25 or in the smaller, East lobe pit lake until Year 100. By Year 25, predicted concentrations of antimony in the Main lobe pit lake water results in HQ_{NOAEL} values greater than 1.0 (range 1.3 to 2.1) for five mammalian receptors (pallid bat, coyote, kit fox, antelope ground squirrel, and Great Basin pocket mouse); and predicted concentrations of molybdenum in Main lobe pit lake water result in HQ_{NOAEL} values greater than 1.0 (range 1.2 to 1.7) for four mammalian receptors (i.e., pronghorn, coyote, wild horse, and kit fox). By Year 100, predicted concentrations of antimony in the Main lobe pit lake water results in HQ_{NOAEL} values greater than 1.0 (range 1.8 to 5.5) for five mammalian receptors (pallid bat, coyote, kit fox, antelope ground squirrel, and Great Basin pocket mouse); and predicted concentrations of molybdenum in the Main lobe pit lake water result in HQ_{NOAEL} values greater than 1.0 (range 1.2 to 2.6) for six mammalian receptors (pronghorn, coyote, wild horse, kit fox, antelope ground squirrel, and Great Basin pocket mouse). At Year 100, the predicted concentration of antimony in the East lobe pit lake water results in an HQ_{NOAEL} value of 1.2 for the pallid bat, and an HQ_{NOAEL} value of 1.03 for the rough-winged swallow.

Overall, minor, long-term, and localized impacts would occur more slowly and affect fewer ecological receptors under this mitigation scenario than under the proposed Project.

4.1.5.4 Partial Pit Backfill Alternative

Surface Disturbance

Effects to wildlife would be similar to those described for the proposed Project, except less reclaimed vegetation (e.g., forage) would be established on the East WRDA since the height of this Project component would be lower and there would be less surface area than the proposed Project. Therefore, impacts to wildlife is anticipated to be minor, long-term, and localized under the Partial Pit Backfill Alternative.

Human Presence and Noise

Effects to wildlife from human presence and noise would be the same as described for the proposed Project.

Water Management Activities

Effects to wildlife from water management activities would be the same as described for the proposed Project, except under this alternative, no pit lakes would form and therefore, impacts associated with exposure to water in pit lakes would not occur.

Hazardous Materials Spill

Effects to wildlife from a hazardous materials spill would be the same as described for the proposed Project.

Recommended Monitoring and Mitigation Measures

No mitigation or monitoring measures are recommended for wildlife.

4.1.6 Special Status Species

4.1.6.1 Proposed Action

A total of 21 special status wildlife species and 7 special status plant species identified as potentially occurring within the study area have been analyzed for the proposed Project. Impact conclusions for each of

these species is presented in **Appendix C**, **Table C-2**, and additional details regarding the types of anticipated impacts from Project-related activities are presented below.

Surface Disturbance

The proposed Project (including ROW authorizations) would result in the long-term localized reduction of approximately 1,067.3 acres of potential special status species habitat, including approximately 1,026.5 acres of mixed desert shrub, 36.6 acres of fourwing saltbush association, and 4.2 acres of sagebrush shrubland. The disturbance associated with the proposed Project would be reclaimed following completion of mining operations and ROW construction, except for approximately 509 acres that would not be reclaimed. Proposed Project components that would not be reclaimed include the open pit, West and Northeast diversion channels, East Channel, diversion berms, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East Access County Road realignment, ROW access roads, water wells and road access, and Booster Station #2. Although this permanent disturbance to habitat would represent a major effect, the calculated intensity level would be moderate and localized.

Effects to special status species from surface disturbance activities would include the long-term localized reduction or loss of habitat. Habitat loss or alteration would result in direct losses of smaller, less mobile special status species, 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 special status species 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 re-established.

The historic GCMC tailings would be buried underneath the barren Gemfield waste rock in the East WRDA. Burying the historic GCMC tailings would isolate the tailings from exposure to meteoric water and atmospheric oxygen, and limit seepage infiltration into the underlying soil and groundwater. This would benefit the surrounding habitat for special status species in the area by limiting vegetation exposure to the underlying contaminants present in the historic tailings and providing approximately 150 acres of additional habitat following successful reclamation.

All cacti, yucca, and Christmas trees in Nevada are protected under NRS 527.060-120. During the 2012, 2013, and 2015 surveys, five different cacti/yucca species (not including sand cholla) were identified within the study area: Joshua tree, hairspine pricklypear, Wiggins' cholla, desert spinystar, and redspined fishhook cactus (Reynolds 2012; CHM2Hill 2014; Soil-Tech 2015). These species are protected under NRS 527.060.120, which prohibits the destruction, cutting, mutilating, or removal of cactus (*Cactaceae* ssp.) and yucca (*Yucca* ssp.) without the written permission of the landowner (e.g., BLM) and/or Nevada State Forester Firewarden (NRS 527). Based on the Joshua tree surveys that were conducted in the survey area, numerous trees potentially would be removed due to Project activities.

Therefore, potential effects to these species from the proposed Project would be considered moderate, long-term, and localized.

Human Presence and Noise

Effects to special status wildlife species from increased human presence and noise from construction and operation activities would be the same as those discussed in the *Wildlife Resource Report for the Gemfield Mine Project* (BLM 2018g). Effects to special status plant species may result from increased access to the plant locations.

Water Management Activities

Effects to special status wildlife species as a result of water management activities, specifically pit lake toxicology, would be the same as described in the *Wildlife Resource Report for the Gemfield Mine Project* (BLM 2018g).

Effects to special status plant species as a result of water management activities would be the same as described in the *Vegetation Resource Report for the Gemfield Mine Project* (BLM 2018f).

Hazardous Materials Spill

Effects to special status wildlife species as a result of a potential hazardous materials spill would be the same as described in the *Wildlife Resource Report for the Gemfield Mine Project* (BLM 2018g).

Effects to special status plant species as a potential hazardous materials spill would be the same as described in the *Vegetation Resource Report for the Gemfield Mine Project* (BLM 2018f).

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for special status species.

4.1.6.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated effects to special status species resources would not occur. Under this alternative, 1,067.3 acres of special status species habitat would not be disturbed or lost, as described for the proposed Project and beneficial effects from covering and reclaiming the historic tailings would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations for up to 23.84 acres of disturbance on BLM-administered land within the Plan boundary. Additional habitat fragmentation and animal displacement would not occur, limiting the effects to special status species resources to existing conditions. The level of human use would remain the same as the current levels. Completion of closure and reclamation activities associated with existing disturbance and mineral exploration activities within the study area would continue to be conducted under existing authorizations.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and would be permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for special status species.

4.1.6.3 Reduced Pit Mine Plan Alternative

Surface Disturbance

Effects to special status species under the Reduced Pit Mine Plan Alternative would be similar to those identified for the proposed Project. However, this alternative would result in approximately 48 fewer acres of permanent disturbance, as compared to the proposed Project because of a reduced open pit configuration. This alternative also would result in approximately 87 fewer acres of disturbance including approximately 84 acres of mixed desert shrub and 0.5 acre of fourwing saltbrush, as compared to the proposed Project. The remaining 2 acres would be associated with existing historic tailings/disturbed areas within the Plan boundary and is not considered habitat for special status species.

Under this alternative, mine-related activities would be reduced approximately 1 year resulting in a corresponding reclamation schedule to achieve reclamation goals. No changes to the construction of ROWs would occur under this alternative.

Human Presence and Noise

Effects to special status species from human presence and noise would be the same as described for the proposed Project, except the duration of impacts would be reduced due to the Project life decreasing by 2 years under this alternative.

Water Management Activities

Effects to special status species from water management activities would be the same as described for the proposed Project.

Hazardous Materials Spill

Effects to special status species from a hazardous materials spill would be the same as described for the proposed Project.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for special status species.

4.1.6.4 Partial Pit Backfill Alternative

Effects to special status species would be the same as described for the proposed Project, except that less reclaimed vegetation would become established on the East WRDA and available for use by special status species since the height of this Project component would be lower and have less surface area than the proposed Project.

Human Presence and Noise

Effects to special status species from human presence and noise would be the same as described for the proposed Project.

Water Management Activities

Effects to special status species from water management activities would be the same as described for the proposed Project, except impacts due to exposure to water in the pit lakes would not occur.

Hazardous Materials Spill

Effects to special status species from a hazardous materials spill would be the same as described for the proposed Project.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for special status species.

4.1.7 Range Resources

4.1.7.1 Proposed Action

Surface Disturbance

The proposed Project (including ROW authorizations) would result in the long-term localized reduction of 1,067.3 acres of vegetation (i.e., forage for livestock). Affected vegetation would include 1,063.1 acres of mixed desert shrub and fourwing saltbush association, and 4.2 acres of sagebrush shrubland. The disturbance associated with the proposed Project would be reclaimed following completion of Project-related activities except for approximately 509 acres that would not be reclaimed. Project components that would not be reclaimed include the open pit, West and Northeast diversion channels, East Channel, diversion berms, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East Access County Road realignment, ROW access roads, water wells and road access, and Booster Station #2. Reclamation would be completed on approximately 828 acres (approximately 62 percent) of the total proposed disturbance area (approximately 1,337 acres). The loss of rangeland and forage available for grazing would be considered during the formal allotment evaluation process. No direct effects to the two cattle guards in the study area, Silver Peak cattle guard and Ramsey Well Guard, are anticipated from the development of the Project.

Under the proposed Project (including ROW authorizations), a BLM-approved four-strand perimeter fence would be constructed along the Plan boundary. The perimeter fence would exclude livestock from approximately 990 acres of rangeland for the duration of the Project; this fence would be removed at the end of mine operations. The disturbance to rangeland in the Montezuma Grazing Allotment would be less than 1 percent of the Montezuma Grazing Allotment acreage and represent a localized, short-term, negligible effect.

The historic GCMC tailings would be buried underneath the barren Gemfield waste rock in the East WRDA. Burying the historic GCMC tailings would isolate the tailings from exposure to meteoric water and atmospheric oxygen, and limit seepage infiltration into the underlying soil and groundwater. This would benefit the range resources in the area by limiting exposure to the underlying contaminants present in the historic tailings, and by providing additional forage for livestock following mine closure and successful reclamation.

Less than 1 percent of the Montezuma Grazing Allotment acreage would be disturbed due to construction and operation activities. The intensity of rangeland loss is negligible to minor because it is anticipated that there would be no changes to AUMs based on implementation of the Proposed Action. The duration of effects is expected to be permanent as the loss of the 509 acres of rangeland would last beyond the duration of the Project. The context is localized as effects would be limited to the Project area only.

Water Management Activities

It is anticipated that mine-related groundwater drawdown would not result in direct effects to range resources within the predicted 10-foot groundwater drawdown contour as the water table in the Project area is greater than 50 feet below the surface. Therefore, range resources in the Project area would not be affected by the lowering of the water table. Potential effects to groundwater and surface water features in the Project vicinity as a result of water management activities are provided in the *Water Resources and Geochemistry Resource Report for the Gemfield Mine Project* (BLM 2018d).

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for range resources.

4.1.7.2 No Action Alternative

Under the No Action Alternative, the Project would not be developed and associated effects to range resources would not occur and the beneficial effects from covering and reclaiming the historic tailings would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations. Under the No Action Alternative, GRL currently is authorized to conduct exploration activities on 23.84 acres of BLM-administered land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would be developed under ROW authorization N-31308 and permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for range resources.

4.1.7.3 Reduced Pit Mine Plan Alternative

Surface Disturbance

Effects to range resources under the Reduced Pit Mine Plan Alternative would be the same as described for the proposed Project except 87 fewer acres of rangeland would be disturbed and livestock grazing would be allowed 1 year earlier with the removal of the perimeter fence.

Water Management Activities

Effects to range resources from water management activities would be the same as described for the Proposed Action.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for range resources.

4.1.7.4 Partial Pit Backfill Alternative

Surface Disturbance

Effects to range resources under the Partial Pit Backfill Alternative would be the same as described for the proposed Project except the perimeter fence would remain in place for 1 additional year, thereby excluding rangeland forage from livestock grazing.

Water Management Activities

Effects to range resources from water management activities would be the same as described for the Proposed Action.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for range resources.

4.1.8 Wild Horses and Burros

The primary issues related to wild horses and burros include loss or alteration of suitable habitats, increased habitat fragmentation, animal displacement, direct loss of wild horses and burros, and effects associated with water management.

Potential effects on wild horses and burros may include the short-term, long-term, and permanent reduction or loss of habitat. Short-term effects arise from habitat removal and disturbance from Project-related activities. Effects to wild horses and burros would cease within the completion of ROW construction activities, mine closure, and successful reclamation. Long-term effects consist of changes to habitats and the wild horse and burro populations that depend on those habitats, 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 to wild horse and burro populations may include limited direct mortalities from Project-related activities (e.g., vehicle collisions), habitat loss or alteration, and incremental habitat fragmentation. Indirect effects, such as animal displacement and reduced fecundity, could result from increased noise and additional human presence in the study area. The degree of the effects on wild horses and burros and their habitats 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 and burros would avoid the disturbance areas during construction and operation activities and increase use in other portions of the HMAs, which could result in changes to usage patterns and distribution within the HMAs.

4.1.8.1 Proposed Action

Surface Disturbance

The proposed Project (including ROW authorizations) would result in disturbance to 86.3 acres of the 62,367-acre Goldfield HMA and 143.8 acres of the 77,876-acre Montezuma Peak HMA, which would amount to approximately 0.14 percent and 0.18 percent of the HMAs, respectively. The disturbance associated with the proposed Project would be reclaimed following completion of mining operations and ROW construction, with the exception of 61.1 acres in the Montezuma Peak HMA associated with the development of the open pit, West Diversion Channel, and road access. Therefore, direct impacts to wild

horses and burros from habitat disturbance are anticipated to be minor, long-term (permanent for the 61.1 acres associated with the open pit, West Diversion Channel, and road access), and localized.

Potential effects to the normal distribution and movement patterns of wild horses and burros likely would be long-term in nature, occurring over the 12-year life of the proposed Project, and would not result in permanent displacement. Wild horses and burros likely would use other areas near the proposed Project, including along and immediately adjacent to U.S. 95 and therefore increasing the risk of vehicle collisions; however, wild horse and burro use of habitat in the Project region is highly variable and typically dependent on water sources and forage available more common to the east and west of the proposed Project.

Burying the historic Goldfield Consolidated Mines Company tailings would isolate the tailings from exposure to meteoric water and atmospheric oxygen, and limit seepage infiltration into the underlying soil and groundwater. This would benefit the surrounding habitat for wild horses and burros in the area by limiting vegetation exposure to the underlying contaminants present in the historic tailings and by providing approximately 150 acres of additional habitat following successful reclamation. This would provide a minor beneficial, long-term, and localized impact to wild horses and burros and their habitat.

Human Presence and Noise

Effects to wild horses and burros from human disturbance and noise could cause them to reduce or eliminate use of a larger land area than the study area itself; therefore, increasing use of other portions of the HMAs over the life of the proposed Project. Also, after initial avoidance of human activity and noise-producing areas, certain individuals may acclimate to the activity and begin to reoccupy areas formerly avoided.

Several factors, including GRL EPMs, would combine to minimize the potential effects related to increased human presence in the study area. First, the proposed Project is in the immediate vicinity of existing mine sites where human activity associated with mining operations continues to date. Second, GRL would establish wildlife protection policies that would prohibit feeding or harassment of wild horses and burros unless attempting to move animals off the site. Third, GRL employees would be trained to monitor the mining and process areas for the presence of wild horses and burros. Fourth, speed limits would be implemented for equipment in heavily trafficked areas on haul roads and other major mine roads to minimize the potential for vehicle collisions with wild horses and burros. Fifth, process areas that include sodium cyanide would be fenced to avoid exposure of wild horses and burros to potentially harmful process solutions.

Water Management Activities

Effects to wild horses and burros as a result of water management activities would be the same as described in the *Wildlife Resource Report for the Gemfield Mine Project* (BLM 2018g).

Hazardous Materials Spill

Effects to wild horses and burros as a result of a potential hazardous materials spill would be the same as described in the *Wildlife Resource Report for the Gemfield Mine Project* (BLM 2018g).

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for wild horses and burros.

4.1.8.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated effects to wild horses and burros would not occur. Under this alternative, 86.3 acres of the Goldfield HMA and 143.8 acres of the Montezuma Peak HMA would not be disturbed or lost, as described under the Proposed Action. Additional habitat fragmentation and animal displacement would not occur, limiting the effects to wild horses and burros to existing conditions. In addition, the benefit to wild horses and burros and their habitat from covering and reclaiming approximately 150 acres of the historic tailings as

described under the Proposed Action would not occur under the No Action Alternative. The level of human use would remain the same as the current levels. Completion of closure and reclamation activities associated with existing disturbance, and mineral exploration activities within the study area would be conducted under existing authorizations. Under the No Action Alternative, GRL currently is authorized to conduct exploration activities on 23.84 acres of BLM-administered land in the Plan boundary. Therefore, impacts to wild horses and burros from the No Action Alternative are anticipated to be negligible, long-term, and localized to the study area.

Under this alternative, most of the ROW authorizations needed to support the proposed Project, including the realignment of U.S. 95, county roads, and associated utilities would not occur. However, Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD for the proposed Project. The anticipated construction activities associated with this utility upgrade would be analyzed separately and developed under ROW authorization N-31308.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for wild horses and burros.

4.1.8.3 Reduced Pit Mine Plan Alternative

Surface Disturbance

Effects to wild horses and burros under the Reduced Mine Plan Alternative would be the same as those identified for the proposed Project. Despite this alternative resulting in approximately 87 fewer acres of overall disturbance (approximately 48 fewer acres of permanent disturbance), as compared to the proposed Project, the difference in disturbance does not occur in either the Goldfield HMA or Montezuma Peak HMA. Therefore, impacts to wild horses and burros is anticipated to be minor, long-term, and localized under the Reduce Mine Plan Alternative.

Under this alternative, mine-related activities would be reduced by approximately 1 year, resulting in a corresponding reclamation schedule to achieve reclamation goals. No changes to the construction of ROWs would occur under this alternative.

Human Presence and Noise

Effects to wild horses and burros from human presence and noise would be the same as described for the proposed Project, except the duration of impacts would be reduced due to the Project life decreasing by 1 year under this alternative

Water Management Activities

Effects to wild horses and burros from water management activities would be the same as described for the proposed Project.

Hazardous Materials Spill

Effects to wild horses and burros from a hazardous materials spill would be the same as described for the proposed Project.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for wild horses and burros.

4.1.8.4 Partial Pit Backfill Alternative

Surface Disturbance

Effects to wild horses and burros would be the same as described for the proposed Project, except less reclaimed vegetation (e.g., forage) would become established on the East WRDA since the height of this

Project component would be lower and would have less surface area than the proposed Project. Therefore, impacts to wild horses and burros is anticipated to be minor, long-term, and localized under the Partial Pit Backfill Alternative.

Human Presence and Noise

Effects to wild horses and burros from human presence and noise would be the same as described for the proposed Project.

Water Management Activities

Effects to wild horses and burros from water management activities would be the same as described for the proposed Project, except under this alternative, no pit lakes would form and therefore impacts associated with exposure to water in pit lakes would not occur.

Hazardous Materials Spill

Effects to wild horses and burros from a hazardous materials spill would be the same as described for the proposed Project.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for wild horses and burros.

4.1.9 Paleontological Resources

The primary issue of concern regarding paleontological resources is the potential for damage to or loss of scientifically important fossils as a result of ground-disturbing activities associated with the proposed Project.

4.1.9.1 Proposed Action

Paleontological resources, including fossil remains and unrecorded fossil sites, corresponding geologic and geographic site data, and fossil-bearing strata could be impacted as a result of the Proposed Action. Direct impacts could result during vegetation clearing, grading of roads, construction of mine facilities, ROW construction, or other Project-related ground disturbance. Indirect impacts would include erosion of fossil beds due to vegetation clearing or the unauthorized collection of scientifically important fossils in the study area during Project-related activities.

Of the eight major geologic units within and near the study area, the Siebert Formation was given a PFYC rating of 4 (High), the Palmetto Formation and Quaternary pediment gravels were assigned a PYFC rating of 2 (Low), and the remaining formations were assigned a PFYC rating of 1 (Very Low).

Field surveys at five localities within the Siebert Formation near the study area documented various fossil bone fragments. While these localities do not occur within the study area, they do indicate that the Siebert Formation contains vertebrate fossils in the Project region and excavations within the Siebert Formation within the study area could produce additional fossils.

Because fossils usually are often buried or encased within a sedimentary formation, their locations often cannot be confirmed until excavation (ground disturbance) occurs. As described in GRL's EPMs, if vertebrate fossils are identified during construction, operation, or reclamation, construction activities would be halted in the area of the discovery and GRL would contact the BLM AO. The BLM AO and/or qualified paleontologist would evaluate the discovery within 5 working days of being notified by GRL. If the discovered paleontological resource is determined to be significant, appropriate measures would be developed to mitigate potential adverse impacts. Construction, operation, and reclamation activities in the area of the discovery would not resume until a Notice to Proceed has been issued by the BLM AO. Because the Siebert Formation has recorded fossil localities within the Project region and near the study area (Fisk and Haasl 2012), any construction activities involving this formation would proceed with exceptional caution.

Due to the high likelihood of encountering fossils in the Siebert Formation, potential impacts to paleontological resources likely would be localized, moderate, and long-term.

Recommended Monitoring and Mitigation Measures

Monitoring P-1: Since there is potential occurrence of fossils in the Siebert Formation in the study area, a paleontological resource monitoring and mitigation plan would be developed for the Siebert Formation. A qualified paleontologist familiar with vertebrate fossils of the Siebert Formation will be onsite during excavation and construction activities in the Siebert Formation as determined necessary from the monitoring and mitigation plan. If fossils are observed in the Siebert Formation by a qualified paleontologist during excavation activities, the BLM AO will be notified immediately to determine the proper evaluation process moving forward and if further evaluations are needed. If the discovered paleontological resource is determined to be significant, appropriate measures will be developed to mitigate potential adverse impacts. Construction, operation, and reclamation activities in the area of the discovery will not resume until a Notice to Proceed has been issued by the BLM AO.

