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

Environmental Assessment

DOI-BLM-NV-W010-2015-0037-EA

Gold Acquisition Corp.

Modification for the Relief Canyon Mine

June 2016

Prepared by:

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

Page

ACRONYMS vii

1 INTRODUCTION 1

1.1 IDENTIFYING INFORMATION 1

1.1.1 Title, Environmental Assessment Number, and Type of Project 1

1.1.2 Location of Proposed Action 1

1.1.3 Name and Location of Preparing Office 1

1.1.4 Case File Number 1

1.1.5 Applicant Name 1

1.2 OVERVIEW 2

1.2.1 Site History 2

1.3 PURPOSE AND NEED FOR ACTION 2

1.4 DECISION TO BE MADE 2

1.5 LAND USE CONFORMANCE STATEMENT 3

1.6 SCOPING, PUBLIC INVOLVEMENT AND ISSUES 4

2 PROPOSED ACTION AND ALTERNATIVES 6

2.1 DESCRIPTION OF THE PROPOSED ACTION 6

2.1.1 Period of Operations 6

2.1.2 Expansion of the Relief Canyon Open Pits 7

2.1.3 Waste Rock Storage 9

2.1.4 Crushing Operation 11

2.1.5 Processing 12

2.1.6 Water Supply, Delivery, and Storage 12

2.1.7 Roads 13

2.1.8 Workforce and Transportation 13

2.1.9 Exploration 13

2.1.10 Ancillary Facilities 16

2.1.11 Reclamation 22

2.1.12 Applicant-Committed Environmental Protection Measures 29

2.2 ALTERNATIVES TO THE PROPOSED ACTION 37

2.2.1 No Action Alternative 37

2.2.2 Alternatives Considered but Eliminated from Further Analysis 37

3 THE AFFECTED ENVIRONMENT 38

3.1 AIR QUALITY 41

3.1.1 Regulatory Framework 41

3.1.2 Assessment Area 42

3.1.3 Existing Environment 42

3.2 CULTURAL RESOURCES 44

3.2.1 Regulatory Framework 44

3.2.2 Assessment Area 44

3.2.3 Existing Environment 44

3.3 INVASIVE, NON-NATIVE SPECIES 45

3.3.1 Regulatory Framework 45

3.3.2 Assessment Area 45

3.3.3 Existing Environment *45*
3.4 MIGRATORY BIRDS 46
3.4.1 Regulatory Framework *46*
3.4.2 Assessment Area *46*
3.4.3 Existing Environment *46*
3.5 NATIVE AMERICAN RELIGIOUS CONCERNS 47
3.5.1 Regulatory Framework *47*
3.5.2 Assessment Area *48*
3.5.3 Existing Environment *48*
3.6 WASTES – HAZARDOUS OR SOLID 48
3.6.1 Regulatory Framework *48*
3.6.2 Assessment Area *48*
3.6.3 Existing Environment *49*
3.7 WATER RESOURCES 49
3.7.1 Regulatory Framework *49*
3.7.2 Assessment Area *50*
3.7.3 Existing Environment *50*
3.8 GEOLOGY AND MINERALS 55
3.8.1 Regulatory Framework *55*
3.8.2 Assessment Area *55*
3.8.3 Existing Environment *55*
3.9 PUBLIC SAFETY, TRANSPORTATION, AND ACCESS 57
3.9.1 Regulatory Framework *57*
3.9.2 Assessment Area *57*
3.9.3 Existing Environment *58*
3.10 SOCIAL AND ECONOMIC VALUES 58
3.10.1 Regulatory Framework *58*
3.10.2 Assessment Area *59*
3.10.3 Existing Environment *59*
3.11 RANGELAND MANAGEMENT 64
3.11.1 Regulatory Framework *64*
3.11.2 Assessment Area *64*
3.11.3 Existing Environment *64*
3.12 SOILS 65
3.12.1 Regulatory Framework *65*
3.12.2 Assessment Area *65*
3.12.3 Existing Environment *65*
3.13 SPECIAL STATUS SPECIES 68
3.13.1 Regulatory Framework *68*
3.13.2 Assessment Area *68*
3.13.3 Existing Environment *68*
3.14 VEGETATION 72
3.14.1 Regulatory Framework *72*
3.14.2 Assessment Area *72*
3.14.3 Existing Environment *72*
3.15 WILDLIFE 75