4.1.9.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to paleontological resources would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations. Under the No Action Alternative, GRL currently is authorized to conduct exploration activities on 23.84 acres of BLM-administered land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. This project would be within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for paleontological resources.

4.1.9.3 Reduced Pit Mine Plan Alternative

Impacts to paleontological resources from the Reduced Pit Mine Plan Alternative would be the same as described for the proposed Project except that potential for the disturbance of fossils in the Siebert Formation would be lower since 87 fewer acres of disturbance would occur with the implementation of this alternative. Due to the high likelihood of encountering fossils in the Siebert Formation, potential impacts to paleontological resources likely would be localized, moderate, and long-term.

Recommended Monitoring and Mitigation Measures

Monitoring and mitigation measures would be the same as those described for the proposed Project.

4.1.9.4 Partial Pit Backfill Alternative

Impacts to paleontological resources from the Partial Pit Backfill Alternative would be the same as described for the proposed Project. Due to the high likelihood of encountering fossils in the Siebert Formation, potential impacts to paleontological resources likely would be localized, moderate, and long-term.

Recommended Monitoring and Mitigation Measures

Monitoring and mitigation measures would be the same as those described for the proposed Project.

4.1.10 Cultural Resources

Primary issues pertaining to NRHP-eligible sites located within the study area include ground-disturbing activities associated with construction and operation of the proposed Project; illegal collecting of artifacts and inadvertent damage to NRHP-eligible sites due to the increased numbers of people in the study area during construction activities; and impacts to unknown NRHP-eligible sites that may be discovered during Project construction.

4.1.10.1 Proposed Action

A total of 224 cultural resources are located within the direct effects APE; 222 archaeological sites, one architectural resource, and the GHMD. The GHMD has been determined eligible for inclusion on the National Register under criteria A, B, C, and D. Of the 222 archaeological sites, 15 have been determined eligible for inclusion on the NHRP and three remain unevaluated; the remaining 204 archaeological sites have been determined not eligible for the NRHP and do not contribute to the significance of the GHMD. Thirteen of the 18 NRHP-eligible or potentially eligible sites contribute to the significance of the proposed GHMD, and four remain unevaluated for their contribution to the GHMD. The remaining NRHP-eligible archaeological site is not an element of the GHMD. The architectural resource has been determined not eligible for inclusion on the NRHP as an individual resource but is a contributing element to the GHMD. The unevaluated archaeological sites and the architectural resource that contributes to the significance of the GHMD will be treated as eligible resources.

A total of 20 NRHP-eligible or potentially eligible cultural resources (18 archaeological sites, 1 architectural resource, and the GHMD) are located in the direct APE for the Proposed Action. The Proposed Action would result in direct localized, long-term, adverse effect to the GHMD and eight archaeological sites. Direct localized, long-term, adverse effect to the architectural resource and the 10 remaining archaeological sites are not expected. SHPO concurred with the BLM findings of effects and BLM currently is consulting with SHPO regarding the measures to resolve the adverse effects. Proposed treatment measures to mitigate direct localized, long-term, adverse effect include testing and documentation; data recovery; archival research; and preparation and distribution of educational materials for public consumption.

A total of 638 cultural resources, including 536 archaeological sites, 101 architectural resources, and the GHMD, were identified within the visual indirect impacts APE, which encompasses the auditory and vibrational APEs. The Proposed Action would result in indirect, localized adverse effects to 16 cultural resources. Within the visual, auditory, and vibrational APEs, the GHMD would be adversely affected by changes to the auditory and visual landscape, and by vibrations emanating from mine facilities and equipment. Within the visual APE, 1 archaeological site and 11 architectural resources would be indirectly adversely impacted by changes to existing viewshed conditions resulting from the Proposed Action. Within the visual and auditory APEs, three architectural resources would be indirectly adversely affected by changes to both viewshed and auditory baseline conditions.

BLM developed a draft memorandum of agreement (MOA) for the Project stipulating the proposed measures to resolve the identified adverse effects. The draft MOA was sent to SHPO for review on July 19, 2018. The draft MOA outlines the steps to be taken to: 1) develop measures to avoid, reduce, or mitigate adverse impacts; and 2) address inadvertent discoveries. If the BLM determines that a historic property would be adversely affected, measures to avoid, minimize, or mitigate such impacts would be implemented.

Recommended Monitoring and Mitigation Measures

CR-1: Unavoidable adverse impacts to historic properties identified within the direct impacts APE or within the indirect APEs would be minimized or mitigated in accordance with the MOA. Any previously unknown historic properties that may be discovered during construction activities would be treated as described in the MOA.

4.1.10.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to cultural resources would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations. Under the No Action Alternative, GRL currently is authorized to conduct exploration activities on 23.84 acres of BLM-administered land in the Plan boundary. As all cultural resources would be avoided during exploration activities, there would be no impacts.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for cultural resources.

4.1.10.3 Reduced Pit Mine Plan Alternative

Effects of the Reduced Pit Mine Plan Alternative on known NRHP-eligible sites and any previously unknown NRHP-eligible sites that may be discovered during Project construction would be the same as described for the Proposed Action. Indirect impacts to the 16 architectural resources within the indirect APEs would be 1 year shorter under the Reduced Mine Plan Alternative.

Recommended Monitoring and Mitigation Measures

Same as for the proposed Project.

4.1.10.4 Partial Pit Backfill Alternative

Effects of the Partial Pit Backfill Alternative on known NRHP-eligible sites and any previously unknown NRHP-eligible sites that may be discovered during Project construction would be the same as described for the Proposed Action. Indirect impacts to the 16 architectural resources within the indirect APEs would be 2 years longer than the Proposed Action due to extended backfill and reclamation activities under the Partial Backfill Alternative.

Recommended Monitoring and Mitigation Measures

Same as for the proposed Project.

4.1.11 Native American Concerns

Primary issues pertaining to properties of traditional religious and cultural importance, TCPs, or sacred sites located in the study area include ground-disturbing activities associated with project construction, and illegal collecting of artifacts and inadvertent damage to areas of tribal concern.

The indicator considered in the analysis of potential impacts to Native American concerns is whether the Proposed Action and alternatives would result in adverse impacts to TCPs, properties of traditional religious and cultural importance, or sacred sites.

4.1.11.1 Proposed Action

Direct and indirect impacts to a place of traditional cultural importance as a result of the proposed Project would be the same as described for prehistoric cultural resources (*Cultural Resources Report for the Gemfield Mine Project* [BLM 2018l]). At this time, no properties of traditional religious and cultural importance, TCPs, or sacred sites have been identified during the Class III cultural resources inventories or through the government-to-government consultation process.

If any places of traditional cultural importance are identified through the ongoing tribal consultation efforts, and would be directly affected by the proposed Project, and avoidance is not feasible, the impacts would be minimized or mitigated through specific operating procedures, stipulations, or mitigation measures developed in consultation/coordination with the affected tribal groups. Indirect impacts such as illegal collecting and/or inadvertent damage to sites of tribal concern (if identified) potentially could occur as a result of increased human activity in the Plan boundary. Under the Proposed Action, direct and indirect impacts to TCPs, properties of traditional religious and cultural importance, or sacred sites are anticipated to be localized, long-term, and have no adverse effect.

The potential for the inadvertent discovery of human remains during construction activities exists within proposed disturbance areas and could result in adverse impacts. If construction or other project personnel discover what they believe to be human remains, funerary objects, or items of cultural patrimony on federal land, construction would cease within the vicinity of the discovery and the BLM AO would be notified of the find. The location of the find would not be publicly disclosed, and the remains would be secured and preserved in place. Any discovered Native American human remains, funerary objects, or items of cultural patrimony found on federal land would be handled in accordance with the NAGPRA (Section (3)(d)(1)). Construction would not resume in the area of the discovery until the BLM AO has issued a Notice to Proceed.

If Native American human remains and associated funerary objects are discovered on private land during construction activities, construction would cease within the vicinity of the discovery and the county coroner or sheriff would be notified of the find. The location of the find would not be publicly disclosed, and the remains would be secured and preserved in place. Treatment of any discovered Native American human remains and associated funerary objects found on private land would be handled in accordance with NRS 383.150.

Recommended Monitoring and Mitigation Measures

At this time, no properties of traditional religious and cultural importance, TCPs, or sacred sites have been identified in the study area. If tribal representatives were to identify any sites of tribal importance, impacts to these resources would be minimized or mitigated through specific operating procedures, stipulations, or mitigation measures developed in consultation/coordination with the affected tribes. Therefore, no additional monitoring or mitigation measures are recommended.

4.1.11.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to Native American concerns would not occur and the beneficial impacts from covering and reclaiming the historic tailings would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations including conducing exploration activities on up to 23.84 acres of BLM-authorized land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for Native American concerns.

4.1.11.3 Reduced Pit Mine Plan Alternative

Effects of the Reduced Pit Mine Plan Alternative on areas of concern to the tribes would be the same as described for the Proposed Action.

Recommended Monitoring and Mitigation Measures

Same as for the proposed Project.

4.1.11.4 Partial Pit Backfill Alternative

Effects of the Partial Pit Backfill Alternative on areas of concern to the tribes would be the same as described for the Proposed Action.

Recommended Monitoring and Mitigation Measures

Same as for the proposed Project.

4.1.12 Air Quality

4.1.12.1 Proposed Action

The proposed Project would have a potential effect on air quality resources in the vicinity of the Project. 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.

Air pollutant emissions associated with the proposed Project would occur during construction operations as well as ongoing mine 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 exist 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. The proposed Project has the potential to increase emissions of criteria air pollutants (including PM_{10}, $PM_{2.5}$, SO_2, nitrogen oxides, and CO), volatile organic compounds which can form ozone, hazardous air pollutants, and greenhouse gases (GHGs) for the short-term duration of mining activities (Stantec 2015a,b).

Air quality and pollutant emissions are regulated under the federal Clean Air Act regulations and Nevada state laws and regulations implemented by the NBPAC. Both federal and state regulations require that ambient concentrations for specific criteria pollutants not exceed allowable levels, referred to as AAQS. These standards have been established by the USEPA and the State of Nevada at levels deemed to preclude adverse impacts on human health and welfare with an adequate margin of safety. Before any construction of a potential source of air pollution can occur, an air quality operating permit (for Class II source) or operating permit to construct (for Class I sources) must be obtained from NBAPC. The operating permit ensures that the source would comply with federal and state emission limitations and meet the NAAQS and the Nevada AAQS.

Air pollution concentrations in amounts that exceed the NAAQS or Nevada AAQS can cause health concerns for humans as well as adverse effects on vegetation, wildlife, water bodies, and visibility. Dispersion modeling analyses were conducted to assess potential air quality impacts resulting from construction activities and full-scale mining operations associated with the Proposed Action. Modeling results indicate that air quality impacts would be below the NAAQS and Nevada AAQS for each phase of the mine life and no substantial adverse impacts would occur. These impacts would be short-term in duration and air pollutant concentrations would return to background levels after mine reclamation is completed. A more detailed description of the dispersion modeling analysis and modeling results is presented in the *Air Quality Resource Report for the Gemfield Mine Project* (BLM 2018m).

During mining operations, air pollutant emissions from the proposed Project are unavoidable; however, several applicant-committed EPMs would be implemented to reduce emissions and potential impacts on air quality. Emission control and reduction requirements would be defined in the NDEP-issued operating permit, and fugitive dust control practices would be described in the associated Dust Control Plan, which is required by NDEP as part of its permit maintenance program. The dust control practices 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. These dust control practices would reduce dust impacts on the mine site as well as offsite locations including along U.S. 95. These dust control practices may reduce particulate emissions between 50 and 90 percent, depending on site-specific conditions (Countess Environmental 2006).

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for air quality.

4.1.12.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and the associated impacts to air quality would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations. Under the No Action Alternative, GRL currently is authorized to conduct exploration activities on 23.84 acres of BLM-administered land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. This project would be within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for air quality.

4.1.12.3 Reduced Pit Mine Plan Alternative

Effects of the Reduced Mine Plan Alternative on air quality resources would be similar to the Proposed Action, except that fugitive PM emissions would be reduced due to the smaller disturbed area footprint. The smaller disturbed area would result in fewer construction-related emissions and fewer acres that are subject to wind erosion, thus reducing the amount of PM emissions. Impacts under this alternative are anticipated to be localized, short-term, and would not exceed applicable air quality standards.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for air quality.

4.1.12.4 Partial Pit Backfill Alternative

Effects of the Partial Pit Backfill Alternative on air quality resources also would be similar to the Proposed Action except that air emissions would be generated when waste rock from the East WRDA is moved to the open pit at the end of mining operations. Mine operation and reclamation activities and associated air emissions would increase by 2 years under this alternative. Impacts under this alternative are anticipated to be localized, short-term, and would not exceed applicable air quality standards.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for air quality.

4.1.13 Noise and Vibration

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. There are no specific noise regulations that would apply to the study area. Neither the State of Nevada nor Esmeralda County have noise regulations that apply to the proposed mining operations.

In the absence of regulatory limits, the degree of disturbance becomes the key factor in evaluating potential Project-generated noise impacts. In this case, the focus of the evaluation is the town of Goldfield; there are no residential or developed recreation areas outside of Goldfield and near the Project site.

4.1.13.1 Proposed Action

The maximum noise levels received at the nearest residence, which is approximately 4,500 feet away from the nearest area where major construction activity would occur (the overburden area), would be reduced over that distance by 40 dB, exclusive of reductions by ground or vegetation sound absorption or topographic shielding. Therefore, maximum construction noise levels at those residential locations would be in the range of approximately 30 dBA to 50 dBA. This would be similar to, or less than, maximum noise levels associated with existing traffic noise. Noise from powered equipment during construction would be audible; however, it would be below the USEPA recommended 55 dBA threshold for outdoor noise. Noise also would be generated by construction equipment associated the relocation of utilities within the consolidated transportation and utility ROW area and other ROWs. Consequently, construction and reclamation noise would be considered short-term, localized, and negligible.

Mining Noise

Although the noise levels associated with the mining operations are fairly consistent, they still are somewhat transient (e.g., truck traffic and haul truck traffic on the site fluctuates). At distances of 1,000 feet or less, noise levels associated with dozer or excavators fluctuate as they move around the study area. At greater distances, the fluctuations may be less noticeable.

Initial Mining Operations

Initial mining noise would be negligible.

Mining Operations

Mining operations noise would be negligible.

Blasting Noise

Construction blasting noise is expected to be audible, and its sudden occurrence could startle people nearby under certain circumstances. For this reason, mine blasting is commonly scheduled for approximately the same time every day and pre-blast sirens warn people that a blast is about to occur, thus minimizing the startle factor. The startle factor could, however, adversely affect passing motorists who would not be aware of or conditioned to the daily occurrence of blasting. The impact would be expected to be short-term, localized, and minor.

Consequently, noise impacts from construction, mining activities, and reclamation would be considered short-term, localized, and minor. Noise levels would exceed ambient levels at a distance of approximately 2,000 feet from major noise generation sources on the mine site, which would be well short of the identified sensitive receptor locations.

Vibration

The primary concern regarding vibration caused by the proposed Project was possible damage to the historic Goldfield High School structure from blasting at the project site required for both construction/ pre-stripping and mining operations. The impacts of blasting manifest as both ground vibration and as air blast pressure.

The analysis of the proposed Project assessed blast vibration as peak particle velocity by distance and blast charge, along the ranges of constants for known rock type in the proposed Project vicinity and for anticipated blast confinement methods. Consequently, based on the blast values used for input into the analyses, blast vibration damage from the proposed Project is not anticipated at the historic Goldfield

High School (TGI 2013). Project-related ground vibration would be expected to be short-term, localized, and negligible.

In addition, the threshold for humans to detect ground vibration may be as low as 0.5 mm/s (0.020 in/s). Consequently, it is not expected that people in Goldfield would be likely to experience vibration from blasting at the proposed Project.

Air Blast

Based on the project-related blast values employed for the analyses, air blast damage is not anticipated at the historic Goldfield High School (TGI 2013) and air blast impacts over all would be expected to be short-term, localized, and minor.

Recommended Monitoring and Mitigation Measures

Issue: Based on the results of the noise analysis, no monitoring measures would be warranted for the proposed Project. Blasting noise may startle motorists traveling on U.S. 95 near the proposed pit.

Mitigation N-1: It is recommended that highway signage be installed warning of the occurrence of daily blasting in order to mitigate the potential startle factor for passing motorists on U.S. 95.

Effectiveness: Highway warning signage would reduce the potential for blasting noise to cause a dangerous over-reaction by motorists passing the proposed Project on U.S. 95 during the once-daily mine blasting.

4.1.13.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to noise levels in the proposed Project vicinity would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations for exploration activities on 23.84 acres of BLM-administered land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and permitted separately. After completion of those activities, the noise environment would revert to slightly quieter conditions dominated by highway traffic and natural sounds primarily from wind and wildlife.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for this alternative.

4.1.13.3 Reduced Pit Mine Plan Alternative

The Reduced Pit Mine Plan Alternative would utilize the same types and numbers of equipment in essentially the same location as the proposed Project. Noise and vibration impacts would be the same as described for the proposed Project except that mine operations would occur during an 11-year span (i.e., 1 year less than the proposed Project).

Recommended Monitoring and Mitigation Measures

Recommended monitoring and mitigation measures is the same as for the proposed Project.

4.1.13.4 Partial Pit Backfill Alternative

The Partial Pit Backfill Alternative would utilize the same types and numbers of equipment in the same locations as the proposed Project. Noise and vibration impacts would be the same as those described for

the Proposed Action, except an additional 2 years of noise generated by haul trucks and other equipment would occur with the hauling of 37 Mt of waste rock from the East WRDA to the pit lobes.

Recommended Monitoring and Mitigation Measures

Recommended monitoring and mitigation measures is the same as for the proposed Project.

4.1.14 Transportation and Access

Effects on transportation resulting from Project construction or operation were evaluated by determining the potential for:

- Adverse or beneficial effects on traffic flows from modifying the alignment of U.S. 95 and changing the number and locations of intersections with side roads;
- Adverse or beneficial effects on traffic safety from modifying the alignment of U.S. 95 and changing the number and locations of intersections with side roads;
- 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. 95 and intersecting local roads in excess of road capacity determined by LOS.

4.1.14.1 Proposed Action

During the early months of the construction period, traffic accessing the study area would do so via the existing road network. Refer to Section 4.1.15, Land Use and Realty, for additional detail regarding the relocation of U.S. 95 and other road ROWs. As the U.S. 95 relocation and intersecting road realignments are completed, the new road network would be in place. It is assumed that existing traffic levels on U.S. 95 would continue unchanged during the construction year. Although 200 to 300 additional vehicle trips during the affected hours would more than triple total traffic levels in the Project vicinity, LOS on U.S. 95 and at affected intersections would remain at LOS “A” (i.e., free-flowing conditions with few restrictions) during construction because the existing traffic volume is light, U.S. 95 is a high-quality facility, and sight distances are unobstructed for long distances. Construction effects on transportation in the area would be localized, temporary, and negligible, with some temporary, minor effects possible when the newly realigned highway and roads are being connected to the existing U.S. 95 alignment.

The primary physical infrastructure modification associated with the proposed Project would be the rerouting of U.S. 95. In addition, there would be a new road providing access to the mine facilities and several adjustments to the alignments of local roads intersecting U.S. 95 near the proposed Project. The net result would be a reduction from nine U.S. 95 intersections to five intersections, including just two within the Plan boundary. This would provide a benefit to traffic safety by reducing the number of potential conflict points between U.S. 95 and intersecting minor roadways.

Highway traffic effects of the proposed Project were analyzed using techniques promulgated in the HCM 2010 (Atkins 2013). The analysis determined that all of the existing and revised intersections near the study area would operate at LOS “A” (Atkins 2013), indicating traffic would continue to operate in a free-flowing condition, allowing individual motorists considerable freedom to maneuver and to select their desired speed. LOS “A” provides ample opportunities for passing and entering or exiting the traffic flow safely (Transportation Research Board 2000). Consequently, the effects of the proposed Project on highway traffic would be local, short-term, and negligible.

Transportation safety concerns related to traffic generated by the proposed Project would be minor. The Project-related increase in traffic would be modest, remaining well within the capacity of the roadways. The mix of heavy vehicles in the traffic stream would increase slightly, but not substantively. As such, any increase in the risk of traffic accidents would be minor to negligible and proportional to the overall increase in traffic. In summary, development of the proposed Project would not substantially affect highway traffic in the Project vicinity.

Recommended Monitoring and Mitigation

No monitoring or mitigation measures are recommended for transportation and access.

4.1.14.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to transportation and access would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations including exploration activities on up to 23.84 acres of BLM-administered land in the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and permitted separately.

The effects of the No Action Alternative on transportation and access in the study area would be minimal.

Recommended Monitoring and Mitigation

No monitoring or mitigation measures are recommended for transportation and access.

4.1.14.3 Reduced Pit Mine Plan Alternative

The Reduced Pit Mine Plan Alternative would employ the same number of workers on the same schedules as the proposed Project and would use the same types and quantities of materials and services during the active life of the mine. Impacts to transportation and access would be the same as described for the proposed Project except the mine operational life would be 11 years (1 year less than the proposed Project).

Recommended Monitoring and Mitigation

No monitoring or mitigation measures are recommended for transportation and access.

4.1.14.4 Partial Pit Backfill Alternative

Impacts to transportation and access from the Partial Pit Backfill Alternative would be the same as described for the proposed Project, except this alternative would add approximately 2 years to mine operations and reclamation activities and additional impacts to transportation and access in the Project vicinity.

Recommended Monitoring and Mitigation

No monitoring or mitigation measures are recommended for transportation and access.

4.1.15 Land Use and Realty

The proposed Project (including ROW authorizations) may affect land use and realty both directly and indirectly. Effects on lands and realty resulting from Project construction or operation were evaluated by determining the potential for:

- Conflicts with, or substantial modifications or termination of existing land uses, ROWs, or land use authorizations in the study area;
- Alterations to land use patterns or other use areas adjacent to or near the study area;
- Conflicts with existing federal, state, and local land use plans, goals, and policies;
- Restricting access to existing land uses or land use authorizations; and

- Stimulating or encouraging the development of land uses not presently anticipated, or conversely, precluding other planned or proposed uses.

4.1.15.1 Proposed Action

The study area encompasses a total of 202,950 acres, including 189,637 acres (93 percent) of BLM-administered land. Surface disturbance for the proposed Project would encompass 1,337.3 acres. Approximately 969.4 acres (73 percent) of the proposed new disturbance are BLM-managed public land and 367.9 acres (27 percent) are private lands.

The proposed Project is consistent with BLM plans and policies that designate land use within the study area as open for mineral exploration and development, as described in the Tonopah RMP (BLM 1997). Although counties do not have jurisdiction to regulate land use on federal lands, the proposed Project would be consistent with the Multiple Use designations of lands in both the Esmeralda County Public Lands Policy Plan (Esmeralda County 2013) and the Nye County Comprehensive Master Plan **(**Nye County 2011). Mineral development is one of the identified acceptable uses under the Multiple Use designation of the study area in both counties' plans. The proposed Project would be expected to comply with adopted plans and policies of potentially affected governmental entities, so any possible conflicts would be negligible, short-term, and localized.

A portion of the study area was disturbed by previous mining activities or was more recently approved for smaller scale disturbance for exploration purposes. New Project-related disturbance (1,337.3 acres) would reduce the amount of land available for livestock grazing and dispersed recreation, although the loss would be very small in the context of the study area and the surrounding region and would be considered negligible, short-term, and localized. Detailed information regarding the loss of access to public lands are addressed in the *Range Resources Report for the Gemfield Mine Project* (BLM 2018i) and the *Recreation Resources Report for the Gemfield Mine Project* (BLM 2018q).

The proposed Project would, by definition, conflict with the existing ROWs in the Project vicinity. New or amended ROW authorizations would be required for the proposed realignments of U.S. 95, and utilities, and county roads in the Project vicinity, as described in detail in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b). The proposed new ROWs would not adversely affect land use or utility availability in the area as the new facilities would be constructed while existing ones were still functional and any necessary service interruptions for connecting into the systems would be minor, short-term, and localized.

Most of the disturbance associated with the proposed Project would be returned to open space, grazing, dispersed recreation, and wildlife habitat following successful reclamation. These uses would be consistent with local and BLM land use plans and guidelines. Several Project facilities (e.g., open pit, U.S. 95, Brickyards Road, east access road and ROW access road realigned within the consolidated transportation, and utility ROW area) totaling 509 acres would not be reclaimed and would remain as permanently disturbed areas. Beneficial impacts from the proposed Project would occur from the covering and reclamation of currently exposed historic tailings (approximately 150 acres) within the Plan boundary. The net effect of the proposed Project on land use and realty would be considered negligible, short-term, and localized.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures would be required for land use and realty.

4.1.15.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to land use and realty would not occur. As the Project would not be approved under this alternative, no reclamation would occur on portions of existing disturbance (i.e., historic tailings). This may be a permanent, localized impact as land use authorizations would not benefit from having these areas

reclaimed. Under this alternative, GRL would be permitted to continue exploration activities (up to 500 acres) under existing approved authorizations.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Under the No Action Alternative, Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures would be required for land use and realty.

4.1.15.3 Reduced Pit Mine Plan Alternative

Direct and indirect impacts to land use and realty from the Reduced Pit Mine Plan Alternative would be the same as described for the proposed Project except 87 fewer acres of land would be disturbed by mine development. Under this alternative, direct impacts to lands and realty would be reduced as there would be fewer acres of disturbance taken from future land use authorizations.

Recommended Monitoring and Mitigation

No monitoring or mitigation measures would be required for land use and realty.

4.1.15.4 Partial Pit Backfill Alternative

Direct and indirect impacts to land use and realty from the Partial Pit Backfill Alternative would be the same as described for the proposed Project except that the mine life would be extended an additional 2 years.

Recommended Monitoring and Mitigation

No monitoring or mitigation measures would be required for land use and realty.

4.1.16 Recreation

Impacts to recreation include displacement of dispersed recreational opportunities for which there are no reasonable substitutes and changes in recreation demands within the study area. Effects on recreation caused by Project construction or operation were evaluated by determining the potential for:

- Conflicts with existing federal, state, and local recreation management plans and policies;
- Conflicts with established recreational uses of the area, including changes in access to existing recreation opportunities for which there are no reasonable alternatives, changes in the level of use of existing recreation areas, and changes resulting from the displacement of recreational opportunities – such as decreases in game populations – from one area to another;
- The potential to substantially degrade or reduce the quantity or quality of the area available for existing or future recreational opportunities, including reduced quality of the aesthetic experience; and
- Unmitigated loss of a unique recreational resource.

4.1.16.1 Proposed Action

Recreational use would be restricted from 1,210.9 acres of public land that would be located inside of a proposed perimeter fence. Restrictions would be for the life of the proposed Project. In addition, the areas proposed for the relocation of U.S. 95 and realignment of local roads would not be available for recreational use. The total area that would not be available for recreational use represents less than 0.1 percent of Esmeralda County. After completion of the Project, approximately 509 acres would be

reclaimed and the perimeter fence removed. Upon completion of mining, ore processing, closure, and reclamation, much of the disturbance area would be available for dispersed recreational use, although the post-mine recreation quality may be degraded.

Hunting in the study area would be impacted as this recreational activity would need to move outside of those areas excluded by the Proposed Action. Although current use of the Project vicinity by mule deer is relatively low, it is likely that mule deer would move away from new areas of Project-related activity. Additional information on hunting impacts is provided in the *Wildlife Resource Report for the Gemfield Mine Project* (BLM 2018g). As a result, hunters likely would follow the deer into surrounding areas. However, as potential impacts on game species are anticipated to be low, the overall impact on recreational hunting would be localized, short-term, and minor. After successful revegetation, disturbed areas would be expected to provide habitat for wildlife, which presumably would attract hunters back to the Project vicinity. Beneficial impacts from the proposed project would occur from the covering and reclamation of currently exposed historic tailings in the Plan boundary. This would result primarily in a minor increase in habitat for deer and other potential game species as well as a minor aesthetic benefit.

The Proposed Action potentially would have a long-term impact on the annual “Vegas to Reno” race due to the relocation of U.S. 95; however, as there would only be a slight change to the highway in this area, impacts to the race route would be localized and negligible.

There may be an increase in regional human population with the construction and operation of the proposed Project. Such impacts would be expected to be localized, short-term, and minor.

Because there is adjacent land available for dispersed recreation activities in the Project vicinity, and because no unique recreation resources would be impacted as a result of the proposed Project, impacts on recreation resources would be short-term, localized, and negligible.

Recommended Monitoring and Mitigation

No monitoring or mitigation measures would be required for recreation.

4.1.16.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed, associated impacts to recreation would not occur, and beneficial impacts from covering and reclaiming the historic tailings would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations including exploration activities on up to 23.84 acres of BLM-administered land within the Plan boundary.

Under this alternative, the realignment of U.S. 95, county roads, and associated utilities ROW authorizations needed to support the proposed Project would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures would be required for recreation.

4.1.16.3 Reduced Pit Mine Plan Alternative

Impacts to recreation from the Reduced Pit Mine Plan Alternative would be same as described for the Proposed Action.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures would be required for recreation.

4.1.16.4 Partial Pit Backfill Alternative

Impacts to recreation from the Partial Pit Backfill Alternative would be same as described for the Proposed Action except that the fence will remain in place for an additional 2 years.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures would be required for recreation.

4.1.17 Social and Economic Values

The primary issues related to social and economic values include the potential for:

- Effects on local population, employment; or earnings from construction or operation of the proposed Project;
- Project-related demands for housing and public services or infrastructure that would exceed capacities in those systems;
- Project-related impacts on public sector fiscal conditions regarding demand for services compared to revenue generated;
- Effects of the No Action Alternative relative to local work force and employment conditions.

Effects to social and economic values would be significant if the Proposed Action or alternatives to the Proposed Action would result in any of the following:

- Changes in local population, employment, or earnings associated with operations of 5 percent or more;
- Demand for temporary or permanent housing exceeding the expected supply of available housing during the scheduled construction or operations periods;
- Displacement of residences or businesses by proposed Project activities without fair and reasonable compensation;
- A 5 percent or greater project-related increase in public expenditures without an equal or greater offsetting public revenue increase, or a comparable increase in public costs that would extend beyond the project-related inflow of public revenues;
- Project-related increases in demands on public services and infrastructure that would consume available capacities in those systems without providing sufficient offsetting revenues for capital expansion to maintain service levels; or
- Changes induced in the social or business community that would impact important changes in organizational structures, local government, or traditional lifestyles of the community.

4.1.17.1 Proposed Action

Under the proposed Project (including ROW authorizations), most of the construction of proposed Project facilities and supporting utility and transportation facilities is expected to occur beginning in 2019, depending on completion of permitting.

Employment is one of the key driving forces in determining the social and economic impacts of a proposed mine. Considering the relatively remote location of the proposed Project, the fact that the area has seen minimal ore production in recent years, and that the nearest active mining area is approximately 75 miles away at Round Mountain, it is expected that few of the required workers would be local. A substantial majority would be expected to come from other parts of Nevada, and a small percentage would come from surrounding states. Under the circumstances, this analysis assumed all of the permanent workers would be new hires, enabling an evaluation of whether local facility and service capabilities would be sufficient should the maximum employment scenario should occur.

Income and Employment

Construction

As noted, construction activities would require employment of up to 200 contract workers for varying periods primarily during a 1-year period at the outset of project development. Construction would be expected to provide a localized, temporary, minor beneficial impact on study area employment.

Operation

As with construction, it is expected that most of the mine operations workers would come from outside the local Tonopah-Goldfield area, while a higher percentage of secondary job opportunities would be filled by individuals already residing in the area. Operations overall would provide a localized, short-term, minor beneficial employment impact in the study area.

The annual indirect earnings impact would add an additional $5.1 million and the total combined wages and benefits during the 10-year primary operations period would be $18.9 million. The increase in income earnings would be a major economic benefit accruing to the local economy of the Tonopah-Goldfield area over the short-term time frame.

Population

The impacts of the estimated construction population on the local communities may well be less than the raw numbers would suggest. The impact would be a minor, temporary beneficial employment increase. The impact likely would be moderate beneficial short-term employment increase on the local study area.

Housing

Construction

Assuming most construction workers would be non-local, they would not affect the permanent housing market to any substantial degree. They would, however, place a substantial demand on local temporary housing resources in Goldfield and Tonopah. Depending on whether most construction workers lodge in existing facilities or choose to bring their own RV type housing, there likely would be major beneficial local impacts during the off season for tourism, but the impacts may be less beneficial, or possibly adverse, during the higher tourism months.

Operation

Operations would generate demand for an estimated 145 housing units for the 10-year duration of maximum operations workforce for the proposed Project. The rental vacancy rate may be overstated; however, the vacancy in all types of units in Tonopah should be sufficient to accommodate the expected project-related demand. Overall, the impact of operations on the housing market in the local Goldfield-Tonopah area would be a moderate beneficial one.

Community Facilities and Services

No significant capacity or service issues have been identified for most public facilities and services in the Tonopah-Goldfield area. The one concern in this regard stems from the recent closing of the Nye Regional Medical Center in Tonopah. In general, the impacts on most facilities and services would be moderate and beneficial, utilizing currently unused capacity in local area. However, the proposed Project also would aggravate an existing concern for access to medical care in the local area.

Education

With respect to education, it is expected that the impacts of the Project-related increase would be minor and beneficial, using currently unused capacity in local district schools.

Public Finance

The proposed Project would generate public revenues from sales and use taxes, net proceeds of mines taxes, *ad valorem* property taxes, and business taxes. The combination of property taxes and net proceeds taxes from the proposed Project would have a major beneficial impact on Esmeralda County revenues. In addition to the public revenues derived from the proposed Project itself, salaries and benefits to workers would contribute to the local economy and to local public revenues. Because a substantial proportion of construction workers would be non-local, only a minor portion of the economic activity generated by these payments would accrue to the local area.

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

Social Conditions

With only a modest change in employment and population expected from the proposed Project, the Proposed Action is not expected to cause adverse changes in the social structure or traditional lifestyles of the study area.

Recommended Monitoring and Mitigation Measures

No monitoring and mitigation measures are recommended for socioeconomics.

4.1.17.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to social and economic values in the area would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations including conducing exploration activities on up to 23.84 acres of BLM-administered land within the Plan boundary.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and permitted separately. Under the No Action Alternative, the number of employees would continue at existing low levels.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for socioeconomics.

4.1.17.3 Reduced Pit Mine Plan Alternative

Construction, mining, processing operations, and ancillary facility development under the Reduced Pit Mine Plan Alternative would be the same as for the proposed Project, except for the 1-year reduction in the Project schedule and a reduction in the footprint of project disturbance – primarily the mine pit, HLP, and west WRDA. Consequently, most of the social and economic impacts would be the same as the proposed Project in type, but with a reduced time frame. Construction activities, including employment and expenditures, would be the same as for the proposed Project. Actions associated with operations also would be the same as for the proposed Project except that the duration of mining would be reduced by 2 years (20 percent). The 10-year mining schedule would be sufficiently long enough that demand for public facilities and services would be at the same levels as for the proposed Project, except they would not continue for as long. Consequently, although the economic impacts generated by the employment and materials needed would be effectively the same annually for this alternative as for the proposed Project, they would not continue for as long under this alternative. The differences experienced by the local area would be similarly beneficial over the short term, but less than would be anticipated under the proposed Project.

In addition to the reduced time frame of beneficial social and economic impacts, this alternative would also result in a reduction in total production of ore, which would indicate a reduction in net proceeds and ad valorem taxes generated by this alternative for local and regional public entities. The magnitude of difference in public revenues generated by this alternative is not yet known, but the Project would still be expected to generate a moderate, but substantial, beneficial short-term fiscal impact on the public entities in the study area.

Implementation of this alternative would have the same social and economic impacts as the proposed Project.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for socioeconomics.

4.1.17.4 Partial Pit Backfill Alternative

Construction, mining, processing operations, and ancillary facility development under the Partial Pit Backfill Alternative would be the same as described for the proposed Project, except for the 2-year increase in the Project life. Consequently, most of the social and economic impacts would be the same as the proposed Project in type, but with an increased time frame.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for socioeconomics.

4.1.18 Environmental Justice

Primary issues related to environmental justice are guided by EO 12898 that initiated consideration of environmental justice in federal actions. The basic question is whether any potential adverse impacts of the proposed Project would fall disproportionately on minority or low-income members of the affected community.

In order to assess the potential for environmental justice impacts, the socioeconomic characteristics of the study area counties and communities were first analyzed for the presence of minority and/or low-income populations. For environmental justice purposes, Esmeralda County was found to have a minority population, and Nye County was found to have a low-income population that met the screening standards. Second, having found that minority and low-income populations are extant in the study area, based on the USEPA's Environmental Justice Guidance (USEPA 1998), the proposed Project and alternatives were evaluated for potential impacts that might be expected to disproportionately impact any such populations.

4.1.18.1 Proposed Action

Potential impacts of the proposed Project (including ROW authorizations) would not be expected to disproportionately affect any particular population. The nearest residential area to the proposed Project is the community of Goldfield, which has a Native American population of approximately 1.6 percent, less than half the county-wide percentage. This indicates that a larger percentage of Native Americans in the county live farther from the study area. Project-related impacts on the minority population would be considered negligible.

The identified, potential low-income population is in Nye County. However, the nearest population concentration in the county is at Tonopah, which is approximately 25 miles from the proposed Project. The most likely impact on residents of Tonopah would be a modest increase in employment opportunities related to the proposed Project, which would be a beneficial impact. Consequently, no adverse impacts on the low-income population would occur and the impacts would be considered negligible to non-existent for environmental justice purposes.

Considering the distances from the proposed Project to residential concentrations other than the town of Goldfield, the only likely adverse impacts would be related to air quality and those would affect the entire population equally, without regard to ethnicity or race. The air quality analysis for the proposed Project is presented in the *Air Quality Resource Report for the Gemfield Mine Project* (BLM 2018m).

An additional provision of the CEQ guidance requires consideration of "impacts that may affect a cultural, historical, or protected resource of value to an Indian tribe or a minority population, even when the population is not concentrated in the vicinity." The analyses in the *Cultural Resources Report for the Gemfield Mine Project* (BLM 2018l) and *Native American Concerns Resource Report for the Gemfield Mine Project* (BLM 2018v) determined that adverse impacts to such resources likely would not occur.

The BLM has held a public scoping meeting in Goldfield, Nevada, and distributed public notices about the proposed Project through mailings and notices in area newspapers in addition to the formal notice in the Federal Register. Based on these considerations, no disproportionate, adverse environmental justice impacts would be anticipated from development of the proposed Project, and therefore, impacts would be short-term, localized, and negligible.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for environmental justice.

4.1.18.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and any associated impacts on environmental justice would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Any potential adverse environmental justice impacts were addressed in the permitting process for the existing activities and no additional environmental justice impacts would be expected. The impacts of the No Action Alternative on environmental justice in the study area would be negligible.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for environmental justice.

4.1.18.3 Reduced Pit Mine Plan Alternative

Environmental justice impacts would be the same as those described for the proposed Project except the beneficial impacts of employment and income during the active mine life would be 1 year less.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for environmental justice.

4.1.18.4 Partial Pit Backfill Alternative

Environmental justice impacts would be the same as described for the proposed Project except the beneficial impacts of employment and income during the active mine life would be increased by approximately 2 years.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for environmental justice.

4.1.19 Visual Resources

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 water bodies, vegetation, and structures as compared to the existing, characteristic landscape.

Each of the alternatives considered in this EIS were analyzed for its potential to result in impacts on visual resources. Visual impacts were analyzed using the methodology outlined in the BLM Handbook H8431-1, Visual Contrast Rating (BLM 1986), which analyze the levels of visual contrast created between a project and the existing, characteristic landscape. As noted previously, the management standards and allowable contrasts for the visual rehabilitation area are those of the management Class IV objective. The following indicators were considered 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 KOPs due to visibility of components of the Proposed Action or alternatives to the Proposed Action.

4.1.19.1 Proposed Action

The visual impact would be greatest from KOP 1 because the proposed HLP would be in the immediate foreground and the East WRDA in the middle-ground as motorists approach from the north. The strong form and sharp line of the proposed HLP would create a contrast that would attract attention as compared to the surrounding landforms. The proposed 12.5-kV distribution line would appear at the base of the HLP but would be weakly visible. The proposed East WRDA appears behind the proposed HLP from KOP 1 and the reclaimed landform of the East WRDA would be consistent with the surrounding natural landforms of the Goldfield Hills backdrop.

KOP 2 would have the greatest view of the north-south development of the proposed Project as the East WRDA is evident in the middle-ground view. The proposed East WRDA represents a landform approximately 7,200 feet in length. From this KOP, existing light-colored mine tailings and waste rock on WRDAs exhibit strong color contrast to the surrounding natural landforms and vegetation. During the height of mining, the light color of the proposed East WRDA would create moderate contrast due to the color of raw rock surfaces and size of the landforms. Color contrast of the existing condition would be lessened under the reclaimed condition due to vegetation color on both the existing mine tailings and waste rock on WRDAs along with the proposed East WRDA. Proposed contour grading of the East WRDA would result in a low contrast with surrounding natural landforms.

From KOP 3, the proposed HLP and East WRDA would be visible in the middle-ground view and block distant views. During the height of mining, the light color of both features would create moderate contrast due to the color of raw rock surfaces and the size of the features. With reclamation and subsequent vegetation growth on the proposed HLP and East WRDA, the resulting color would blend into the surrounding natural landform color. The strong form and sharp line of the proposed HLP creates a contrast that would attract attention as compared to the surrounding landforms prior to the implementation of reclamation measures. Proposed contour grading of the East WRDA would result in a low contrast with surrounding natural landforms.

The view from KOP 4 is comprised of existing structures and utility lines, which contrast moderately from the natural surroundings due to form and color. Proposed mine facilities including the South Overburden Stockpile, East WRDA, and HLP would be visible behind the existing structures and utility lines in the background. The proposed Project facilities would result in weak contrast during the height of mining due to color from the raw rock surfaces. Under the reclaimed condition and vegetation color, the proposed Project facilities would blend into the surrounding natural landform color with low contrast. Proposed contour grading of the East WRDA would result in a low contrast with surrounding natural landforms.

The HLP and East WRDA would be seeded and vegetation cover would establish during reclamation of the Project. Vegetation cover would use native species and closely resemble existing undisturbed vegetation in the landscape. However, the moderate size of the HLP and East WRDA would remain and would be visible outside of the project area, despite vegetation cover. Accordingly, visual contrast would be permanent and moderate following operation and reclamation.

The intensity of impacts following reclamation would be moderate due to the change to the viewshed and scenic quality with a noticeable degree of contrast with the existing landscape. The duration of impacts would be permanent following reclamation due to the permanent impact on the viewshed. The impact context would be regional as the activity would be visible outside of the visual resources study area. However, the Proposed Action following reclamation, as viewed from all four KOP's would not conflict with established BLM VRM Class IV objectives, which allow for a high level of change to the characteristic landscape.

Lighting applicant-committed EPMs are outlined in the *Project Alternatives Resource Report for the Gemfield Mine Project* (BLM 2018b). The Proposed Action would result in a minor increase in the number of haul trucks or other equipment with headlights due to night time construction and operations. With the implementation of the Proposed Action, including applicant-committed EPMs impacts to dark skies are anticipated to be short-term, localized, and minor.