3.15.1 Regulatory Framework ... *75*
3.15.2 Assessment Area ... *76*
3.15.3 Existing Environment ... *76*
4 ENVIRONMENTAL CONSEQUENCES ... 77
4.1 AIR QUALITY ... 77
4.1.1 Proposed Action ... *77*
4.1.2 No Action Alternative ... *80*
4.2 CULTURAL RESOURCES ... 80
4.2.1 Proposed Action ... *80*
4.2.2 No Action Alternative ... *80*
4.3 INVASIVE, NON-NATIVE SPECIES ... 80
4.3.1 Proposed Action ... *80*
4.3.2 No Action Alternative ... *81*
4.4 MIGRATORY BIRDS ... 81
4.4.1 Proposed Action ... *81*
4.4.2 No Action Alternative ... *82*
4.5 NATIVE AMERICAN RELIGIOUS CONCERNS ... 83
4.5.1 Proposed Action ... *83*
4.5.2 No Action Alternative ... *83*
4.6 WASTES – HAZARDOUS/SOLID ... 83
4.6.1 Proposed Action ... *83*
4.6.2 No Action Alternative ... *83*
4.7 WATER RESOURCES ... 84
4.7.1 Proposed Action ... *84*
4.7.2 No Action Alternative ... *85*
4.8 GEOLOGY AND MINERALS ... 85
4.8.1 Proposed Action ... *85*
4.8.2 No Action Alternative ... *86*
4.9 PUBLIC SAFETY, TRANSPORTATION, AND ACCESS ... 86
4.9.1 Proposed Action ... *86*
4.9.2 No Action Alternative ... *86*
4.10 SOCIOECONOMICS ... 86
4.10.1 Proposed Action ... *86*
4.10.2 No Action Alternative ... *87*
4.11 RANGELAND MANAGEMENT ... 88
4.11.1 Proposed Action ... *88*
4.11.2 No Action Alternative ... *88*
4.12 SOILS ... 88
4.12.1 Proposed Action ... *88*
4.12.2 No Action Alternative ... *89*
4.13 SPECIAL STATUS SPECIES ... 89
4.13.1 Proposed Action ... *89*
4.13.2 No Action Alternative ... *91*
4.14 VEGETATION ... 91
4.14.1 Proposed Action ... *91*
4.14.2 No Action Alternative ... *91*

4.15 WILDLIFE 92
4.15.1 Proposed Action *92*
4.15.2 No Action Alternative *92*
5 CUMULATIVE EFFECTS 94
5.1 INTRODUCTION 94
5.1.1 Cumulative Analysis Methodology *94*
5.1.2 Description of Cumulative Effects Study Area Boundaries *95*
5.1.3 Past, Present, and Reasonably Foreseeable Future Actions *96*
5.2 CUMULATIVE IMPACT ANALYSIS 107
5.2.1 Air Quality *107*
5.2.2 Migratory Birds, Special Status Species, and Wildlife *109*
5.2.3 Water Resources *110*
5.2.4 Geology and Minerals *112*
5.2.5 Socioeconomics *113*
5.2.6 Rangeland Management *114*
5.2.7 Soils *115*
5.2.8 Vegetation *116*
6 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED 119
6.1 NATIVE AMERICAN CONSULTATION 119
6.2 COORDINATION AND/OR CONSULTATION (AGENCIES) 119
6.3 INDIVIDUALS AND/OR ORGANIZATIONS CONSULTED 119
6.4 PUBLIC OUTREACH/INVOLVEMENT 119
7 LIST OF PREPARERS 120
7.1 BUREAU OF LAND MANAGEMENT 120
7.2 BUREAU OF LAND MANAGEMENT CONTRACTOR 120
7.3 THIRD PARTY CONSULTANTS 120
8 REFERENCES 121
9 FIGURES 128