Recommended Monitoring and Mitigation Measures

Issue: The reclaimed form of the proposed HLP is a strong pyramidal form that contrasts with the undulating forms of the surrounding Goldfield Hills.

Mitigation V-1: Additional recommended mitigation is to round the slope angles on the sides and develop middle slope undulations for the proposed HLP to break up the strong pyramidal form, which would help to reduce visual contrast with the surrounding form of the Goldfield Hills.

Effectiveness: The implementation of the additional mitigation would be effective in reducing the visual contrast to a low level.

4.1.19.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to visual resources would not occur and the beneficial impacts from covering and reclaiming the historic tailings would not occur. Under this alternative, GRL would be permitted to continue exploration activities under existing approved authorizations.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD for the Project. The anticipated construction activities associated with this utility upgrade would occur within the existing 20-foot-wide ROW (N-31308).

Recommended Monitoring and Mitigation Measures

No additional monitoring or mitigation measures are recommended for visual resources.

4.1.19.3 Reduced Pit Mine Plan Alternative

The visual impact from KOP 1 would be the same as for the Proposed Action.

The visual impact from KOP 2 would be the same as for the Proposed Action post mining. However, the long, flat form of the East WRDA following reclamation would create moderate contrast with the surrounding landforms.

The visual impact from KOP 3 varies from the Proposed Action because the HLP would not be as visible as it is obscured by an existing landform. With reclamation and removal of the South Overburden Stockpile along with the reduction in size of the East WRDA, the resulting forms would blend into the surrounding natural landform color. However, the long, flat form of the East WRDA following reclamation would create moderate contrast with the surrounding landforms.

The visual impact from KOP 4 varies from the Proposed Action due to the reduction in size of the East WRDA. In addition, the resulting forms would blend into the surrounding natural landform color.

The intensity, duration, and impact context would be the same as for the Proposed Action.

The impacts of dark sky resources would be the same as for the Proposed Action.

Recommended Monitoring and Mitigation Measures

Issue: The reclaimed form of the proposed HLP is a strong pyramidal form and the reclaimed form of the proposed East WRDA has a long, flat top that contrasts with the undulating forms of the surrounding Goldfield Hills.

Mitigation V-2: Additional recommended mitigation is to round the slope angles on the sides and develop middle slope undulations for the proposed HLP to break up the strong pyramidal form and undulate the top of the East WRDA to reduce visual contrast with the surrounding form of the Goldfield Hills.

Effectiveness: The implementation of the additional mitigation would be effective in reducing the visual contrast to a low level.

4.1.19.4 Partial Pit Backfill Alternative

The visual impact from KOP 1 would be the same as for the Proposed Action.

The visual impact from KOP 2 would be the same as for the Proposed Action post mining. However, the long, flat form of the East WRDA following reclamation would create moderate contrast with the surrounding landforms.

The visual impact from KOP 3 varies from the Proposed Action because the HLP would be less visible as it is obscured by an existing landform. With reclamation and removal of the South Overburden Stockpile along with the greater reduction in size of the East WRDA as compared to the Proposed Action and also with the Reduced Mine Plan, the resulting forms would blend into the surrounding natural landform color. However, the long, flat form of the East WRDA following reclamation would create minor contrast with the surrounding landforms

The visual impact from KOP 4 varies from the Proposed Action due to the greater reduction in size of the East WRDA as compared to the Proposed Action. In addition, the resulting forms would blend into the surrounding natural landform color.

The intensity, duration, and impact context would be the same as for the Proposed Action.

The impacts of dark sky resources would be the same as for the Proposed Action with an extended duration of lights from hauling backfill material for 2 years.

Recommended Monitoring and Mitigation Measures

Same as for the Reduced Mine Plan Alternative.

4.1.20 Hazardous Materials and Solid Waste

Primary issues related to hazardous materials and solid waste include the potential for an accidental spill during transport of hazardous materials and the potential for accidental hazardous materials spills or releases in the Project site.

4.1.20.1 Proposed Action

There are two potential areas for accidental release of hazardous materials or fuels: 1) the Project site; and 2) along major transportation routes to the Project site during transportation of hazardous materials or fuels.

Project-Related Hazardous Materials Releases:

A hazardous material spill or accidental release within the study area (including amended ROWs) would be minor in intensity because it would be quickly and completely remediated, short-term in duration, and localized.

Transportation-Related Hazardous Material Releases:

Based on the annual consumption rates, an approximate load delivery frequency for the materials to be transported to the proposed Project were estimated. Approximately 17 truckloads of 6,400 gallons would be required per month for sodium cyanide; 23 truckloads of 6,000 gallons for diesel fuel; 10 truckloads of 30 tons per load for ammonium nitrate; and one shipment of 3,900 gallons for sodium hydroxide (GRL 2018a). Accident rates estimated by Battelle (2001) suggest that for toxics such as sodium cyanide, the accident rate is 0.5 accidents per million miles travelled; sodium hydroxide is 0.23 accidents; diesel fuel is 0.13 accidents; and ammonium nitrate is 0.61 accidents.

Using these statistics and the projected truck traffic needed by the proposed Project over a 12-year mine life, the estimated number of sodium cyanide transportation accidents would be 0.16; diesel fuel would be 0.06; ammonium nitrate would be 0.12; and sodium hydroxide would be 0.004. Thus, only one truck spill is estimated for the entire 12-year mine life of the proposed Project.

In addition, the probability of a release for each substance would be as follows: diesel fuel – probability of 290.2 in 1,000 miles for the Reno I-80/U.S. 95 route and 210.3 in 1,000 miles for the Las Vegas U.S. 95 route; sodium cyanide – 99.5 in 1,000 miles for the Reno I-80/U.S. 95 route and 72.1 in 1,000 miles for the Las Vegas U.S. 95 route; and sodium hydroxide – 3.4 in 1,000 miles for the Reno I-80/U.S. 95 route and 2.4 in 1,000 miles for the Las Vegas U.S. 95 route. These results indicate a high probability of an accidental release of diesel fuel, and a low probability of an accidental release of sodium hydroxide to the environment during the estimated life of the Proposed Action. National accident statistics for flammable and combustible materials (diesel fuel) indicate a higher incident of release per mile of travel than the other categories used in this analysis. Based on the small quantities of hazardous waste that would be generated by the Proposed Action, an accident resulting in a release to the environment during transportation off the Proposed Action area is not anticipated.

A spill of hazardous materials or fuels along either route that does not impact a water body or stream channel would only impact 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 within 1 year, making the spill or release short-term in duration and localized in extent.

A spill or release into a water body such as a flowing stream or Walker Lake would be moderate to major in intensity, depending on the size and extent of the spill and how fast the spill spreads in the water body. Remediation within 1 year may not be possible and the spread of the spill could result in impacts over a large area, making the spill or release potentially long-term in duration and regional in extent.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for hazardous material and solid waste.

4.1.20.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and thus Project-related spills and accidental spills during transportation of hazardous materials or fuels to the Project site would not occur. However, previously permitted mining activities would continue, including exploration, reclamation, and closure.

Under this alternative, most of the ROW authorizations needed to support the proposed Project including the realignment of U.S. 95, county roads, and associated utilities would not occur. Esmeralda County would replace and upgrade the existing water pipeline from the Klondike wellfield to the town of Goldfield, as discussed in the POD. This project would be within the existing 20-foot-wide ROW (N-31308) and permitted separately.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for hazardous material and solid waste.

4.1.20.3 Reduced Pit Mine Plan Alternative

Hazardous materials and solid waste impacts would be the same as described for the proposed Project except that lower amounts of hazardous materials and solid waste would be used or generated since the mine life would be 1 year less and 87 fewer acres would be disturbed than the proposed Project.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for hazardous material and solid waste.

4.1.20.4 Partial Pit Backfill Alternative

Hazardous materials and solid waste impacts would be the same as described for the proposed Project except that higher amounts of hazardous materials and solid waste would be used or generated since the mine life would be 2 years longer than the proposed Project.

Recommended Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for hazardous material and solid waste.

4.2 Cumulative Effects

As required under the NEPA and the regulations implementing NEPA, this section analyzes potential cumulative impacts from past, present, and reasonably foreseeable future actions (RFFAs) combined with the Proposed Action within the Cumulative Effects Study Area (CESA) specific to the resources for which cumulative impacts may be anticipated. A cumulative impact is defined as “the impact which results from the incremental impact of the action, decision, or project when added to other past, present, and RFFAs, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). This analysis focuses on cumulative impacts of the Proposed Action and other actions both within and outside of the Proposed Action area.

The boundaries of the CESAs vary by resource. Cumulative effects should be evaluated in terms of the specific resource, ecosystem, and human community being impacted. To determine the size of the CESAs, each environmental resource was analyzed to determine the extent to which the environmental effect from the project could be reasonably detected and the geographic area impacted was defined.

For the purposes of this analysis and under federal regulations, “impacts” and “effects” are assumed to have the same meaning and are interchangeable. The cumulative effects analysis was accomplished through the following steps: Step 1: Establish appropriate geographical area CESAs for analysis by resource; Step 2: Identify the past, present, and RFFAs relevant to the resources in the CESAs; Step 3: Summarize the

effects of the Proposed Action in conjunction with past, present, proposed, and RFFAs; and Step 4: Provide a cumulative impacts analysis and discussion.

Information utilized in the cumulative impacts analysis was gathered from the following sources: BLM's LR2000, BLM's Land Records Search, Geographic Information System shapefiles provided by the BLM and the client, aerial photography, and existing environmental assessment and EIS documents.

Environmental consequences of the Proposed Action and action alternatives are described in Sections 4.1.1 through 4.1.20. Based upon the analysis conducted for each resource, it was determined necessary to analyze cumulative impacts for all the resources with the exception of Range Resources.

The geographical areas considered for the analysis of cumulative effects are shown and discussed further in the resource report for each resource (BLM 2018c through 2018v) and described in **Table 4-1**. The CESA boundaries vary in size and shape to reflect each evaluated resource (**Figure 4-1**).

Table 4-1 Cumulative Effects Study Area by Resource

Resources	Cumulative Effects Study Area	Size of Area (acres)
Geology and Minerals/ Paleontological Resources	Plan boundary and ROW realignments and historic Diamondfield and Goldfield mining districts	56,662
Water Resources and Geochemistry/Soils/ Vegetation/Wildlife Resources/Special Status Species/ Recreation/Land Use and Realty	Study area and the Alkali Spring Valley Watershed	202,950
Wild Horses and Burros	Goldfield and Montezuma Peak HMA	141,385
Cultural Resources/Visual Resources	Plan boundary and ROW realignments and anything visible within a 15-mile radius of the Plan boundary.	528,979
Native American Concerns	Area extending approximately 10 miles north, 8 miles west, 5 miles east, and 3 miles south of the proposed Project.	139,070
Air Quality	50-kilometer (km) (31-mile) radius from the center of the Proposed crusher area	1,940,756
Noise and Vibration	Plan boundary and ROW realignments or modifications and a 5-mile radius.	50,199
Transportation and Access/ Hazardous Materials and Solid Waste	Plan boundary and ROW realignments, as well as the main transportation routes from Las Vegas and Reno to the Plan boundary.	487
Social and Economic Values/Environmental Justice	Nye and Esmeralda Counties	13,909,155

Past, present, and reasonably foreseeable future actions for each CESA are outlined in detail in each resource report (BLM 2018c through 2018v) and are summarized in the following sections.

4.2.1 Geology and Minerals

The CESA for geology and minerals encompasses the Goldfield Mining District as defined by Tingley (1998). The Goldfield Mining District extends east and north of the town of Goldfield. The Goldfield Mining District was the site of intensive mining activity between 1902 and 1919. Mineral production included gold, silver, and copper. After 1919, the district has since experienced sporadic small-scale mining activity (Ashley and Keith 1976).

CHURCHILL COUNTY
LANDER COUNTY
EUREKA COUNTY
WHITE PINE COUNTY
MINERAL COUNTY
NYE COUNTY
ESMERALDA COUNTY
MONO COUNTY
LINCOLN COUNTY
FRESNO COUNTY
INYO COUNTY
TULARE COUNTY
KERN COUNTY
SAN BERNARDINO COUNTY
CLARK COUNTY

50
6
95
93
395
15
515
215

Existing Wells
Proposed Wells (W) & Well Yard (Green)
Esmeralda County Water Line (ROW)
Proposed Klondike Water Well Location Approximately 7.9 Miles North of Plan Boundary

Coaldale
Tonopah
Goldfield
Beatty
Las Vegas
Plan Boundary
Nevada
California

Cumulative Effects Study Areas

Figure 4-1

Gemfield Mine Project

Legend

- Plan Boundary
- City
- Klondike Water Well
- Water Line ROW
- Interstate
- U.S. Highway
- County Boundary
- State Boundary

CESA Boundaries

- Social and Economic Values, Environmental Justice
- Visual Resources, Cultural Resources
- Air Quality
- Wildlife, Special Status Species,Vegetation, Recreation, Water Resources and Geochemistry, Soils, Land Use and Realty
- Native American Concerns
- Transportation and Access, Hazardous Materials and Solid Waste
- Wild Horses and Burros
- Noise and Vibration
- Geology and Minerals, Paleontological Resources

Source: GRL 2018.

N

0 10 20 40 Miles

4.2.1.1 Proposed Action

Mineral production in the Goldfield Mining District has historically included gold, silver, and copper, as well as intermittent mining of the basin fill material as a source of gravel for road construction. Surface mining activity affects geology and mineral resources by excavating, modifying, or covering natural topographic and geomorphic features, and by removing mineral deposits.

Mining disturbance in the mining district has included exploration, open pit and underground mining, and construction of WRDAs, heap leaching, ore milling and processing, and tailings disposal facilities. The mining district is disturbed by numerous localized historic prospects, mine excavations, and associated WRDAs that were not reclaimed. For the purpose of this evaluation, geologic disturbance is defined to include mine components that permanently alter the natural topographic and geomorphic features in the area such as historic prospects and other mineral exploration areas (reclaimed and unreclaimed).

Based on available information, past, present, and RFFAs within the CESA for geology and minerals would result in an estimated 10,060 acres of geologic disturbance that would result in a permanent alteration of the natural topography. Of the total acres of new disturbance that would occur under the Proposed Action, the project incrementally would increase the permanent alteration of topography (as open pit, WRDAs, and HLP) in the CESA on approximately 500 acres. The approximate 500 acres of disturbance represents a less than 1 percent increase in the total amount of land where the topography and geomorphology would be altered by mining in the Goldfield Mining District.

4.2.1.2 No Action Alternative

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

4.2.1.3 Reduced Mine Plan Alternative

Cumulative impacts to geology and mineral resources from the Reduced Mine Plan Alternative would be similar but less than those identified for the Proposed Action. Of the total acres of new disturbance that would occur under this Alternative, the proposed Project incrementally would increase the permanent alteration of topography (as open pit, WRDAs, and HLP) in the CESA on approximately 362 acres of proposed new disturbance. This acreage represents a less than 1 percent increase in the total amount of land where the topography and geomorphology would be altered by mining in the Goldfield Mining District.

4.2.1.4 Partial Pit Backfill Alternative

Cumulative impacts to geology and mineral resources from the Partial Pit Backfill Alternative would be similar to those identified for the Proposed Action. However, the partial backfill is expected to act as a buttress for the lower (i.e., backfilled) slopes. The buttressing effect would further improve the long-term stability of the pit walls and likely reduce the size of potential failures that potentially could occur in the post-closure period.

4.2.2 Water Resources and Geochemistry

The CESA boundary for water resources and geochemistry includes the study area and the Alkali Spring Valley Hydrographic Area. The CESA was defined to include the maximum geographic extent of effects from surface disturbances and water management activities associated with the proposed Project (and interrelated actions) and past, present, and RFFAs. The total area of the CESA encompasses 202,950 acres.

Within this CESA, past and present disturbance has resulted from the following activities: mineral development and exploration projects (847 acres); utilities, infrastructure, and public purpose activities (6,406 acres); roads and railroads (2,539 acres); dispersed recreation; and livestock grazing.

Wildland fires are another major disturbance. These can cumulatively impact 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 utilizer 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 additions of nitrogen and other constituents. Livestock also can trample vegetation around water sources, degrading surface water quality through the subsequent erosion.

Mining also has the potential for cumulative impacts to 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 pose a threat for erosion and sedimentation to the watershed. Individual mine impacts may be minor to negligible, while cumulative mining activity can pose potential for significant impacts to 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 run-off.

RFFAs in the CESA would include: mineral development and exploration projects (1,882 acres) and utilities, infrastructure, and public purpose activities (1,242 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.

4.2.2.1 Proposed Action

The Proposed Action is predicted to not affect any perennial springs or seeps, and therefore, would not contribute to the cumulative impacts to seeps and springs in the CESA.

The Proposed Action would result in the development of pit lakes at closure that would persists for the foreseeable future. The pit lakes are predicted to behave as a strong hydraulic sink (i.e., hydrologic capture zone where there is groundwater inflow that is lost to evaporation but no outflow to the groundwater system). Therefore, the pit water quality from the Proposed Action combined with past, present, and RFFAs is not anticipated to add to cumulative impacts to groundwater quality within the CESA.

After the pit lakes are fully developed, the pit lake volume and surface area would be sustained by groundwater inflow into the pit. Model simulations estimate that the long-term groundwater flow into the pits would be approximately 14.3 gpm (23.1 acre-feet/year). The long-term groundwater inflow to the pits that would be lost by evaporation represents 0.7 percent of the estimated perennial yield of groundwater available from the Alkali Spring Hydrographic Area (HA). This groundwater withdrawal required for the proposed Project compared with the perennial yield indicates that the regional, long-term impact to the available groundwater in the basin associated with the pit lakes would be negligible.

Groundwater pumping for the proposed Project would reduce the total quantity of groundwater available within the Alkali Spring HA. The estimated perennial groundwater yield for the Alkali Spring HA is 3,000 acre-feet/year (NDWR 2018). The average water supply required by the mine (i.e., 807 acre-feet/year) represents approximately 27 percent of the total estimated perennial yield for the basin. This

groundwater withdrawal required for the proposed Project compared with the perennial yield in combination with the past, present, and RFFAs within the CESA indicates that the cumulative impact to the available groundwater in the basin would be major, regional, and long-term.

Under the Proposed Action, the East WRDA would be constructed over the existing historic GCMC tailings. Results of geochemical characterization sampling and testing indicate that the historic tailings material have the potential to generate acid rock drainage and leach metals. Placement of waste rock with a low potential for acid generation and metals leaching over the historic tailings area would limit the exposure of the tailings to air and water and thereby minimize potential future impacts to surface or groundwater resources (SRK 2013b, GRL 2018a). Placement of the waste rock over the historic tailings as outlined in the Proposed Action in combination with the past, present, and RFFAs is expected to reduce the potential for the historic tailings to impact surface water and groundwater quality in the CESA compared to existing conditions.

Impacts to surface water resources would involve removal or disturbance of a portion of unnamed ephemeral drainage and associated contributing watershed areas. The watershed surface disturbance from the Proposed Action consists of 1 percent of the CESA. The Proposed Action surface disturbance, in combination with the past, present, and RFFAs within the CESA, represents 7 percent of the CESA. The Proposed Action in combination with the past, present, and RFFAs are anticipated to have minor to negligible, long-term cumulative effect to watersheds CESA.

4.2.2.2 No Action Alternative

Under the No Action Alternative, all other past, present, and RFFAs discussed for the Proposed Action are anticipated to take place, but the proposed Project would not be developed, and impacts to water resources associated with the Proposed Action would not occur. The historic GCMC mill tailings would not be covered with WRDA. The historic tailings would continue to erode and be transported and deposited along the Big Wash downstream from the facility (and downstream from the Plan boundary) during major storm events. In addition, the GCMC historic mill tailings are acid generating and can leach metals. Therefore, not covering the historic tailings with waste rock is expected to result in a long-term, moderate, and regional incremental increase to impacts to groundwater quality within the CESA.

4.2.2.3 Reduced Mine Plan Alternative

Cumulative impacts to water resources from the Reduced Mine Plan Alternative would be essentially the same as those identified for the Proposed Action with the following exceptions.

The groundwater pumping required as a water supply for the development and operation of the proposed Project would be the same as for the Proposed Action. However, the duration of the groundwater pumping would be reduced by 2 years, and because this alternative does not include the 1 year of pumping for fill of the pit lakes that is included in the Proposed Action. This reduction in the duration of groundwater pumping to supply the project would reduce the amount of groundwater withdrawal, and thereby reduce impacts to the available groundwater resource within the Alkali Spring HA.

Under the Reduced Mine Plan Alternative, impacts to surface water resources would involve removal or disturbance of a portion of unnamed ephemeral drainages and associated contributing watershed areas. The impacts to the watershed would be the same as for the Proposed Action.

4.2.2.4 Partial Pit Backfill Alternative

Cumulative impacts to water resources from the Partial Pit Backfill Alternative in combination with the past, present, and RFFAs would be essentially the same as those identified for the Proposed Action with the following exceptions.

Under the Partial Pit Backfill Alternative, the backfill placed in the pits would eliminate pit lake development. As a result, the long-term groundwater inflow to the pits that would be lost by evaporation described under the Proposed Action would not occur. A groundwater flow through system would

re-establish through the pit backfill material during the post-closure period (SRK 2018b). Model simulation estimates that the long-term groundwater outflow from the pit backfill material would be approximately 15 gpm. The groundwater that flows out of the pit is predicted to impact the downgradient water quality. Specifically, fluoride and sulfate are predicted to exceed the NDEP Profile II reference values for groundwater (i.e., exceed the Nevada Secondary Enforceable Drinking Water Standards) in groundwater extending greater than 500 meters downgradient of the northern edge of the pit (SRK 2018b). These downgradient groundwater quality impacts are considered incremental impacts that would increase the cumulative impacts to groundwater quality in the CESA, therefore in combination with the past, present and RFFAs, cumulative impacts would be the same as for the Proposed Action.

Impacts to surface water resources would involve removal or disturbance of a portion of unnamed ephemeral drainages and associated contributing watershed areas. The cumulative impacts to the watershed would be the same as for the Proposed Action.