List of Tables

Table 1.2-1: Authorized Currently Used, Proposed, and Total Surface Disturbance Acres by Land Ownership and Component 3
Table 2.1-1: Approximate Ore and Waste Rock Volumes 7
Table 2.1-2: Mine Mobile Equipment Requirements for the Proposed Action 8
Table 2.1-3: Waste Rock Storage Area 5 Design Parameters and Dimensions Summary 9
Table 2.1-4: Waste Rock Distribution by Lithology 10
Table 2.1-5: Heap Leach Facility Design Parameters Summary 11
Table 2.1-6: Equipment Associates with Exploration Activities 14
Table 2.1-7: Fuels, Reagents, Volumes, and Shipments 18
Table 2.1-8: Approved Reclamation Seed Mixture 24
Table 2.1-9: Reclamation Schedule 30
Table 3.0-1: List of Supplemental Authority Elements Considered for Analysis 38
Table 3.0-2: Additional Affected Resources 39
Table 3.1-1: National Ambient Air Quality Standards for Criteria Pollutants 41

Table 3.1-2: **Nevada Ambient Air Quality Standards for Criteria Pollutants** 42
Table 3.1-3: **Existing Relief Canyon Mine Emissions Summary** 43
Table 3.1-4: **Existing Relief Canyon Mine Hazardous Air Pollutants** 44
Table 3.1-5: **Existing Relief Canyon Mine Greenhouse Gas Emissions** 44
Table 3.6-1: **Existing Relief Canyon Petroleum Products** 49
Table 3.10-1: **Population Statistics and Estimates of Assessment Area** 59
Table 3.10-2: **Demographic Statistics of Assessment Area** 59
Table 3.10-3: **Employment by Sector in 2014 for Assessment Area and State of Nevada** 61
Table 3.12-1: **Soil Associations within the Project Area** 66
Table 4.1-1: **Modeled Emission Rates for the Project** 77
Table 4.1-2: **Highest Modeled Air Pollutant Concentrations from the Proposed Action at Receptor Points Accessible to Public** 78
Table 4.1-3: **Hazardous Air Pollutants Emissions for the Proposed Action** 79
Table 4.1-4: **Proposed Project Greenhouse Gas Emissions** 79
Table 4.4-1: **Undisturbed Vegetation in the Area of the Proposed Action** 81
Table 5.1-1: **Cumulative Effects Study Areas** 95
Table 5.1-2: **Summary of Past and Present Mineral Actions in Wildlife CESA** 97
Table 5.1-3: **Summary of Past and Present Mineral Actions in Range CESA** 97
Table 5.1-4: **Summary of Past and Present Mineral Actions in Water Resources CESA** 98
Table 5.1-5: **Geothermal Lease Summary** 98
Table 5.1-6: **Wildland Fire Acres in the CESAs** 100
Table 5.1-7: **Grazing Allotments within the CESAs** 102
Table 5.1-8: **RFFAs in the Air Quality CESA** 103
Table 5.1-9: **RFFAs in the Wildlife CESA** 105
Table 5.1-10: **RFFAs in the Range CESA** 106
Table 5.1-11: **RFFAs in the Water Resources CESA** 106
Table 5.2-1: **Air Quality Emissions within the Air Quality CESA, Tons per Year** 108

List of Figures

Figure 1.1.1 **Project Location, Access, and Land Status**
Figure 2.1.1 **Existing and Proposed Facilities**
Figure 2.1.2 **Proposed Exploration Disturbance**
Figure 2.1.3 **Cross Section of Waste Rock Storage Area**
Figure 2.1.4 **Generalized Cross Section of New Heap Leach Pad**
Figure 2.1.5 **Process Flow Sheet**
Figure 2.1.6 **Typical Haul Road Cross Section**
Figure 2.1.7 **Cross Section of Reclaimed Old Heap Pads**
Figure 2.1.8 **Post-Mining Topography**
Figure 3.3.1 **Vegetation Communities and Noxious Weeds within the Project Area**
Figure 3.7.1 **Hydrographic Basin**
Figure 3.8.1 **Localized Geology within the Project Area**
Figure 3.11.1 **Economics and Social Values Assessment Area**
Figure 3.12.1 **NRCS Soil Map Units for the Proposed New Disturbance**
Figure 3.13.1 **Survey Tracks**

Figure 3.13.2 Special Status Plant Species within the Project Area
Figure 5.1.1 Cumulative Effects Study Areas
Figure 5.1.2 Air Quality CESA

ACRONYMS

°	degrees
mg/m^3	milligrams per cubic meter
$\mu g/m^3$	micrograms per cubic meter
ABA	Acid Base Accounting
ADR	Adsorption-Desorption Recovery
amsl	above mean sea level
ANFO	ammonium nitrate and fuel oil
ARD	acid rock drainage
ARPA	Archaeological Resources Protection Act
ASM	ASM Affiliates
AUMs	animal unit months
BAPC	Bureau of Air Pollution Control
BLM	Bureau of Land Management
BMPs	Best Management Practices
BMRR	Bureau of Mining Regulation and Reclamation
CAAA	Clean Air Act Amendments
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
CH_4	methane
CHN	community health nursing
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CWA	Clean Water Act
DPBH	Division of Public and Behavioral Health
EA	Environmental Assessment
EO	Executive Order
EPA	United States Environmental Protection Agency
EPM	Environmental Protection Measure
FCAA	Federal Clean Air Act
FLPMA	Federal Land Policy and Management Act
FPD	Fire Protection District
FR	Federal Register
GHG	Greenhouse gas
gpm	gallons per minute
GPS	Global Positioning System
HAP	hazardous air pollutant
HDPE	high density polyethylene
Hg	Mercury
HLDE	Heap Leach Draindown Estimator
IM	Instruction Memorandum

IMPROVE	Interagency Monitoring of Protected Visual Environments
K	Kindergarten
Knight Piésold	Knight Piésold and Co.
LR2000	Land & Mineral Legacy Rehost 2000 System
MBTA	Migratory Bird Treaty Act
MEND	Mine Environmental Neutral Drainage
mg/L	milligram per liter
ML	Metal Leaching
MOU	Memorandum of Understanding
MSHA	Mine Safety and Health Administration
MWMP	Meteoric Water Mobility Procedure
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NAD	North American Datum
NAGPRA	Native American Graves Protection and Repatriation Act
NDA	Nevada Department of Agriculture
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NHP	Nevada Highway Patrol
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
N_2O	nitrous oxide
Non-PAG	Non-potentially acid generating
NO_2	nitrogen dioxide
NPM	Net Proceeds of Minerals
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NRV	Nevada Reference Value
O_3	Ozone
OHMA	Other Habitat Management Area
PAG	potentially acid generating
Pb	Lead
PCS	Petroleum Contaminated Soil
PCSD	Pershing County School District
PK	pre-Kindergarten
Plan	Plan of Operations
PLS	pure live seed
ppb	parts per billion
ppm	parts per million
Project	Modification for the Relief Canyon Mine
RC	Reverse Circulation

RCRA	Resource Conservation and Recovery Act
SETT	Sagebrush Ecosystem Technical Team
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SWReGAP	Southwest Regional Gap Analysis Project
SWS	Schlumberger Water Services
TCP	Traditional Cultural Property
TDS	total dissolved solids
U.S.	United States
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VFD	Volunteer Fire Department
WPCP	Water Pollution Control Permit
WRC	Wildlife Resource Consultants

1 INTRODUCTION

1.1 Identifying Information

1.1.1 Title, Environmental Assessment Number, and Type of Project

Title: Gold Acquisition Corp. – 2015 Plan Modification (2015 Plan Modification) for the Relief Canyon Mine (Project)

Environmental Assessment (EA) Number: DOI-BLM-NV-W010-2015-0037-EA

Type of Project: Mine Expansion.

1.1.2 Location of Proposed Action

The Project is located on both public lands, administered by the Bureau of Land Management, Winnemucca District Office – Humboldt River Field Office (BLM), and Gold Acquisition Corp.-controlled private lands in Pershing County, Nevada. Located at the base of the South Humboldt Range, the project site is approximately 17.5 miles east-northeast of Lovelock, Nevada, and approximately 110 miles northeast of Reno, Nevada.

The Project is located in portions or all of Section 13, Township 27 North, Range 33 East (T27N, R33E), and Sections 16 through 21, T27N, R34E, Mount Diablo Base and Meridian (Project Area). The Project Area encompasses approximately 2,974 acres, comprised of approximately 1,644 acres of public land and 1,330 acres of private land. Figure 1.1.1 shows the Proposed Action location, access, and land status.

1.1.3 Name and Location of Preparing Office

Lead Office:
Bureau of Land Management
Humboldt River Field Office
Winnemucca District
5100 East Winnemucca Boulevard
Winnemucca, Nevada 89445

1.1.4 Case File Number

Relief Canyon Mine Plan of Operations, BLM case file number NVN-064634

1.1.5 Applicant Name

Gold Acquisition Corp., a wholly owned subsidiary of Pershing Gold Corporation.