4.2.3 Soils Resources

The CESA boundary for soil resources includes the study area and the Alkali Spring Valley Watershed. The CESA was defined to include the maximum geographic extent of effects from surface disturbances and water management activities associated with the proposed Project (and interrelated actions) and past, present, and RFFAs. The total area of the CESA encompasses 202,950 acres.

Within this CESA, past and present disturbance has resulted from the following activities: mineral development and exploration projects (847 acres); utilities, infrastructure, and public purpose activities (6,406 acres); roads and railroads (2,539 acres); dispersed recreation; and livestock grazing.

Each past and present disturbance in the CESA may have impacted soil resources in a variety of ways. Heavy equipment could have resulted in compacting soil, increasing the density to the point where vegetation cannot grow and support the ecosystem. Disturbance of soil can make it vulnerable to wind and water erosion. Paved roads reduce the infiltration of water into the soil and concentrate erosive forces down embankments. Fine particulates can easily contaminate the water or air and are difficult to recapture once they are disturbed from the environment. Natural soil profiles also are lost during ground disturbance. Contamination can occur by exposing naturally occurring geochemical process or through inadvertent releases.

Wildland fire can remove or change the vegetation cover, which typically prevents erosion. Heavy precipitation events can then remove soil, and transport sediment downstream. Particularly hot fires also can sterilize the soil, eliminating the seed bank, and preventing vegetative regrowth. Regular occurrences of fire also are a natural component of the landscape, returning nutrients to the soil and triggering succession of different communities in the CESA.

Recreation and livestock grazing may have resulted in impacts to the soil. These can increase erosion, particularly along waterways where activities concentrate. Trails can serve as new sources of erosion, combining disturbance of the vegetation with breaking apart the soil surface, which can channel precipitation into new areas.

RFFAs in the CESA would include: mineral development and exploration projects (1,882 acres) and utilities, infrastructure, and public purpose activities (1,242 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. These activities would lead to similar disturbances as those described for past and present actions.

4.2.3.1 Proposed Action

The proposed Project would incrementally increase disturbance to soils by an additional 1,337 acres (less than 1 percent of the CESA) resulting in a total cumulative disturbance of approximately 14,254 acres (approximately 7 percent of the CESA). The disturbance also is located adjacent to an existing mine, with similar known soil characteristics. Mitigation measures for the proposed Project include stockpiling

suitable soil for growth media and rehabilitating disturbed areas to the extent possible. Pending completion of successful reclamation, the incremental additional effects to soils as a result of the proposed Project would not be permanent in nature for the majority of the Project disturbance area. Therefore, these impacts to soil resources in combination with past, present, and RFFAs in the CESA would be long-term and minor.

4.2.3.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. Operations would continue for the mine as previously authorized. Impacts to the CESA from past, present, and RFFAs would be localized, long-term, and minor.

4.2.3.3 Reduced Mine Plan Alternative

Cumulative impacts to soils would be the same as described for the proposed Project, except that 87 fewer acres of soils would be removed as a result of the proposed Project.

4.2.3.4 Partial Pit Backfill Alternative

Cumulative impacts to soils would be the same as described for the proposed Project.

4.2.4 Vegetation (Including Noxious Weeds, Invasive, and Non-Native Species)

The CESA boundary for vegetation (including noxious weeds, invasive, and non-native species) includes the study area and the Alkali Spring Valley Watershed. The CESA was defined to include the maximum geographic extent of effects to vegetation resources from surface disturbances and water management activities associated with the proposed Project and past, present, and RFFAs. The total area of the CESA encompasses 202,950 acres.

Within this CESA, past and present disturbance has resulted from the following activities: mineral development and exploration projects (847 acres); utilities, infrastructure, and public purpose activities (6,406 acres); roads and railroads (2,539 acres); dispersed recreation; and livestock grazing.

Disturbances directly remove vegetation during ground-disturbing development and have the potential to introduce or spread noxious weeds and non-native invasive species. This includes the construction of mines, roads, utilities, and associated infrastructure. Noxious weeds and non-native invasive species are often the first species to establish, especially along road corridors and where vehicles travel off-road. Vehicles that travel off-road spread seeds of noxious weeds and non-native invasive species, and roads create access into areas that might not otherwise have been accessible. Reclamation and revegetation required for projects on public land would minimize long-term impacts to vegetation. Noxious weeds and non-native invasive species are more likely to establish in disturbed areas; therefore, successful reclamation assists to limit the spread of these species.

Indirect impacts from past and present disturbances includes impacts from fugitive dust, which can cover leaves thereby reducing photosynthesis. Erosion can be increased due to disturbance of the vegetative layer, including from off-road recreation and livestock trampling. Livestock also can control the vegetation communities through the intensity of browsing. Another indirect impact includes the establishment of invasive species along disturbances and associated transportation routes. RFFAs in the CESA would include mineral development and exploration projects (1,882 acres) and utilities, infrastructure, and public purpose activities (1,242 acres).

4.2.4.1 Proposed Action

Cumulative effects from the Proposed Action in combination with past, present, and RFFAs include the incremental loss of habitat in the CESA. This new disturbance is less than a 1 percent increase in total disturbance for the CESA. The impacts would be located adjacent to existing development, concentrating similar types of disturbances in similar areas. Pending completion of successful reclamation, the incremental additional effects to vegetation as a result of the Project would be temporary in nature for the

majority of the Project disturbance area, and the loss of mature shrubs would be minimal relative to the total acreage of woody species communities that occur in the CESA. The removal of shrubs from these areas would result in a long-term change in vegetative structure since it would take up to 25 years for shrub species of similar stature to become re-established in these areas. In addition, since water management-related effects to vegetation would not occur under the Project, no cumulative effects to vegetation associated with water management activities are anticipated.

Lastly, implementation of the Project's Reclamation Plan, in association with the proposed Project and other authorized actions, would minimize the introduction or spread of noxious weeds and invasive species within the study area, thereby minimizing the Project's contribution to cumulative effects. Due to these factors, cumulative effects to vegetation would be long-term and negligible to minor.

4.2.4.2 No Action Alternative

Under the No Action Alternative, there would be no additional impacts to vegetation. Previously permitted mining activities would occur as outlined in authorized permits and reclamation and closure plans. Although the past, present, and RFFAs would occur, overall effects in the CESA would be less than the action alternatives since mining would end and reclamation would start sooner, but impacts would still be anticipated to be long-term and negligible to minor.

4.2.4.3 Reduced Mine Plan Alternative

Cumulative impacts to vegetation would be the same as described for the proposed Project, except that 87 fewer acres of vegetation would be removed as a result of the proposed Project.

4.2.4.4 Partial Pit Backfill Alternative

Cumulative impacts to vegetation would be the same as described for the proposed Project except that a smaller surface area associated with the East WRDA would be reclaimed as a result of the Proposed Action.

4.2.5 Wildlife Resources (Including Migratory Birds)

The CESA boundary for wildlife resources (including migratory birds) includes the study area and the Alkali Spring Valley Watershed. The CESA boundary is defined to include the maximum geographic extent of effects to wildlife resources from surface disturbances and water management activities associated with the proposed Project and RFFAs. The total area of the CESA encompasses 202,950 acres. Of the 202,950 acres covered by the CESA, 12,917 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 6.4 percent of the CESA.

4.2.5.1 Proposed Action

Cumulative effects to wildlife resources primarily would be directly related to habitat loss, habitat fragmentation, and animal displacement. Many of the local wildlife populations (e.g., mule deer, pronghorn) 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 habitat loss and disturbance from incremental development. In addition, local birds would be displaced, into neighboring territories, thereby increasing local competition, which can lead to increases in predation, mortality, or lost nesting opportunities. Competition among the remaining resources can limit population health. Positive changes can include the introduction of artificial nesting or perching habitat (e.g., utility poles), and may increase in habitat heterogeneity.

The proposed Project incrementally would increase disturbance to wildlife habitat by an additional 1,337 acres (less than 1 percent of the CESA) resulting in a total cumulative disturbance of approximately 14,254 acres (approximately 7 percent of the CESA). No migratory bird nests would be disturbed, including raptor nests, from the Proposed Action.

Indirect effects associated with human presence and noise would incrementally increase in the CESA during the life of the proposed Project. The contribution of the proposed Project to these effects would be short-term and temporary and would cease following completion of operations and final reclamation. Pending completion of successful reclamation, the incremental additional effects to wildlife as a result of the proposed Project would be temporary in nature for the majority of the Project disturbance area, although it may take up to 10 to 25 years to re-establish shrub communities. The reclaimed areas, and areas associated with habitat conversion, would be capable of supporting wildlife and migratory bird use; however, species composition and densities would change.

Groundwater drawdown associated with proposed dewatering operations would not result in a reduction in the amount and extent of available surface water (e.g., springs) in the Project vicinity and associated wetland habitat for wildlife species within the groundwater drawdown contour. This is discussed in greater detail in the *Water Resources and Geochemistry Resource Report for the Gemfield Mine Project* (BLM 2018d).

4.2.5.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed, and there would be no additional impacts to wildlife and migratory birds and associated habitat. Previously permitted mining activities would occur as outlined in authorized permits and reclamation and closure plans as well as other past, present, and RFFAs. Overall, effects in the CESAs would be less than the alternatives, since mining would end earlier, and no additional surface disturbance would occur from the Project but would still be anticipated to be long-term and minor. Wildlife and migratory bird habitat would still be impacted by future wildland fires, rangeland actions, recreation, and changes in the environment. Cumulative impacts to wildlife are expected to be negligible, long-term, and localized.

4.2.5.3 Reduced Mine Plan Alternative

Cumulative impacts to wildlife would be the same as described for the proposed Project, except that 87 fewer acres of habitat would be removed as a result of this Alternative. In addition, reclamation of habitat would occur 2 years sooner due to the decreased mine life under this alternative.

4.2.5.4 Partial Pit Backfill Alternative

Cumulative impacts to wildlife would be the same as described for the proposed Project, except the duration of impacts would last approximately 2 years longer than the proposed Project. In addition, impacts associated with exposure to water in the pit lakes would not occur.

4.2.6 Special Status Species

The CESA boundary for special status species includes the study area and the Alkali Spring Valley Watershed. The spatial extent of the CESA was defined to include the maximum geographic extent of effects to special status species from surface disturbances and water management activities associated with the proposed Project and RFFAs. The total area of the CESA encompasses 202,950 acres. Of the 202,950 acres covered by the CESA, 12,917 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 6.4 percent of the CESA.

4.2.6.1 Proposed Action

Cumulative effects to special status species would parallel those described for general wildlife. The proposed Project incrementally would increase disturbance to potential special status species habitat by an additional 1,337 acres (less than 1 percent of the CESA) resulting in a total cumulative disturbance of approximately 14,254 acres (approximately 7 percent of the CESA).

Indirect effects associated with human presence and noise would incrementally increase in the CESA during the life of the proposed Project. The contribution of the proposed Project to these effects would be short-term and temporary and would cease following completion of operations and final reclamation. Pending completion of successful reclamation, the incremental additional effects to special status species

as a result of the proposed Project would be temporary in nature for the majority of the Project disturbance area. The reclaimed areas, and areas associated with habitat conversion, would be capable of supporting special status species use; however, species composition and densities would change.

Groundwater drawdown associated with proposed dewatering operations would not result in a reduction in the amount and extent of available surface water (e.g., springs) in the Project vicinity and associated wetland habitat for special status species within the groundwater drawdown contour. This is discussed in greater detail in the *Water Resources and Geochemistry Resource Report for the Gemfield Mine Project* (BLM 2018d).

Based on 2012 and 2013 field survey results (Reynolds 2013, 2012), implementation of the proposed Project would not contribute to cumulative effects for the Eastwood's milkweed or sand cholla.

Based on the Joshua tree surveys that were conducted in the survey area, numerous trees potentially would be removed due to proposed Project activities. Therefore, potential cumulative effects to this species from the proposed Project would be considered moderate and long-term.

4.2.6.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and there would be no additional impacts to special status wildlife or plants from the Project. Previously permitted mining activities would occur as outlined in authorized permits and as described for past, present, and RFFAs. Overall, effects in the CESA would be less than the action alternatives, since mining would end earlier. Habitat would still be impacted by past, present, and RFFAs with impacts expected to be long-term and negligible to minor.

4.2.6.3 Reduced Mine Plan Alternative

Cumulative impacts to special status species would be the same as described for the proposed Project, except that 87 fewer acres of habitat would be removed as a result of this Alternative. In addition, reclamation of habitat would occur 2 years sooner due to the decreased mine life under this alternative.

4.2.6.4 Partial Bit Backfill Alternative

Cumulative impacts to special status species would be the same as described for the proposed Project, except the duration of impacts would last approximately 2 years longer than the proposed Project. In addition, impacts associated with exposure to water in the pit lakes would not occur.

4.2.7 Wild Horses and Burros

The CESA boundary for wild horses and burros is based on known distribution and movements of wild horses and burros in this region of Nevada in relation to the BLM's designated Goldfield HMA and Montezuma Peak HMA. The CESA encompasses the extent of potential effects from activities associated with the proposed Project and interrelated actions may result in cumulative effects when combined with potential effects from past, present, and RFFAs. HMA information for the CESA was sourced from the 1997 Tonopah RMP and from monitoring data collected by the BLM. The total area of the CESA encompasses 141,385 acres. Of the 141,385 acres covered by the CESA, 10,364 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 7.3 percent of the CESA.

4.2.7.1 Proposed Action

Cumulative effects to wild horses and burros primarily would be directly related to habitat loss, habitat fragmentation, and animal displacement. Many of the local herds 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 habitat loss and disturbance from incremental development.

The proposed Project incrementally would increase disturbance to wild horse and burro habitat by an additional 1,337 acres (less than 1 percent of the CESA) resulting in a total cumulative disturbance of approximately 11,701 acres (approximately 8.3 percent of the CESA). Pending completion of successful reclamation, the incremental additional effects to wild horses and burros as a result of the proposed Project would be temporary in nature for the majority of the Project disturbance area. The reclaimed areas, and areas associated with habitat conversion, would be capable of supporting wild horse and burro use; 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 proposed Project. The contribution of the proposed Project to these effects would be minor and long-term and would cease following completion of operations and final reclamation.

Groundwater drawdown associated with proposed dewatering operations is not anticipated to result in a long-term reduction in the amount and extent of available surface water (e.g., springs) in the Project vicinity or associated wetland habitat for wild horses and burros within the groundwater drawdown contour.

4.2.7.2 No Action Alternative

The No Action Alternative would not authorize additional development, and previously permitted mining activities would continue, including closure and reclamation, as well other past, present, and RFFAs in the CESA. Cumulative impacts to wild horses and burros 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.

4.2.7.3 Reduced Mine Plan Alternative

Cumulative effects to wild horses and burros under the Reduced Mine Plan Alternative would be the same as those identified for the proposed Project, except mine-related activities and associated human presence and noise would be reduced by approximately 1 year. This would result in a corresponding reduction in the reclamation schedule to achieve reclamation goals. Overall, cumulative impacts under the Reduced Mine Plan Alternative would be less than those under the Proposed Action but would still be anticipated to be minor, long-term, and localized.

4.2.7.4 Partial Pit Backfill Alternative

Cumulative impacts to wild horses and burros would be the same as the proposed Project, except the duration of impacts would last approximately 2 years longer than the proposed Project. In addition, less reclaimed vegetation (e.g., forage) would be established on the East WRDA since the height of this Project component would be lower and there would be less surface area than the proposed Project. In addition, impacts associated with exposure to water in the pit lakes (as discussed in the *Wildlife Resource Report for the Gemfield Mine Project* [BLM 2018g]) would not occur. Overall, cumulative impacts under the Partial Pit Backfill Alternative would be less than those under the Proposed Action but would still be anticipated to be minor, long-term, and localized.

4.2.8 Paleontological Resources

The CESA boundary for paleontological resources includes the Plan boundary and historic Diamondfield and Goldfield mining districts. The spatial extent of the CESA was defined to include the maximum geographic extent of potential impacts from activities associated with the proposed Project (and interrelated actions) that may result in cumulative impacts when combined with potential impacts from past, present, and RFFAs. The total area of the CESA encompasses 56,662 acres. Of the 56,662 acres covered by the CESA, 10,060 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 18 percent of the CESA.

Within this CESA, past and present disturbance has resulted from the following activities: mineral development and exploration projects (660 acres); utilities, infrastructure, and public purpose activities (6,045 acres); roads and railroads (1,655 acres); dispersed recreation; and livestock grazing.

The main impacts to paleontological resources often are the result of illegal collecting activities. Past roads and present roads may have resulted in easier access to paleontological resources, which may have provided opportunities for illegal collecting activities. Ground-disturbing activities may destroy paleontological resources if a field survey by a qualified paleontologist is not conducted prior to and during surface disturbing activities.

The various mineral development and exploration projects and other surface disturbances within the paleontological resources CESA are located on a variety of geologic formations with varying fossil potential. Not all disturbances would pose a risk to fossil resources, particularly if the geologic formation is non-fossil-bearing, and if a field survey was completed and mitigation measures were in place prior to ground-disturbing activities.

RFFAs within the CESA would include the following: mineral development and exploration projects (1,077 acres) and utilities, infrastructure, and public purpose activities (623 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 for past and present actions. RFFAs occurring in non-fossil-bearing geologic formations would not impact or affect paleontological resources. Future restoration projects also could occur in this CESA. However, since most treatments would occur at or above the soil surface, risks to paleontological resources from treatment projects would be considered negligible.

4.2.8.1 Proposed Action

According to the paleontological resources report that addresses vertebrate and invertebrate fossils in the study area (Fisk and Haasl 2012), no vertebrate fossil localities were confirmed within the study area through background research, paleontological field surveys, and queries to other paleontologists. However, fossil localities were noted within the CESA (Fisk and Haasl 2012). If paleontologically significant fossiliferous deposits, particularly vertebrate fossils, are identified by a qualified paleontologist during excavation or other ground-disturbing activities associated with construction of the proposed Project, those activities would be halted in the area of the discovery and GRL would contact the BLM AO. If the discovered paleontological resource is determined significant, appropriate measures would be developed to mitigate potential adverse impacts. Through implementation of appropriate mitigation measures in the event of an unanticipated discovery, potential impacts to paleontological resources are anticipated to be localized, moderate, and long-term.

Due to the high likelihood of encountering fossils in the Siebert Formation, potential impacts from the Proposed Action to paleontological resources likely would be localized, moderate, and long-term. With the implementation of mitigation measure in the event of an unanticipated discovery, no adverse impacts to paleontological resources are anticipated as a result of the proposed Project and no incremental impacts to these resources would occur when added to past and present actions and RFFAs within the CESA.

4.2.8.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed. Previously permitted mining activities would continue, including reclamation and closure, as well as other past, present, and RFFAs. Cumulative impacts to this CESA from the No Action Alternative would be localized, long-term, and negligible.

4.2.8.3 Reduced Mine Plan Alternative

Cumulative impacts to paleontological resources from past and present actions, RFFAs, and the Reduced Pit Mine Plan Alternative would be the same as described for the proposed Project except that potential

for the disturbance of fossils in the Siebert Formation would be lower since 87 fewer acres of disturbance would occur with the implementation of this alternative.

4.2.8.4 Partial Pit Backfill Alternative

Cumulative impacts to paleontological resources from past and present actions, RFFAs, and the Partial Pit Backfill Alternative would be the same as described for the proposed Project.

4.2.9 Cultural Resources

The CESA boundary for cultural resources is defined as the area in which the proposed Project facilities within the Plan boundary (including the proposed mine facilities, U.S. 95 realignment, and utility ROW realignments or modifications) and ROW realignments or modification that occur outside of the Plan boundary (including Brickyards Road; water pipeline, water wells, and facilities; and underground fiber optic line) that would be visible within a 15-mile radius of the study area. The rationale for this CESA is based on the results of the viewshed analysis (by facility) and the distance from which facilities may be discernable by the human eye. The total area of the CESA encompasses 528,979 acres.

Within this CESA, past and present disturbance has resulted from the following activities: mineral development and exploration projects (2,551 acres); utilities, infrastructure, and public purpose activities (7,916 acres); oil, gas, and geothermal development (15 acres); roads and railroads (5,536 acres); dispersed recreation; and livestock grazing.

The RFFAs within the CESA would include: mineral development and exploration projects (1,882 acres) and utilities, infrastructure, and public purpose activities (801 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 for past and present actions.

Of the 528,979 acres covered by the CESA, 18,700 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 3.5 percent of the CESA.

4.2.9.1 Proposed Action

Historic properties located in the Project APE would be mitigated in accordance with the MOA. In addition, any previously unknown NRHP-eligible sites discovered during construction activities would be treated in accordance with GRL's EPMs. Therefore, the proposed Project is not expected to cumulatively contribute to direct impacts to historic properties.

Compliance with Section 106 of the National Historic Preservation Act (NHPA) has minimized impacts to historic properties; however, past and present mining and mining exploration in the CESA have resulted in cumulative impacts to these properties. Although cultural resource inventories are completed in advance of projects with the intent of avoiding historic properties, impacts to these properties have occurred. Indirect impacts, such as illegal collecting of artifacts, have occurred and most likely would continue to occur in the CESA through increased access, development, and increased human presence, as a result of past, present, and RFFAs. The development and implementation of treatment plans for historic properties that cannot be avoided or protected typically involves archaeological excavation or other forms of data recovery. Although data recovery mitigates adverse impacts to historic properties under Section 106, the property itself ultimately is lost. Over time, this represents a cumulative loss. Cumulative impacts would be localized, long-term, and have an adverse effect.

4.2.9.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed, and the associated impacts to cultural resources would not occur. Previously permitted mining activities and reclamation and closure plans, and the other past, present, and RFFAs would continue to occur. Overall, cumulative effects to this CESA from the No Action Alternative would be less than the Proposed Action since additional surface

disturbance from that alternative would not occur and therefore would not impact additional historic properties but still would be anticipated to be long-term and localized.