1.2 Overview

1.2.1 Site History

Permitting activities for the Project began in 1981 with the original Plan of Operations (Plan) approved in 1984 by the BLM, which included 485 acres of approved surface. Subsequent plan modifications in 1986, 2007, 2008, 2014, and 2015 approved additional surface disturbance by 137.6 acres for a total of 622.6 acres approved under the current Plan. At the present time 225.6 acres of the authorized disturbance is not in use. This plan modification proposes to take 211.8 acres of this previously authorized disturbance and use it for other purposes (Proposed Action). Table 1.2-1 presents the authorized surface disturbance acreages, currently authorized and active acres, and total authorized and proposed acres by land ownership.

1.3 Purpose and Need for Action

The purpose of the federal action is to allow expansion of mining operations on public lands within the Plan boundary.

The need for the action is established by the BLM's responsibility under the 2008 Energy and Mineral Policy, Section 302 of the Federal Land Policy and Management Act of 1976 (FLPMA), and BLM Surface Management Regulations at 43 Code of Federal Regulations (CFR) 3809, to respond to a mining and exploration plan of operations and to take any actions necessary to prevent unnecessary or undue degradation of public land administered by the BLM.

1.4 Decision to be Made

The decision to be made by the BLM would be one of the following:

- Approve the proposed 2015 Plan Modification without modifications or additional mitigation measures;
- Approve the proposed 2015 Plan Modification with modifications or additional mitigation measures;
- Approve the proposed 2015 Plan Modification with the Proposed Action replaced or modified by an alternative action;
- Deny approval of the proposed 2015 Plan Modification and not authorize the proposed activities if it is found the proposed activities do not comply with 43 CFR 3809 regulations and the FLPMA mandate to prevent unnecessary or undue degradation.

Table 1.2-1: Authorized Currently Used, Proposed, and Total Surface Disturbance Acres by Land Ownership and Component

Facilities	Authorized and Currently Used[1] Acres			Proposed Acres			Total Acres		
	Public	Private	Total	Public	Private	Total	Public	Private	Total
Exploration Roads & Pads	9.0	0	9.0	7.3	10.2	17.5	16.3	10.2	26.5
Access Roads	10.6	3.6	14.2	1.0	1.0	2.0	11.6	4.6	16.2
Haul Roads	3.7	28.1	31.8	1.0	4.8	5.8	4.7	32.9	37.6
Wells/Pipelines	1.0	1.0	2.0	1.0	1.0	2.0	2.0	2.0	4.0
Well Abandonment	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.4
Pits	63.0	4.8	67.8	41.2	27.1	68.3	104.2	31.9	136.1
Ponds	4.1	0	4.1	0	0	0	4.1	0	4.1
Process Solution Ditch	3.4	0	3.4	0	0	0	3.4	0	3.4
Heap Leach Cells 1 – 4, 6, 7	130.6	0	130.6	0	0	0	130.6	0	130.6
Cover for Heap Cells 1 – 4	0	0	0	7.9	0	7.9	7.9	0	7.9
Waste Rock Storage Areas[2]	49.4	42.0	91.4	0	95.7	95.7	49.4	137.7	187.1
Process Area Yards Buildings, Lab, Warehouse	0.6	0	0.6	0	0	0	0.6	0	0.6
Crusher Yard	0	18.8	18.8	0	0	0	0	18.8	18.8
Storage/In-Fill	4.0	0	4.0	0	0	0	4.0	0	4.0
Contractor's Yard	0	2.7	2.7	0	2.2	2.2	0	4.9	4.9
Overland Conveyor	0.1	0.4	0.5	0	0	0	0.1	0.4	0.5
Growth Media Stockpiles	7.5	3.7	11.2	1.6	6.8	8.4	9.1	10.5	19.6
Class III Landfill [3]	0.2	0	0.2	0	0	0	0.2	0	0.2
New Parking Lot	0	0	0	0.6	0	0.6	0.6	0	0.6
Materials Storage	0	0	0	1.2	0	1.2	1.2	0	1.2
Drainage Control	4.4	0	4.4	0	0	0	4.4	0	4.4
Total Acres	**291.7**	**105.2**	**396.9**	**62.9**	**148.9**	**211.8**	**354.6**	**254.1**	**608.7**

It should be noted that all acreages in this table have been rounded to the nearest tenth of an acre, so acreages in this table may not reflect the exact permitted acres of disturbance in the approvals.

[1]These acres are authorized in the 1984 Plan of Operations and subsequent Plan Modifications and Plan updates in 1986, 2007, 2008, 2014, and 2015. A total of 622.6 acres of surface disturbance was authorized. Current Project facilities utilize 396.9 acres.

[2]Includes 42 acres of reclaimed waste rock storage areas that cannot be re-disturbed without additional surety.

[3]New Class III waivered landfill to be built in Waste Rock Storage Area; therefore, no additional acres of disturbance are needed for this facility.

1.5 Land Use Conformance Statement

The Proposed Action is in conformance with the Winnemucca District Resource Management Plan and Record of Decision (May 21, 2015), as amended by the Record of Decision and Approved Resource Management Plan Amendments for the Great Basin Region including the Greater-Sage Grouse Sub-Regions of Idaho and Southwestern Montana, Nevada and Northeastern California, Oregon, and Utah (September 21, 2015).This Proposed Action is specifically provided for in the following Goal and Objectives for Mineral Resources: Leasable, Locatable, and Saleable:

> Goal: Make federal mineral resources available to meet domestic needs. Encourage responsible development of economically sound and stable domestic minerals and energy production, while assuring appropriate return to the public. Ensure long-term health and diversity of the public lands by minimizing impacts on other resources, returning lands disturbed to productive uses, and preventing unnecessary or undue degradation.

Objective MR 1: Return lands disturbed by mineral operations that are stable, safe, productive, and visually compatible and ensure quality of the environment in accordance with FLPMA and other applicable laws, regulations, and policy. Prevent undue or unnecessary degradation of public lands. An exception, in whole or in part, may be granted if, at the time of closure, a viable plan exists for a productive continued economic use of the site (see Sustainable Development Goals and Objectives).

Objective MR 8: Allow appropriate occupancy (meeting the requirements of 43 CFR 3715 or other applicable regulations) on mineral development sites, while protecting resources and maintaining public access.

Objective MR 9: Manage locatable mineral operations to provide for the mineral needs of the nation, while assuring compatibility with and protection of other resources and uses.

1.6 Scoping, Public Involvement and Issues

A scoping process was conducted in order to determine the scope and focus of the environmental analysis. An internal scoping meeting was held on August 7, 2015, with an interdisciplinary team of resource specialists who are trained in areas specific to the Project. Based on this internal scoping meeting, the BLM defined appropriate issues and developed initial determinations of what specific information would be analyzed in this EA. A 30-day public scoping period was initiated on August 14, 2015, and concluded on September 14, 2015. Four scoping letters were received from private individuals, state agencies, county governments, and interested parties. In addition, two letters of support of the Project were received from Humboldt and Pershing Counties. Through internal and external scoping, the following issues were identified with regard to the Proposed Action:

- What potential effects does the Proposed Action have on ground water?
- What would be the permanent effects on availability of ground water for livestock and water rights holders?
- What would be the effects of a possible release of hazardous materials into the environment?
- What would be the effects of possible leachates into the Carson River watershed?
- What would be the impact of the Proposed Action on Special Status Species (SSS)?
- What would be the impact of the proposed action on the availability of water resources for SSS?
- What potential effects does the Proposed Action have on wildlife in general?
- What potential effects does the Proposed Action have on migratory birds?
- What effect would the Proposed Action have on cultural resources?
- What potential effect would the Proposed Action have on Native American Religious Concerns?
- What potential effects does the Proposed Action have on air quality?
- What would be the short- and long-term impacts to vegetation?
- How would the Proposed Action affect invasive and nonnative plant species?
- What would be the short and long term impacts to soil removal?
- What would be the short and long term impacts to Biological Soil Crust (BSC) if present?
- How would the Proposed Action impact recreation?

- How would the Proposed Action impact dark skies?
- How would lighting be managed to reduce light pollution?
- Would range improvements be impacted by the Proposed Action?
- How would the Proposed Action affect economic and social values?