4.2.9.3 Reduced Mine Plan Alternative

Cumulative effects of the Reduced Pit Mine Plan Alternative on known NRHP-eligible sites and any previously unknown NRHP-eligible sites that may be discovered during Project construction would be the same as described for the Proposed Action.

4.2.9.4 Partial Pit Backfill Alternative

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

4.2.10 Native American Concerns

The CESA boundary for Native American concerns is defined as an area extending approximately 10 miles north, 8 miles west, 5 miles east, and 3 miles south of the proposed Project (**Figure 4.2-1**). The CESA was determined based on the findings in an ethnographic study conducted in July 2013 and titled *Numic Perspectives: Traditional and Historic Places of the Battle Mountain District, Lander, Eureka, Nye, and Esmeralda Counties, Nevada* (Rucks 2013). The total area of the CESA encompasses 139,070 acres.

Within this CESA, past and present disturbance has resulted from the following activities: mineral development and exploration projects (791 acres); utilities, infrastructure, and public purpose activities (6,283 acres); roads and railroads (3,846 acres); dispersed recreation; and livestock grazing.

The RFFAs within the CESA would include: mineral development and exploration projects (1,255 acres) and utilities, infrastructure, and public purpose activities (801 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 for past and present actions.

Of the 139,070 acres covered by the CESA, 12,976 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 9.3 percent of the CESA.

4.2.10.1 Proposed Action

Pending further tribal consultation/coordination, no cumulative impacts to Native American concerns are anticipated as a result of the Proposed Action and no incremental impacts to these concerns would occur when added to past and present actions and RFFAs within the CESA. Cultural resources inventories and government-to-government consultation/coordination would be completed for any future proposed development within the CESA, and potential adverse impacts to any Native American concerns would be avoided or mitigated, as appropriate.

Illegal collecting of artifacts and inadvertent damage to archaeological sites, including sites of tribal importance, has occurred and most likely would continue to occur in the CESA through increased access, development, and increased human presence as a result of past, present, and RFFAs. Cumulative impacts would be long-term, localized, and have no adverse effect.

4.2.10.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed, and the associated impacts to cultural resources and Native American concerns would not occur. Previously permitted mining activities and reclamation and closure plans, and the other past, present, and RFFAs would continue to occur. Overall, cumulative effects to this CESA from the No Action Alternative would be less than the Proposed Action since mining would end sooner and the additional surface disturbance from that alternative would not occur but are still anticipated to be long-term, localized, and minor.

4.2.10.3 Reduced Mine Plan Alternative

Cumulative effects of the Reduced Mine Plan Alternative on areas of concern to the tribes would be the same as described for the Proposed Action.

4.2.10.4 Partial Pit Backfill Alternative

Cumulative effects of the Partial Pit Backfill Alternative on areas of concern to the tribes would be the same as described for the Proposed Action.

4.2.11 Air Quality

The CESA boundary for air quality is defined as a 50-km (31-mile) radius from the center of the proposed crusher area. The CESA encompasses either all or parts of 11 air quality planning areas as defined by the NBAQP. These 11 planning areas (defined as HAs) include: 117, 137A, 141, 142, 143, 144, 145, 146, 147, 148, and 149. The total area of the CESA encompasses 1,940,756 acres. Of the 1,940,756 acres covered by the CESA, 55,944 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 2.9 percent of the CESA. USEPA has designated all areas within the CESA as unclassifiable/attainment for all criteria air pollutants. The nearest non-attainment area is in Washoe County, Nevada, which is designated nonattainment for PM_{10}. The nearest Class I area is the John Muir Wilderness area, which is located approximately 81 miles southwest of the Project site and outside the CESA.

4.2.11.1 Proposed Action

The Project is located in rural Nevada with few stationary sources of air pollution. Cumulative impacts in the CESA would occur from existing sources, the proposed Project, and RFFAs that would have air pollutant emissions. The primary sources of air pollution in the CESA are from fugitive dust generated from mining operations, mineral exploration, wildland fires, and vehicle traffic over paved and unpaved roads. Stationary air pollution sources exist with higher density in Tonopah, and to a lesser extent, Goldfield. RFFAs in the CESA would be similar to current activities in the area, including mining and mineral exploration. These RFFAs could impact air quality within the CESA, but the impacts likely would be localized with little impact regionally.

Dispersion modeling analyses were conducted to assess potential cumulative air quality impacts resulting from mining operations associated with the Proposed Action as well as other regional air emission sources. The analysis included existing permitted emission sources located within 50 km of the Plan boundary. Modeling results indicate that air quality impacts would be below the NAAQS and no substantial adverse impacts would occur. A more detailed description of the cumulative dispersion modeling analysis and modeling results is presented in the *Air Quality Resource Report for the Gemfield Mine Project* (BLM 2018m).

The Proposed Action in combination with past, present, and RFFAs would result in a minimal cumulative increase of emissions within the air quality CESA. Fugitive dust, PM, and emissions would continue to impact the CESA. CESA-wide, impacts can be mitigated by Fugitive Dust Control Plans, wildland fire management, and preserving protective vegetation cover. While 3 percent of the CESA is disturbed from the Proposed Action in combination with past, present, and RFFAs, the acreage impacts from human activities to air quality are relatively small compared to acreages for wildland fires. Wildland fire degradation of air quality would be mitigated through wildland fire management and fuel conservation measures by the landowner.

Overall, cumulative impacts from the Proposed Action, when combined with past, present, and RFFAs, would be short-term, localized, and would not exceed applicable air quality standards in the air quality CESA.

4.2.11.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed. Previously permitted mining activities would continue, including reclamation and closure, as well as other past, present, and RFFAs. Cumulative impacts to this CESA from the No Action Alternative would be less than the Proposed Action and expected to be short-term and localized.

4.2.11.3 Reduced Mine Plan Alternative

Cumulative effects of the Reduced Mine Plan Alternative on air quality resources would be similar to those described for the Proposed Action, except that fugitive PM emissions would be reduced due to the elimination of the West WRDA and the reduced size of the Open Pit, East Pit, and HLP. These changes would result in fewer construction-related emissions and fewer disturbed acres that are subject to wind erosion, thus reducing the amount of particulate matter emissions.

Because PM emissions would be lower under this alternative, it is expected that the corresponding pollutant concentrations in the air within the CESA also would be reduced. Similar to the Proposed Action, the Reduced Pit Mine Plan Alternative would not result in an exceedance of applicable air quality standards.

4.2.11.4 Partial Pit Backfill Alternative

Cumulative effects of the Partial Pit Backfill Alternative on air quality resources would be similar to those described for the Proposed Action. The proposed surface disturbance would be the same as described for the Proposed Action. However, mine operation and reclamation activities would increase by 2 years under this alternative to place waste rock from the East WRDA in the open pit. Backfilling waste rock in the open pit would generate emissions from trucks hauling waste rock over unpaved roads, loading and unloading waste rock, and from tailpipe emissions from mobile equipment. Additionally, because mining activities would increase by 2 years, fugitive PM emissions from wind erosion would be generated during that time prior to reclamation.

Cumulative PM emissions would be extended approximately 2 years under this alternative, but short-term and annual maximum emissions would not be expected to exceed emissions in the Proposed Action. In the same way, the maximum pollutant concentrations in the air would be similar to those estimated for the Proposed Action and would not result in an exceedance of applicable air quality standards.

4.2.12 Noise and Vibration

The CESA boundary for noise and vibration encompasses an area within a 5-mile radius of the approximate center of the study area. The spatial extent of the CESA is based on the anticipated level of noise emissions from the proposed Project and the rate at which noise levels decay over distance. The total area of the CESA encompasses 50,199 acres.

4.2.12.1 Proposed Action

Past actions would have no impact on noise in the study 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 proposed Project, although no such 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 proposed 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 proposed Project, and with sufficiently strong noise emissions, to create cumulative noise impacts at the identified noise sensitive receptors.

4.2.12.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed. Previously permitted mining activities would continue, including reclamation and closure, as well as other past, present, and

RFFAs. Cumulative impacts to this CESA from the No Action Alternative would be less than the Proposed Action and expected to be short-term and negligible.

4.2.12.3 Reduced Mine Plan Alternative

Noise and vibration cumulative impacts would be the same as those described for the proposed Project, except reduced in duration as the mine life is decreased by 1 year under this alternative.

4.2.12.4 Partial Pit Backfill Alternative

Noise and vibration cumulative impacts would be the same as those described for the proposed Project, except an additional 2 years of noise generated by haul trucks and other equipment would occur with the hauling of 37 Mt of waste rock from the East WRDA to the pit lobes.

4.2.13 Transportation and Access

The CESA boundary for transportation and access includes the Plan boundary (including the U.S. 95 realignment, and utility and road ROW realignments or modifications) and the main transportation route north on U.S. 95 to Coaldale, east on U.S. Highway 6 to Tonopah, and south on U.S. 95 to Beatty. The CESA area is larger than the proposed roadway modifications to ensure the scope of access opportunities to the study area are considered. The total area of the CESA encompasses 487 acres.

4.2.13.1 Proposed Action

Because this is a realignment of a short section of an existing road, there would be few, if any, cumulative effects on access or traffic conditions resulting from the proposed Project and other interrelated past, present and RFFAs because they are relatively small traffic generators and their access points are widely distributed throughout the CESA.

4.2.13.2 No Action Alternative

The No Action Alternative would not authorize additional development, and previously permitted mining activities would continue, including mine closure and reclamation, as well other past, present, and RFFAs in the CESA. The realignment of the U.S. 95 and other access roads would not take place under the No Action Alternative and these roads would stay in use as they currently exist. Cumulative impacts to transportation and access under the No Action Alternative would be less than those under the Proposed Action but would still be anticipated to be localized, long-term, and negligible.

4.2.13.3 Reduced Mine Plan Alternative

Impacts to transportation and access would be the same as described for the proposed Project.

4.2.13.4 Partial Pit Backfill Alternative

Impacts to transportation and access would be the same as described for the proposed Project.

4.2.14 Land Use and Realty

The CESA boundary for lands and realty includes the study area and the Alkali Spring Valley Watershed. At its eastern extremity, the CESA extends approximately 2.4 miles beyond the Esmeralda County boundary into Nye County. The CESA is based on the potential extent of cumulative impacts on land use and realty. The total area of the CESA encompasses 202,950 acres. Of the 202,950 acres covered by the CESA, 12,917 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 6.4 percent of the CESA.

4.2.14.1 Proposed Action

Approval of the proposed Project would increase disturbance within the CESA by 1,337 acres in addition to disturbance associated with past, present, and RFFAs (12,917 acres) for a total disturbance of

14,254 acres, which is approximately 7 percent of the CESA. Although the cumulative surface disturbance would be greater than the proposed new disturbance from the proposed Project, it still would be a small increment of the vast acreage of public lands in the Project vicinity and would have minimal effect on land uses displaced by past, present, and reasonably foreseeable projects in the CESA. The cumulative un-reclaimed disturbance area that would remain after completion of the interrelated actions, including the proposed 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 uses.

4.2.14.2 No Action Alternative

The No Action Alternative would not authorize additional development, and previously permitted exploration activities would continue, including closure and reclamation, as well other past, present, and RFFAs in the CESA. Cumulative impacts to lands and realty under the No Action Alternative would be less than those under the Proposed Action but would still be anticipated to be a negligible, long-term, cumulative effect on land uses.

4.2.14.3 Reduced Mine Plan Alternative

Cumulative impacts to land use and realty would be the same as described for the proposed Project except that 87 fewer acres would be disturbed by mine development, which would result in a total cumulative disturbance of 14,167 acres.

4.2.14.4 Partial Pit Backfill Alternative

Cumulative impacts to land use and realty would be the same as described for the proposed Project.

4.2.15 Recreation

The CESA boundary for recreation includes the Alkali Spring Valley Watershed. The CESA is based on the potential cumulative impacts of the proposed Project on recreation opportunities and the spatial intersection of recreation and other land uses including wildlife and land use and realty among others. The total area of the CESA encompasses 202,950 acres. Of the 202,950 acres covered by the CESA, 12,917 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 6.4 percent of the CESA.

4.2.15.1 Proposed Action

The proposed Project incrementally would increase land disturbance by an additional 1,337 acres (less than 1 percent of the CESA) resulting in a total cumulative disturbance of approximately 14,254 acres (approximately 7 percent of the CESA).

Although the cumulative surface disturbance would be considerably greater than the direct disturbance from the proposed Project, the amount of public lands in the CESA would be able to accommodate dispersed recreation activities displaced by past and present actions and RFFAs in the CESA. The cumulative un-reclaimed surface disturbance within the study area would represent a small fraction of the total land area available for dispersed recreation in the CESA and would have short-term, localized, and negligible impact on recreation resources and opportunities.

Past and present actions and RFFAs would not directly affect parks, concentrated recreational use areas, designated wilderness or wilderness study areas, or other protected areas in the CESA.

It is not known at this time whether the RFFAs would result in a substantial increase in local population such that demand would exceed the current supply of developed recreation facilities. If the cumulative demand for developed recreational opportunities were to exceed the available supply, additional facilities would need to be developed.

4.2.15.2 No Action Alternative

The No Action Alternative would not authorize additional development, and previously permitted mining activities would continue, including closure and reclamation, as well other past, present, and RFFAs in the CESA. Cumulative impacts to lands and realty under the No Action Alternative would be less than those under the Proposed Action but would still be anticipated to be long-term and minor.

4.2.15.3 Reduced Mine Plan Alternative

Cumulative impacts to recreation would be the same as described for the proposed Project.

4.2.15.4 Partial Pit Backfill Alternative

Cumulative impacts to recreation would be the same as described for the proposed Project except for the additional time (2 years) for the Project life and additional impacts related to recreation.

4.2.16 Social and Economic Values

The CESA boundary for social and economic values includes Nye and Esmeralda counties, with particular focus on the community of Tonopah, Nevada. The rationale for the CESA is that the proposed Project would be located in Esmeralda County; however, the largest community in the vicinity is Tonopah, which is just inside the Nye County line, approximately 25 miles north of the Plan boundary. The total area of the CESA encompasses 13,909,155 acres. The data presented in Section 3.17 and provided in the *Social and Economic Values Resource Report for the Gemfield Mine Project* (BLM 2018r) also applies to the CESA analysis as the past and present actions have shaped the existing socioeconomic environment. The largest RFFAs anticipated in the CESA include continued mineral development and exploration activities as well as utility, infrastructure, and public purpose sites.

4.2.16.1 Proposed Action

The Proposed Action would contribute to the cumulative social values and economy of the CESA. Employment would continue at the mine at current levels for 10 years. This directly improves the CESA economy 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 cumulative CESA economy, and this would maintain the current economic benefits from this mine for the next 10 years.

Anticipated schedules for increases or decreases in employment for most projects within the CESA are not known. Initiation of RFFAs within the CESA would increase competition for workers and likely would result in greater population growth. It is assumed that there would be sufficient capacity within the CESA to accommodate more than one project without adversely affecting local communities. No adverse social or economic impacts have been identified from the proposed Project. The economic impacts of the proposed Project, and others that may occur in a similar timeframe, are expected to be mostly beneficial. Consequently, it is anticipated that no adverse cumulative social or economic impacts would occur as a result of the Proposed Action.

In addition, if all mines that are considered a RFFA were to go into operation around the same time, the socioeconomic impacts may be long-term and moderate to major, primarily resulting from shortages in housing, labor, and the increased demand on public services as well as public revenue. Therefore, the Proposed Action, when combined with past, present, and RFFAs could result in minor beneficial cumulative impacts to the social and economic values of the CESA.

4.2.16.2 No Action Alternative

Under the No Action Alternative, no additional activities would be authorized at the mine. Previously permitted mining activities would continue, including reclamation and closure, as well as other past, present, and RFFAs. Cumulative effects to social values and economics would be negligible under

existing conditions since there would be no increases to employment levels within the areas of Nye and Esmeralda counties within the CESA boundary.

4.2.16.3 Reduced Mine Plan Alternative

Cumulative impacts to social and economic values would be the same as described for the proposed Project except for the reduced time frame and social and economic benefits.

4.2.16.4 Partial Pit Backfill Alternative

Cumulative impacts to social and economic values would be the same as described for the proposed Project except for the additional time (2 years) for the Project life and additional social and economic benefits that would occur during this time frame.

4.2.17 Environmental Justice

The CESA boundary for environmental justice includes Nye and Esmeralda counties, with particular focus on the community of Tonopah, Nevada. The rationale for the CESA is that the mine would be located in Esmeralda County, but the largest community in the vicinity is Tonopah, which is just inside the Nye County line, approximately 25 miles north of the proposed Project. The total area of the CESA encompasses 13,909,155 acres. Within this CESA, past and present disturbance has resulted from the following activities: mineral development and exploration projects (206,932 acres); utilities, infrastructure, and public purpose activities (186,826 acres); oil, gas, and geothermal development (361 acres); roads and railroads (111,427 acres); wildland fires (153,298 acres); dispersed recreation; and livestock grazing. Of the 13,909,155 acres covered by the CESA, 701,646 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 5 percent of the CESA.

4.2.17.1 Proposed Action

The environmental justice analysis did not identify any disproportionate adverse impacts from the proposed Project, and an effort to involve all communities in the decision-making process was documented. As previously stated, no disproportionate, adverse environmental justice impacts would be anticipated from development of the proposed Project. Consequently, no cumulative environmental justice impacts are anticipated as a result of the proposed Project when combined with other past, present, and RFFAs.

4.2.17.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed. Previously permitted mining activities would continue, including reclamation and closure, as well as other past, present, and RFFAs. Cumulative impacts to this CESA from the No Action Alternative are not anticipated.

4.2.17.3 Reduced Mine Plan Alternative

Cumulative environmental justice impacts would be the same as the described for the proposed Project.

4.2.17.4 Partial Pit Backfill Alternative

Cumulative environmental justice impacts would be the same as the described for the proposed Project.

4.2.18 Visual Resources

The CESA boundary for visual resources encompasses an area within 15 miles of the Plan boundary from which the proposed project facilities would be visible. Beyond 15 miles from the proposed Plan boundary, the proposed Project facilities would either not be visible or would be considered as a minor element in the visual landscape (**Figure 4-1**). A viewshed analysis was conducted within the CESA boundary to document which project facilities would be visible from locations within the CESA boundary and these also are represented in **Figure 4-1**. Prominent existing features within the CESA include the

Montezuma Range and Peak to the west, and the Goldfield Hills to the east and south. The total area of the CESA encompasses 528,979 acres.

Of the 528,979 acres covered by the CESA, 18,700 acres of disturbance are associated with past, present, and RFFAs, which is a disturbance of approximately 3.5 percent of the CESA.

4.2.18.1 Proposed Action

Cumulative effects to visual resources in the CESA from the proposed Project in combination with past, present, 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, WRDAs, HLP, and resulting change in topography. This increase would blend with the existing mine and have a moderate additional impact to visual resources. Reclamation activities would further reduce the visual impacts of the proposed Project with grading of the WRDAs and HLP to simulate natural slopes in the surrounding areas. However, reclaimed and remaining features from the proposed Project in combination with the other past, present, and RFFAs within the CESA would continue to have long-term cumulative impacts to visual resources in the CESA but would be moderate and blend into the existing landscape.

4.2.18.2 No Action Alternative

Under the No Action Alternative, the alternatives would not be developed, and there would be no additional impacts to visual resources. Previously permitted mining activities would occur as outlined in authorized permits and reclamation and closure plans, as well as other past, present, and RFFAs. No reclamation of past actions would occur and would remain moderately visible for color. Overall effects in the CESA would be slightly less than the alternatives, since mining development would still be visible, but authorized activities would be less than in the proposed alternatives impacts, which would be long-term and minor.

4.2.18.3 Reduced Mine Plan Alternative

Cumulative effects to visual resources in the CESA from the Reduced Mine Plan Alternative in combination with past, present, and RFFAs would include changes in line, form, color, and texture elements that would contrast with the existing landscape. The Reduced Mine Plan Alternative would increase the direct effects of contrast (i.e., moderate color contrast and moderate line and form contrast) with the existing landscape by expanding the visual impacts with construction of the open pit, WRDAs, and HLP and resulting change in topography. This increase would blend with the existing disturbance and have a moderate additional impact to visual resources within the CESA with less impact to visual resources than the Proposed Action due to less acreage associated with the East WRDA and HLP. Reclamation activities would further reduce the visual impacts of the Reduced Mine Plan Alternative with grading of the East WRDA and HLP to simulate natural slopes in the surrounding areas and lower reclaimed elevation of the East WRDA than the Proposed Action resulting in less impact to visual resources than the Proposed Action. However, reclaimed and remaining features in combination with the other past, present, and RFFAs would continue to have cumulative long-term impacts to visual resources in the CESA but would be moderate and blend into the existing landscape.

4.2.18.4 Partial Pit Backfill Alternative

Cumulative effects to visual resources in the CESA from the Partial Pit Backfill Alternative in combination with past, present, and RFFAs would include changes in line, form, color, and texture elements that would contrast with the existing landscape. The Partial Pit Backfill Alternative would increase the direct effects of contrast (i.e., strong color contrast, stronger line and form contrast, and moderate textural contrast) with the existing landscape by expanding the visual impacts with construction of the open pit, WRDA, and HLP and resulting change in topography. This increase would blend with the existing disturbance and have a minor to moderate impact to visual resources within the CESA with less impact to visual resources than the Proposed Action due to the lower elevation of the East WRDA. The longer construction duration would have an additional impact to visual resources than either the Proposed Action or the Reduced Mine Plan

Alternative. Reclamation activities would further reduce the visual impacts of the Partial Backfill Alternative with grading of the East WRDA and HLP to simulate natural slopes in the surrounding areas and lower reclaimed elevation of the East WRDA than both the Proposed Action and the Reduced Mine Plan Alternative resulting in less impact to visual resources than both the Proposed Action and the Reduced Mine Plan Alternative. However, reclaimed and remaining features in addition to the past, present, and RFFAs would continue to have long-term cumulative impacts to visual resources in the CESA but would be moderate and blend into the existing landscape.

4.2.19 Hazardous Materials and Solid Waste

The CESA boundary for hazardous materials and solid waste includes the Plan boundary (including the U.S. 95 realignment, and utility and road ROW realignments or modifications), the Brickyards Road ROW modification, as well as the main transportation routes from Las Vegas and Reno to the study area. These routes are areas of potential spills due to an unlikely accident and, therefore, are included in the CESA for hazardous materials. The total area of the CESA encompasses 487 acres.

4.2.19.1 Proposed Action

The proposed Project would increase the amount of hazardous materials transported, stored, and consumed on-site. Solid waste that is generated also would increase. There would be a noticeable increase in truck traffic in and around the study area. The transportation routes for hazardous materials are used as major transportation routes through Nevada, so the increase in truck traffic due to the proposed Project and over the lifetime of the Project would be incremental, but noticeable compared to the current truck traffic. Also, given the low probability of a hazardous materials release with proper implementation of GRL's Spill Contingency Plan, the potential for cumulative impacts resulting from a release of hazardous materials under the proposed Project would be low. No cumulative impacts from the generation of solid waste are anticipated.

4.2.19.2 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed. Previously permitted mining activities would continue, including reclamation and closure, as well as other past, present, and RFFAs. Cumulative impacts to this CESA from the No Action Alternative would be less than the Proposed Action and expected to be short-term, negligible, and localized.

4.2.19.3 Reduced Mine Plan Alternative

Hazardous materials and solid waste cumulative impacts for the Reduced Mine Plan Alternative would be the same as described for the proposed Project.

4.2.19.4 Partial Pit Backfill Alternative

Hazardous materials and solid waste cumulative impacts for the Partial Pit Backfill Alternative would be the same as described for the proposed Project except for the additional time (2 years) for the Project life and additional impacts related to hazardous materials and solid waste.

4.3 Residual Impacts

4.3.1 Unavoidable Adverse Impacts

Unavoidable adverse impacts for the Proposed Action are described below. The unavoidable adverse impacts for the alternatives are similar to those for the Proposed Action, therefore, only the differences are discussed.

Unavoidable adverse impacts for the No Action Alternative: No unavoidable adverse impacts beyond those already realized from historic mine features are anticipated.

Unavoidable adverse impacts for the Reduced Mine Plan Alternative: Same as the Proposed Action, except 14.4 Mt of ore would be permanently removed and a total disturbance reduction of 87 acres and permeant disturbance reduction of 48 acres would occur.

Unavoidable adverse impacts for the Partial Backfill Alternative: Same as the Proposed Action except no pit lakes would form.

4.3.1.1 Geology and Minerals

Residual adverse effects to geology and mineral resources as a result of the proposed Project would include the permanent removal of up to 25 Mt of ore, and the permanent alteration of the landscape on a total of up to approximately 500 acres as a result of the proposed development of the open pit, HLP, and WRDAs.

4.3.1.2 Water Resources and Geochemistry

Successful implementation of mitigation measures would minimize or eliminate most residual adverse effects to water resources. However, an area of residual mine-related groundwater drawdown is predicted to persist for the foreseeable future under the proposed Project. Model simulations estimate that the long-term groundwater flow into the pits would be approximately 14.3 gpm (23.1 acre-feet/year) under the Proposed Action; and 11.5 gpm (18.6 acre-feet/year) under the Reduced Mine Plan Alternative. The long-term groundwater inflow to the pits that would be lost by evaporation is a residual impact and represents less than 1 percent of the estimated perennial yield of groundwater available from the Alkali Spring HA.

4.3.1.3 Soils Resources

Residual impacts to soils as a result of surface disturbance-related activities would include the permanent loss of soil quality and vegetative productivity from approximately 509 acres from the open pit, West and Northeast diversion channels, East Channel, Southeast Diversion Berm, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East County Road realignment, ROW access roads, water wells and road access, and Booster Station #2, as these Project components would not be reclaimed.

4.3.1.4 Vegetation

Residual impacts to vegetation under the proposed Project would include the long-term loss of 1,026.5 acres of mixed desert scrub, 36.6 acres of fourwing saltbush association, and 4.2 acres of sagebrush shrubland vegetation types. The expansion of the open pit, West and Northeast diversion channels, East Channel, diversion berms, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East Access County Road realignment, ROW access roads, water wells and road access, and Booster Station #2 would result in the permanent loss of approximately 509 acres of mixed desert shrub and fourwing saltbush association, respectively. In areas that are disturbed by the proposed Project but later reclaimed, the loss of shrub-dominated communities would represent a long-term change in vegetation composition (i.e., shrub-dominated communities to grass/forb dominated communities) under the proposed Project because it would take approximately 25 years for mature shrubs to become established in these communities.

4.3.1.5 Wildlife

Residual effects to wildlife resources under the proposed Project would include the long-term loss of 1,067.3 acres of mixed desert scrub (including Joshua trees), fourwing saltbush association, and sagebrush shrubland. The expansion of the open pit, West and Northeast diversion channels, East Channel, diversion berms, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East Access County Road realignment, ROW access roads, water wells and road access, and Booster Station #2 would result in the permanent loss of 509 acres of mixed desert shrub and fourwing saltbush habitat. In areas that are disturbed by the proposed Project but later reclaimed, the loss of shrub-dominated communities would represent a long-term change in wildlife habitat (i.e., shrub-

dominated communities to grass/forb dominated communities) under the proposed Project because it would take approximately 25 years for mature shrubs to become established in these communities.

4.3.1.6 Special Status Species

Residual effects to special status species resources under the proposed Project would include the long-term loss of 1,067.3 acres of mixed desert scrub, fourwing saltbush association, and sagebrush shrubland. The expansion of the open pit, West and Northeast diversion channels, East Channel, diversion berms, one process pond, sediment basins, U.S. 95 realignment, Brickyards Road realignment, East Access County Road realignment, ROW access roads, water wells and road access, and Booster Station #2 would result in the permanent loss of 509 acres of mixed desert shrub and fourwing saltbush habitat. In areas that are disturbed by the proposed Project but later reclaimed, the loss of shrub-dominated communities would represent a long-term change in special status species habitat (i.e., shrub-dominated communities to grass/forb dominated communities) under the proposed Project because it would take approximately 25 years for mature shrubs to become established in these communities.

There would be a permanent loss of Joshua trees in unreclaimed areas. In areas that are reclaimed, there could be long-term loss of Joshua trees as re-establishment of Joshua trees can take up to 30 years or more and success is dependent on rates of soil compaction, precipitation levels, and the potential invasion of native communities by noxious and invasive weed species.

4.3.1.7 Range Resources

Residual effects for range resources would include the permanent loss of forage available for grazing on approximately 509 acres of rangeland associated with areas that would not reclaimed. The loss of rangeland and forage available for grazing would be considered during the formal allotment evaluation process but would not affect the AUMs currently permitted for the allotment.

4.3.1.8 Wild Horses and Burros

Residual effects to wild horses and burros under the Proposed Action would include the permanent loss of 61.1 acres of the Montezuma Peak HMA. In areas that would be disturbed by the proposed Project but later reclaimed, the loss of shrub-dominated communities within these HMAs 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 established in these communities.

4.3.1.9 Paleontological Resources

No known scientifically significant paleontological resources have been identified in the study area as a result of the background research and field survey. If vertebrate fossils are discovered during construction, operation, or reclamation activities, measures would be taken to evaluate the discovery and develop appropriate mitigation if the discovery is determined scientifically significant. Therefore, no residual impacts to paleontological resources are anticipated.

4.3.1.10 Cultural Resources

The Proposed Action would result in the loss of cultural resources that are not eligible for the NRHP. Although these sites would be recorded to BLM standards and the information integrated into local and statewide databases, the sites ultimately would be destroyed by proposed Project construction. Historic properties identified within the proposed Project APE would be avoided, or if avoidance is not feasible, mitigated in accordance with the MOA. Although impacts to historic properties would be minimized or mitigated through implementation of data recovery or other forms of mitigation, some of the cultural values associated with these sites cannot be fully mitigated; therefore, it is anticipated that residual impacts to these resources would occur.

4.3.1.11 Native American Concerns

With ongoing tribal consultation/coordination with participating tribal groups throughout the project, and by following the procedures outlined in the NHPA, EO 13007, American Indian Religious Freedom Act of 1978, and NAGPRA, no residual impacts to Native American concerns would occur as a result of the Proposed Action.

4.3.1.12 Air Quality

After mining operations have concluded, the exposed surface areas would be reclaimed, including seeding to promote vegetative cover. Reclamation activities could result in localized, short-term impacts during construction. After reclamation is complete, most disturbed areas would develop vegetative cover, and soils subject to wind erosion 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 slightly higher wind erosion dust emissions from pre-mining conditions.

4.3.1.13 Noise and Vibration

Upon completion of mining and reclamation activities associated with the proposed Project, noise emissions, ground vibration, and air blast emissions would all cease and there would be no residual noise or vibration impacts from the proposed Project.

4.3.1.14 Transportation and Access

The realigned highway and road network would remain permanently, which would result in a minor reduction of traffic conflict points and a minimal increase in travel distance as compared with currently existing conditions.

4.3.1.15 Land Use and Realty

There would be approximately 509 acres of unreclaimed disturbance that would remain as post-reclamation features, which would result in the removal of additional public land for future multiple use authorizations.

4.3.1.16 Recreation

There would be a permanent loss of approximately 509 acres of lands available for recreation. This loss of acreage available for recreation would be considered negligible in the context of the CESA and the extensive public lands in the vicinity.

4.3.1.17 Social and Economic Values

For the most part, social and economic impacts from the Proposed Action would be short-term in nature, largely ending after the proposed Project is completed. There would be public and private investment from revenues generated by the project in homes, businesses, and public infrastructure including the realignments of utilities and U.S. 95 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.

4.3.1.18 Environmental Justice

There would be no disproportionate adverse environmental justice impacts on minority or low-income populations; therefore, no residual impacts to environmental justice are anticipated.

4.3.1.19 Visual Resources

Contour grading of the proposed HLP and East WRDA would notably reduce form contrast over the long term. Revegetating the visible faces of these facilities would notably reduce color contrast. With the implementation of reclamation measures, the Class IV VRM objectives would be achieved. Therefore, residual impacts to visual resources would be minimized. With implementation of additional mitigation

measures to provide further contour grading of the proposed HLP and East WRDA, impacts would be further reduced.

4.3.1.20 Hazardous Materials and Solid Waste

Residual impacts from the use of hazardous materials under the proposed 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 GRL's Spill Contingency Plan, and prompt cleanup of potential spills and releases, would minimize the potential for residual impacts due to an accidental spill or release of hazardous materials.

Proper disposal of non-hazardous solid waste in county Class III landfills according to standards, which is proposed for this project, would minimize residual impacts with regard to such materials.

4.3.2 Irreversible and Irretrievable Commitments of Resources

Irreversible and irretrievable commitment of resources take place when the impact from the project to the resource cannot be fully recovered; therefore, making it unavailable for future use. **Table 4-2** provides the information on this commitment of resources for the Proposed Action and alternatives.

Table 4-2 Irreversible and Irretrievable Commitments of Resources

Supplemental Authority/ Resource	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Backfill Alternative
Geology and Minerals	Potential loss of future use of geologic resources beneath mine features such as WRDAs.	Potential loss of future use of geologic resources beneath the existing disturbance features.	Potential loss of future use of geologic resources beneath mine features such as WRDAs.	Potential loss of future use of geologic resources beneath mine features such as WRDAs as well as within the backfilled pit.
Water Resources and Geochemistry	The pit lake would behave as a sink and not impact downgradient water quality.	The pit lake would behave as a sink and not impact downgradient water quality.	The pit lake would behave as a sink and not impact downgradient water quality.	Groundwater flow through the backfilled pit has the potential to impact downgradient groundwater quality.
Soils	1,337 acres of soils would be directly disturbed; permanently altering the structure of these soils. In addition, 509 acres of soils would be removed and not subject to reclamation.	329 acres of soils has been directly disturbed; permanently altering the structure of these soils.	1,251acres of soils would be directly disturbed; permanently altering the structure of these soils. In addition, 461 acres of soils would be removed and not subject to reclamation.	1,337 acres of soils would be directly disturbed; permanently altering the structure of these soils. In addition, 509 acres of soils would be removed and not subject to reclamation.
Vegetation (Including Noxious Weeds, Invasive, and Non-Native Species	1,337 acres of vegetation would be directly disturbed and would undergo reclamation; therefore, permanently altering the vegetation community. In addition, 509 acres of vegetation would be removed and not subject to revegetation.	329 acres of vegetation has been directly disturbed and would not undergo reclamation; therefore, permanently altering the vegetation community. Most of the 329 acres if disturbance beyond the 23.84 Of NOI disturbance would not be reclaimed.	1,251 acres of vegetation would be directly disturbed and would undergo reclamation; therefore, permanently altering the vegetation. In addition, 461 acres of vegetation would be removed and not subject to revegetation.	1,337 acres of vegetation would be directly disturbed and would undergo reclamation; therefore, permanently altering the vegetation. In addition, 509 acres of vegetation would be removed and not subject to revegetation.
Wildlife Resources (Including Migratory Birds)	509 acres of habitat would be disturbed and not subject to reclamation.	329 acres of wildlife habitat has been disturbed.	461 acres of habitat would be disturbed and not subject to reclamation.	509 acres of habitat would be disturbed and not subject to reclamation.
Special Status Species	509 acres of habitat would be disturbed and not subject to reclamation.	329 acres of habitat has been disturbed.	461 acres of habitat would be disturbed and not subject to reclamation.	509 acres of habitat would be disturbed and not subject to reclamation.

Supplemental Authority/ Resource	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Backfill Alternative
Range Resources	509 acres of rangeland would be disturbed and not subject to reclamation.	329 acres of rangeland has been disturbed.	461 acres of rangeland would be disturbed and not subject to reclamation.	509 acres of rangeland would be disturbed and not subject to reclamation.
Wild Horses and Burros	509 acres of rangeland would be disturbed and not subject to reclamation.	329 acres of rangeland has been disturbed.	461 acres of rangeland would be disturbed and not subject to reclamation.	509 acres of rangeland would be disturbed and not subject to reclamation.
Paleontological Resources	509 acres of would be disturbed and not subject to reclamation.	329 acres has been disturbed.	461acres of would be disturbed and not subject to reclamation.	509 acres of would be disturbed and not subject to reclamation.
Cultural Resources	509 acres of would be disturbed and not subject to reclamation.	329 acres has been disturbed.	461acres of would be disturbed and not subject to reclamation.	509 acres of would be disturbed and not subject to reclamation. None Identified.
Native American Concerns	None Identified.	None Identified.	None Identified.	None Identified.
Air Quality	None Identified.	None Identified.	None Identified.	None Identified.
Noise and Vibration	None Identified.	None Identified.	None Identified.	None Identified.
Transportation and Access	Permanent realignment of ROWs.	None Identified.	Permanent realignment of ROWs	Permanent realignment of ROWs.
Land Use and Realty	Permanent realignment of ROWs.	None Identified.	Permanent realignment of ROWs.	Permanent realignment of ROWs.
Recreation	509 acres of would be disturbed and not subject to reclamation.	329 acres has been disturbed	461acres of would be disturbed and not subject to reclamation.	509 acres of would be disturbed and not subject to reclamation.
Social and Economic Values	None Identified.	None Identified.	None Identified.	None Identified.
Environmental Justice	None Identified.	None Identified.	None Identified.	None Identified.
Visual Resources	Permanent change to the viewshed from both the reclaimed and unreclaimed mine features.	Existing impacts to viewshed from existing disturbance	Permanent change to the viewshed from both the reclaimed and unreclaimed mine features.	Permanent change to the viewshed from both the reclaimed and unreclaimed mine features.
Hazardous Materials and Solid Waste	None Identified.	None Identified.	None Identified.	None Identified.

4.3.3 Relationship of Short-term Uses and Long-term Productivity

The short-term use is described as the life of the project and reclamation. The long-term productivity looks at the effects following reclamation and beyond. **Table 4-3** provides this information for each resource.

Table 4-3 Impacts from Short-Term Use and Long-Term Productivity

Supplemental Authority/ Resource	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Backfill Alternative
Geology and Minerals	Potential loss of future use of geologic resources beneath mine features such as WRDAs.	Potential loss of future use of geologic resources beneath the existing disturbance features.	Potential loss of future use of geologic resources beneath mine features such as WRDAs.	Potential loss of future use of geologic resources beneath mine features such as WRDAs as well as within the backfilled pit.
Water Resources and Geochemistry	The pit lake would behave as a sink and not impact downgradient water quality.	Historic tailings have the potential to impact groundwater.	The pit lake would behave as a sink and not impact downgradient water quality.	Groundwater flow through the backfilled pit has the potential to impact downgradient groundwater quality.
Soils	1,337 acres of soils directly impacted. This short-term impact would significantly reduce the long-term productivity of the soils.	329 acres of soils previously impacted. This short-term impact would significantly reduce the long-term productivity of the soils.	1,251 acres of soils directly impacted. This short-term impact would significantly reduce the long-term productivity of the soils.	1,337 acres of soils directly impacted. This short-term impact would significantly reduce the long-term productivity of the soils.

Supplemental Authority/ Resource	Proposed Action	No Action Alternative	Reduced Mine Plan Alternative	Partial Backfill Alternative
Vegetation (Including Noxious Weeds, Invasive, and Non-Native Species	1,337 acres of vegetation removed, and soils altered; therefore, creating a long-term impact and change in the productivity once reclaimed.	329 acres of vegetation removed, and soils altered; therefore, creating a long-term impact and change in the productivity once reclaimed.	1,251 acres of vegetation removed, and soils altered; therefore, creating a long-term impact and change in the productivity once reclaimed.	1,337 acres of vegetation removed, and soils altered; therefore, creating a long-term impact and change in the productivity once reclaimed.
Wildlife Resources (Including Migratory Birds)/Special Status Species	1,337 acres of habitat removed; therefore, creating a long-term impact of the site.	329 acres of habitat removed; therefore, creating a long-term impact of the site.	1,251 acres of habitat removed; therefore, creating a long-term impact of the site.	1,337 acres of habitat removed; therefore, creating a long-term impact of the site.
Range Resources/Wild Horses and Burros	1,337 acres of vegetation/forage disturbed; therefore, creating a long-term impact and change in productivity.	329 acres of vegetation/forage disturbed; therefore, creating a long-term impact and change in productivity.	1,251 acres of vegetation/forage disturbed; therefore, creating a long-term impact and change in productivity.	1,337 acres of vegetation/forage disturbed; therefore, creating a long-term impact and change in productivity.
Paleontological Resources	None Identified.	None Identified.	None Identified.	None Identified.
Cultural Resources	None Identified.	None Identified.	None Identified.	None Identified.
Native American Concerns	None Identified.	None Identified.	None Identified.	None Identified.
Air Quality	None Identified.	None Identified.	None Identified.	None Identified.
Noise and Vibration	None Identified.	None Identified.	None Identified.	None Identified.
Transportation and Access	None Identified.	None Identified.	None Identified.	None Identified.
Land Use and Realty	The realignment of U.S. 95 and the utility ROWs would be permanent.	None Identified.	The realignment of U.S. 95 and the utility ROWs would be permanent.	The realignment of U.S. 95 and the utility ROWs would be permanent.
Recreation	Loss of 509 acres of area not reclaimed.	Loss of 329 acres of area not reclaimed.	Loss of 461 acres of area not reclaimed.	Loss of 509 acres of area not reclaimed.
Social and Economic Values	None Identified.	None Identified.	None Identified.	None Identified.
Environmental Justice	None Identified.	None Identified.	None Identified.	None Identified.
Visual Resources	None Identified.	None Identified.	None Identified.	None Identified.
Hazardous Materials and Solid Waste	None Identified.	None Identified.	None Identified.	None Identified.

5.0 Consultation and Coordination

This chapter reviews agency and public consultation and coordination that occurred prior to and during preparation of this EIS. It also includes the list of agencies and individuals who received the draft document. In addition to agencies called out here, a list of preparers of the EIS can be found in **Appendix B**.

5.1 Cooperating Agencies and Consultation Process

Cooperating agencies were invited to participate in the NEPA process including review of analyses, contribution of technical expertise, and assisting in the response to public comments as required by their jurisdiction or regulatory authority. MOAs were developed between the cooperating agencies and the BLM.

As part of the federal review process in response to GRLs proposed Gemfield Project, the BLM sent letters to the agencies and counties below inviting their participation as cooperating agencies for the NEPA process and EIS documentation. The NDOW, Nye County, Esmeralda County, NDOT are cooperating agency in the preparation and review of the EIS, as outlined in the MOUs with the TFO.

The USEPA is participating as a coordinating and cooperating agency with the BLM on this Project per the April 30, 2013, MOU between the USEPA and BLM on EIS level mining operations for locatable minerals on federal lands administered by the BLM within the state of Nevada.

On July 10, 2013, the BLM TFO sent letters via certified mail to official tribal representatives of the Duckwater Shoshone, Death Valley Timbisha Shoshone, and Yomba Shoshone tribes to inform them of the proposed Gemfield Mine Project and to request any comments or questions they may have regarding the proposed Project. On August 14, 2013, tribal representatives from the Duckwater Shoshone and Death Valley Timbisha Shoshone accompanied the BLM on a visit to the study area; tribal representatives from the Yomba Shoshone Tribe were unable to participate in the visit. During the site visit, the tribal representatives requested a copy of the Plan, which was sent by the BLM on December 19, 2013, via certified mail. The BLM invited tribal representatives from the Yomba Shoshone Tribe to participate in a second field visit to the study area in early June 2014, but the tribe was unable to participate.

As of this date, none of the contacted tribes has expressed any concerns with the proposed Project or has identified any sites of tribal importance within or adjacent to the study area. Consultation between the BLM and contacted tribes is ongoing and will continue throughout the proposed Project.

5.2 Public Participation and Scoping

This environmental document 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, responses to e-mails, meetings with individual public agencies and interest groups. 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 NEPA at four specific points: scoping period, review of Draft EIS, review of 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 public meeting will be held in Goldfield, Nevada, 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.

The BLM initiated the public scoping process by publishing a NOI to prepare an EIS in the Federal Register on December 24, 2013 (Federal Register Volume 78, Number 247). A public scoping meeting was held on January 10, 2014, in Goldfield, Nevada, to obtain input on issues and concerns to be evaluated in the EIS. 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 EIS Preparation Plan.

The following are the key scoping issues identified for the proposed Project.

- Visual impacts and the effects of light pollution to the Death Valley National Park night sky.
- Concern about loss of water sources for pronghorn antelope and wildlife.
- Impacts to wildlife, including reptile and bird species, from the removal of Joshua tree habitat.
- Mitigation measures to reduce visual impacts from mine development (e.g., lighting, facility paint colors, etc.).
- Potential impacts to water resources and risk of contamination to these resources, including sediment transport to surface waters and groundwater pollution.
- The potential for impacts to soils and water resources from failed containment systems and lack of adequate response procedures.
- Air quality impacts from mine development, including potential visibility impacts to Class I areas.
- Concerns about potential mine contribution to GHGs and the need for effective mitigation.
- Concern about impacts to vegetation, wildlife resources, special status species, critical habitat, and wetland and riparian areas from mine development.
- Concerns about ensuring effective planning, implementing, and monitoring mine reclamation.
- Potential impacts to minority and low-income populations, and Native American TCPs.

Appendix A

Major Permits and Approvals

Table A-1 Major Permits and Approvals

Permit/Approval	Issuing Authority	Permit Purpose
Federal Permits Approvals and Registrations		
Explosives Permit	U.S. Bureau of Alcohol, Tobacco and Firearms (BATF)	Storage and use of explosives
Hazardous Waste ID No.	U.S. Environmental Protection Agency (USEPA)	Registration as a small-quantity generator of wastes regulated as hazardous
Notification of Commencement of Operations	Mine Safety and Health Administration (MSHA)	Mine safety issues, training plan, mine registration
Biological Opinion and Consultation	U.S. Fish and Wildlife Service (USFWS)	Only if project may affect federally listed Threatened or Endangered Species.
Federal Communications Commission Permit	Federal Communications Commission	Frequency registrations for radio/microwave communication facilities
State Permits		
Air Quality Operating Permit	Nevada Bureau of Air Pollution Control (NBAPC)	Regulates project sources of air emissions
Mercury Operating Permit to Construct Air	NBAPC / Nevada Mercury Control Program	Requires use of Nevada Maximum Achievable Control Technology for all thermal units that have the potential to emit mercury
Reclamation Permit	NDEP/BMRR	Reclamation of surface disturbance, includes financial assurance requirements. Site currently operates under Reclamation Permit No. 0228.
Water Pollution Control Permit (WPCP)	NDEP/BMRR	Prevent degradation of waters of the State, establish minimum facility design/containment requirements
General Stormwater Discharge Permit	NDEP/Bureau of Water Pollution Control	Management of site stormwater
Permit to Appropriate Water	Nevada Division of Water Resources (NDWR)	Water appropriation
Industrial Artificial Pond Permit	NDOW	Ponds containing chemicals directly associated with the processing of ore
Liquefied Petroleum Gas License	Nevada Board of the Regulation of Liquefied Petroleum Gas	Tank specification and installation, handling, and safety requirements
Potable Water System Permit	Nevada Bureau of Safe Drinking Water	Water system for drinking water and other domestic uses (e.g., lavatories)
Radioactive Materials License	Nevada Bureau of Safe Drinking Water	Nuclear flow and mass measurement devices if used in the mineral processing facilities
Septic Treatment Permit Sewage Disposal System Permit	NDEP/Bureau of Water Pollution Control	Design, operation, and monitoring of septic and sewage disposal systems
Hazardous Materials Storage Permit	Nevada Fire Marshall	Hazardous materials safety
Local Permits		
Building Permits	Esmeralda County Building Planning Department	Compliance with local building standards/requirements
Conditional Special Use Permit	Esmeralda County Building Planning Department	Compliance with applicable zoning ordinances
County Road Use and Maintenance Permit/Agreement	Esmeralda County Building Planning Department	Use and maintenance of county roads

Source: GRL 2018a.

Appendix B

List of Preparers

List of Preparers and Reviewers

BLM EIS Team		
Resource/Responsibility	**Name**	**Degree(s) and Experience**
Project Manager/District Lead Planning & Environmental Coordinator	Christine Gabriel	BS Environmental Design MS Urban Planning 22 years' experience
Mining Advisor	Joe Moskiewicz	BS Agriculture, Major in Natural Resources- Environmental Conservation 40+ years' experience
Geology, Mining Law	William Coyle	MS Geography BS Park and Resource Management 8 years' experience
Mining Engineer (Lead)	Darin McDoniel	BS Mining Engineering 12 years' experience
Hydrology (Groundwater)	Jim Harris	BS Geology MS Environmental Geology/Hydrology 21 years' experience
Hydrology (Surface Water)/ Floodplains/Wetlands/Riparian	Justin Ferris	BS Geology PhD Hydrology 15 years' experience
Vegetation and Soils, Range, Grazing, Noxious Weeds/Invasive Species/Non-native Species	Dashell Burnham	BS Rangeland Resources 3 years' experience
Migratory Birds, Wildlife, Threatened and Endangered Species (Plants and Animals)	Greg Bjornstrom	BS Wildlife Resources 20 years' experience
Wild Horse and Burros	Elizabeth Freniere	BS Ecology and Management of Rangelands BA Communication 4 years' experience
Cultural Resources, Paleontology	Jonah Blustain	MA Anthropology BA Archaeology and Anthropology 9 years' experience
Native American Coordination and Consultation	Juan Martinez	BS Fisheries and Wildlife Science 22 years' experience
Air Quality	Craig Nicholls	BS Atmospheric Science MS Atmospheric Science 28 years' experience
Lands and Realty	Wendy Seley	BS Business Administration 17 years' experience
Recreation, VRM	Paul Amar	BS Natural Resources RRT, AS EMS 11 years' experience
Environmental Justice/Socioeconomics	Julie Suhr Pierce	Honors BA Music MS Economics PhD Environmental, Natural Resource, Public Economics, and Public Land Management 32 years' experience

BLM EIS Team		
Resource/Responsibility	**Name**	**Degree(s) and Experience**
Hazardous Materials	Earl Numinen	BS Economics 10 years' experience
Fire Management, Forestry	Vaughn Cork	MS Fire Ecology 14 years' experience
Public Outreach	Kyle Hendrix	BA Communications Minor in Communications 8 years' experience

Cooperating Agencies EIS Team	
Nye County, Nevada (Formal Cooperating Agency)	
Name	**Degree(s) and Experience**
Tim Sutton	JD MS Social Work BS Social Work 8 years' experience
Esmeralda County, Nevada (Formal Cooperating Agency)	
Michelle "Mickie" Bates	30 years' experience
Michael Anderson	26 years' experience
Nevada Department of Environmental Protection	
Matt Schulenberg	BS Environment Engineering 1.5 years' experience
Nevada Department of Transportation (Formal Cooperating Agency)	
Christopher E. Young, RPA	MA Anthropology BA Anthropology 26 years' experience
Nevada Department of Wildlife (Formal Cooperating Agency)	
Tracy Kipke	BS Conservation Biology 15 years' experience
D. Bradford Hardenbrook	MS Natural Resources/Wildlife BS Forestry/Wildlife 32 years' experience
USEPA (Formal Cooperating Agency)	
Jeanne Geselbracht	MA Geography BA Geography 27 years' experience

Stantec EIS Team (Third-party Consultant)		
Resource/Responsibility	**Name**	**Degree(s) and Experience**
Project Manager	Kristi Schaff	BS Land Rehabilitation 15 years' experience
Assistant Project Manager, Vegetation Resources, Range Resources	Jon Alstad	MS Range Science BS Animal Science 28 years' experience
Lead Author/Project Coordinator, Wildlife Resources, Special Status Species, Wild Horses and Burros	Matt Brekke	BS Wildlife Biology 11 years' experience
Cultural Resources, Native American Traditional Values	Ross Smith	MA Anthropology BA Anthropology/Archaeology 19 years' experience
Paleontological Resources	Robert Berry	Prof. Degree Hydrogeology PhD Geology/Geochemistry 40+ years' experience
Soils Resources	Chuck Herrmann	BS Soil Science 17 years' experience
Visual Resources	Barb Santner	BS Landscape Architecture 31 years' experience
Land Use and Realty, Noise, Recreation, Socioeconomics, Environmental Justice, Transportation and Access	Bernie Strom (Planera, Inc.)	MCRP City and Regional Planning BS Urban Planning 37 years' experience
Water Resources and Geochemistry, Geology and Minerals	Patrick Plumley (Plumley and Associates, Inc.)	MS Geology BS Geology 29 years' experience
Air Quality	Eric Farstad (Redhorse Corporation)	BS Meteorology 24 years' experience
Document Production	Debbie Thompson	A.A.S. Business Secretary 21 years' experience
GIS Technician	Jeff Barber	BS Applied Geography 14 years' experience

Gemfield Resources, Ltd. EIS Team Reviewers	
Name	**Title**
Debbie Lassiter	Executive Director, Environmental Affairs
Ginger Peppard	U.S. Environmental Permitting Manager

Appendix C

Special Status Species Support Information

Table C-1 Special Status Species Potentially Occurring within the Study Area

Common Name/ Scientific Name	Status[1]	Habitat Requirements
MAMMALS		
Pallid bat *Antrozous pallidus*	BLM; NV-SP	Found in a variety of habitats from desert scrub to forests. Roosts in a variety of structures including mines, caves, buildings, and trees. Intolerant of roosts in excess of 40 degrees Celsius.
Townsend's big-eared bat *Corynorhinus townsendii*	BLM; NV-SPS	Highly associated with caves and mines. Very susceptible to disturbance at roost sites. Periodically moves to alternate roosts and actively forages and drinks throughout the winter. Typically forages in open forest habitats.
Big brown bat *Eptesicus fuscus*	BLM	Found in a variety of habitats including forests, shrublands, and agricultural and urban areas. Roosts in a variety of structures including mines, caves, buildings, and trees. More tolerant of human habitation than other bat species. Roosts in groups up to several hundred individuals.
Spotted bat *Euderma maculatum*	BLM; NV-T	Found in a variety of habitats from low elevation desert scrub to high elevation coniferous forest habitats, including pinyon-juniper, sagebrush, and urban habitats. Closely associated with rocky cliffs. Roosts primarily in crevices on cliff faces and in caves and mines.
Silver-haired bat *Lasionycteris noctivagans*	BLM	A forest-associated species often found at higher elevations in pinyon-juniper, subalpine fir, aspen, and willow habitats. Roosts almost exclusively in trees in the summer. Frequently alternates roost sites. Maternity roost sites are usually in woodpecker holes.
Hoary bat *Lasiurus cinereus*	BLM	Tree-associated species. Found primarily in forested upland habitats, as well as in forest riparian zones and agriculture habitats. May occur in park and garden settings in urban areas. A solitary rooster that typically roosts in trees.
California myotis *Myotis californicus*	BLM	Found in a variety of habitats from desert scrub to forests. Roosts in a variety of structures including mines, caves, buildings, and trees. Actively forages throughout the winter.
Western small-footed myotis *Myotis ciliolabrum*	BLM	Found in a variety of habitats from desert scrub to pine-fir forests. Roosts in caves, mines, and trees. Forages in open areas.
Fringed myotis *Myotis thysanodes*	BLM	Found in a variety of habitats from low desert scrub habitats to high elevation coniferous forests. Found from upper elevation creosote bush desert to pinyon-juniper and white fir in the White Pine Range in White Pine County, Nevada. Roosts in mines, caves, trees, and buildings.
Long-legged myotis *Myotis volans*	BLM	Pinyon-juniper and other higher elevation forest habitats. Night roosts and hibernacula located in caves and mines. Forages in open areas at canopy height.
Canyon bat *Parastrellus hesperus*	BLM	Lower and Upper Sonoran desert habitats of blackbrush, creosote, salt desert shrub, and sagebrush, with occasional occurrence in Ponderosa pine and pinyon-juniper, usually in association with rock features such as granite boulders and canyons. Roosts in mainly in rock crevices.
Brazilian free-tailed bat *Tadarida brasiliensis*	BLM; NV-SP	Found in a wide variety of habitats from desert scrub to coniferous forests. Roosts in caves, mines, trees, bridges, and buildings. Colonies often number in the thousands.
Yuma myotis *Myotis yumanesis*	BLM	Variety of habitats, including sagebrush, salt desert scrub, agriculture, playa, and riparian habitats. Day roosts in trees, buildings, mines, caves, bridges, and rock crevices. Nights roosts mainly occur in man-made structures.
Dark kangaroo mouse *Microdipodops megacephalus*	BLM; NV-SP	Intermountain desert scrub, sagebrush, grasslands and meadows, badlands and dunes, and areas around desert playas and ephemeral pools.
Pale kangaroo mouse *Microdipodops pallidus*	BLM; NV-SP	Valley floors with saltbush and greasewood. Higher elevation sagebrush shrublands. Requires fine, loose, sandy soils.

Common Name/ Scientific Name	Status[1]	Habitat Requirements
BIRDS		
Golden eagle *Aquila chrysaetos*	BLM	Mountain or hilly terrain. Nests usually occur on cliffs or in trees. Forages over open areas with an adequate prey base. Breeding period is March 15 to July 15.
Peregrine falcon *Falco peregrinus*	BLM; NV-E	Open country near cliffs. Typically migrates south of U.S. during winter months. Nests on cliffs and rock ledges. Forages in open areas typically near water. Breeding period is March 15 to July 15.
Western burrowing owl *Athene cunicularia* spp. *hypugea*	BLM	Open country from desert scrub to grasslands. Often found in or around prairie dog colonies and ground squirrel colonies. Nests in burrows. Breeding period is April 15 to August 15.
Loggerhead shrike *Lanius ludovicianus*	BLM; NV-SPS	Open country including desert scrub and sagebrush grasslands. Nests and forages in brushy areas. Breeding period is April 15 to July 15.
Sage thrasher *Oreoscoptes montanus*	BLM; NV-SPS	Spends the summer months in sagebrush shrublands and winters in desert scrub. Breeding period is April 15 to July 15.
Brewer's sparrow *Spizella breweri*	BLM; NV-SPS	Sagebrush shrublands, brushy areas, and desert scrub. Except for singing males, this bird is very secretive and found under the canopy cover. Breeding season is April 15 to July 15.
PLANTS		
Eastwood's milkweed *Asclepias eastwoodiana*	BLM	Open areas with a variety of basic soils (pH usually greater than 8), often in small washes or other moisture accumulating microsites in shadscale, mixed shrub, sagebrush, and lower pinyon-juniper zones.
Sand cholla *Grusonia pulchella*	BLM, NV-SP	Dry open areas, mostly sandy soils in shadscale, mixed shrub, sagebrush, and lower pinyon-juniper zones.
Hairspine pricklypear *Opuntia polyacantha* var. *polyacantha*	NV-SP	Sandy soils of plains, flats, and low hills mostly in grassland.
Desert spinystar *Escobaria vivipara* var. *deserti*	NV-SP	Rocky slopes and hills of limestone or dolomite in desert scrub, Joshua tree woodlands, and lower pinyon-juniper zones.
Wiggins' cholla *Cylindropuntia echinocarpa*	NV-SP	Sandy or gravelly soils of benches, slopes, mesas, flats, and washes in desert systems.
Redspined fishhook cactus *Sclerocactus polyancistrus*	NV-SP	Basalt and limestone hillsides, generally on south to southwest facing slopes.
Joshua tree *Yucca brevifolia*	NV-SP	Desert. Common associates include perennial grasses, juniper, pinyon, sagebrush, and desert shrub species.

[1]Status:

FE = Federally Endangered Species

BLM = BLM Sensitive Species

NV-T = Nevada State Threatened

NV-SP = Nevada State Protected

NV-SPS = Nevada State Protected Sensitive

Table C-2 Special Status Species Impact Conclusions

Common Name/ Scientific Name	Status[1]	Potential for Occurrence Within or Near the Study Area	Impact Conclusion
MAMMALS			
Pallid bat *Antrozous pallidus*	BLM; NV-SP	High. This species has been documented within the study area. Suitable roosting and foraging habitat occurs within the study area.	Potential effects to these species from the proposed Project would be considered minor, long-term, and localized.
Townsend's big-eared bat *Corynorhinus townsendii*	BLM; NV-SPS	High. This species has been documented within the study area. Suitable roosting and foraging habitat occurs within the study area.	
Big brown bat *Eptesicus fuscus*	BLM	High. This species has been documented southwest of the study area in the Palmetto Mountains. Suitable roosting and foraging habitat occurs within the study area.	
Spotted bat *Euderma maculatum*	BLM; NV-T	High. This species has been documented immediately west of the town of Goldfield, Nevada, less than 5 miles from the study area. Suitable roosting and foraging habitat occurs within the study area.	
Silver-haired bat *Lasionycteris noctivagans*	BLM	High. This species has been documented southwest of the study area in the Palmetto Mountains. Suitable roosting and foraging habitat occurs within the study area.	
Hoary bat *Lasiurus cinereus*	BLM	High. This species has been documented southwest of the study area in the Palmetto Mountains. Suitable roosting and foraging habitat occurs within the study area.	
California myotis *Myotis californicus*	BLM	High. This species has been documented immediately west of the town of Goldfield, Nevada, less than 5 miles from the study area. Suitable roosting and foraging habitat occurs within the study area.	
Western small-footed myotis *Myotis ciliolabrum*	BLM	High. This species has been documented immediately west of the town of Goldfield, Nevada, less than 5 miles from the study area. Suitable roosting and foraging habitat occurs within the study area.	
Fringed myotis *Myotis thysanodes*	BLM	High. This species has been documented northeast of the study area in the Toquima Range. Suitable roosting and foraging habitat occurs within the study area.	
Long-legged myotis *Myotis volans*	BLM	High. This species has been documented southwest of the study area in the Palmetto Mountains. Suitable roosting and foraging habitat occurs within the study area.	
Canyon bat *Parastrellus hesperus*	BLM	High. This species has been documented immediately west of the town of Goldfield, Nevada, less than 5 miles from the study area. Suitable roosting and foraging habitat occurs within the study area.	
Brazilian free-tailed bat *Tadarida brasiliensis*	BLM; NV-SP	High. This species has been documented southwest of the study area in the Palmetto Mountains. Suitable roosting and foraging habitat occurs within the study area.	
Yuma myotis *Myotis yumanesis*	BLM	High. This species has been documented within the study area. Suitable roosting and foraging habitat occurs within the study area.	
Dark kangaroo mouse *Microdipodops megacephalus*	BLM; NV-SP	Low. This species has not been documented within the study area and low-quality habitat occurs within the study area.	Potential effects to these species from the proposed Project would be considered minor, long-term, and localized.
Pale kangaroo mouse *Microdipodops pallidus*	BLM; NV-SP	Low. This species has not been documented within the study area and low-quality habitat occurs within the study area.	

Common Name/ Scientific Name	Status[1]	Potential for Occurrence Within or Near the Study Area	Impact Conclusion
BIRDS			
Golden eagle *Aquila chrysaetos*	BLM	High. A total of two nests (one active, one inactive) have been documented within 5 miles of the study area. Suitable nesting and foraging habitat occurs within the study area.	Potential effects to these species from the proposed Project would be considered minor, long-term, and localized.
Peregrine falcon *Falco peregrinus*	BLM; NV-E	Low. This species known distribution in Nevada has expanded in recent years to include western Nevada as well as central Nevada. A known nest site is over 10 miles northwest of the study area.	
Western burrowing owl *Athene cunicularia* spp. *hypugea*	BLM	Moderate. This species has not been documented within the study area; however, suitable nesting and foraging habitat occurs within the study area.	
Loggerhead shrike *Lanius ludovicianus*	BLM; NV-SPS	High. This species has been documented within the study area during field surveys. Suitable nesting and foraging habitat occurs within the study area.	Potential effects to these species from the proposed Project would be considered minor, long-term, and localized.
Sage thrasher *Oreoscoptes montanus*	BLM; NV-SPS	High. This species has been documented within the study area during field surveys. Suitable nesting and foraging habitat occurs within the study area.	
Brewer's sparrow *Spizella breweri*	BLM; NV-SPS	High. This species has been documented within the study area during field surveys. Suitable nesting and foraging habitat occurs within the study area.	
PLANTS			
Eastwood's milkweed *Asclepias eastwoodiana*	BLM	This species was documented within the study area in 2013.	Potential effects to this species from the proposed Project would be considered negligible, long-term, and localized.
Sand cholla *Grusonia pulchella*	BLM, NV-SP	This species was documented 1.5 miles east of the study area in 2012.	Negligible, long-term, and localized effects to sand cholla are anticipated as a result of development of the proposed Project.
Hairspine pricklypear *Opuntia polyacantha* var. *polyacantha*	NV-SP	This species was documented within the study area in 2012.	Potential effects to these species from the proposed Project would be considered minor, long-term, and localized.
Desert spinystar *Escobaria vivipara* var. *deserti*	NV-SP	This species was documented within the study area in 2012.	
Wiggins' cholla *Cylindropuntia echinocarpa*	NV-SP	This species was documented within the study area in 2012.	
Redspined fishhook cactus *Sclerocactus polyancistrus*	NV-SP	This species was documented within the study area in 2012.	
Joshua tree *Yucca brevifolia*	NV-SP	This species was documented within the study area in 2012, 2014, and 2015. A total of 2,744 Joshua trees of various sizes and condition were observed in the study area.	

[1]Status:

FE = Federally Endangered Species

BLM = BLM Sensitive Species

NV-T = Nevada State Threatened

NV-SP = Nevada State Protected

NV-SPS = Nevada State Protected Sensitive

Appendix D

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