2 PROPOSED ACTION AND ALTERNATIVES

2.1 Description of the Proposed Action

Gold Acquisition Corp. proposes to expand the existing open pits creating one larger pit, build a new waste rock storage facility on private land, conduct exploration activities outside of the existing pit area, and construct ancillary facilities. The Proposed Action includes using 211.8 acres of previously authorized but currently unused surface disturbance. The proposed disturbance would be needed for mine expansion and mineral exploration activities. The mined ore would be processed on the previously permitted heap leach pad Cells 6 and 7, of which only cell 6A has been constructed.

The previously authorized disturbance acres would be re-purposed (i.e., used for different mining purposes in different locations within the Project Area) as compared to the surface disturbance authorized in the 1984 Plan and subsequent amendments. Generally speaking, the Proposed Action would create a larger pit than originally authorized, the heap leach pads would be smaller, and there would be a new waste rock storage facility on private land. The Proposed Action would also involve constructing several new roads, a new pipeline, closing and reclaiming the old heap leach pads (Cells 1-4), adding an analytical laboratory, a contractor's yard, stockpiling growth media, and expanding the exploration drilling areas. Table 1.2-2, provides an acreage breakdown of the authorized, existing and proposed facilities on public land and private land. The remainder of the Project components and activities would use and in some cases expand the existing infrastructure within the Project Area. The ore mined under the Proposed Action would be processed in the existing Adsorption-Desorption Recovery (ADR) facility. Water for the mining and heap leach operations would be obtained from the existing water supply wells, PW-1 and PW-2, located west of the pit area, until it becomes necessary to relocate these wells as mining proceeds, given their proximity to the pit, in which case, replacement wells would be drilled. Power would be obtained from the existing power supply system consisting of a power line, on-site generators, and additional generators. Figure 2.1.1 shows the existing, proposed, and expanded facilities. The proposed exploration roads are shown on Figure 2.1.2.

2.1.1 Period of Operations

The Project time frame consists of approximately ten years for construction, operation, closure, and reclamation, followed by at least ten years of post-closure monitoring. Construction of needed facilities would require approximately six months followed by approximately three years of active mining. Once mining was ended, the loaded leach pads (Cells 6 and 7) would continue to be leached for approximately two years. Reclamation of the mining facilities would be initiated once the mining activities were completed. Once revegetation objectives are met, that portion of the bond could be released by the BLM and Nevada Division of Environmental Protection (NDEP). Closure and reclamation of the processing facilities would commence once leaching has been terminated. The Heap Leach Draindown Estimator (HLDE) model shows the draindown from the heaps would reach a level that could be managed in the planned evapotranspiration cells in 15 months after initiation of heap closure, under ideal conditions. The performance of these cells would be monitored for at least ten years after they are constructed.

2.1.2 Expansion of the Relief Canyon Open Pits

As shown in Figure 2.1.1, the existing pits within the Project Area would be expanded to create one larger pit by constructing laybacks that would expand the pit boundaries. The currently authorized pits cover 63 acres of public land and 4.8 acres of private land. The expanded pit would create an additional 41.2 acres of surface disturbance on public land and 27.1 acres of disturbance on private land (Table 1.2-1). The majority of the land to be disturbed by the expanded pit has been previously disturbed around the existing pit by exploration drilling and general Project traffic since the mid-1980s.

Based on drilling data obtained since 2011, the ore and waste rock proposed to be mined are similar to the materials previous operators mined in the 1980s. Consequently, the pit, waste rock storage area, and heaps are expected to have similar geochemical properties as previously mined materials. Table 2.1-1 presents the approximate tonnages of ore and waste proposed to be mined.

Table 2.1-1: Approximate Ore and Waste Rock Volumes

Material Type	Tons to be Mined
Ore	10,345,000
Waste rock	28,209,000
Total	**38,554,000**

The North and South pits would be mined to a depth of approximately 5,080 feet above mean sea level (amsl), which is roughly the elevation of the water table beneath the existing pits as measured in January 2015 (Schlumberger Water Services [SWS] 2015; Appendix D in the 2015 Plan Modification). The ground water elevations beneath the pits have been documented by taking monthly measurements from piezometers located in each pit. Sections 3.7 (Affected Environment) and 4.7 (Environmental Consequences) discuss the mine hydrology and the results from the 2014 pumping test in greater detail.

The following criteria have been used as the basis for the design of the expanded pit at the Relief Canyon Mine:

- The pit would use double-benching with two 20-foot benches followed by a step-out every second bench;
- The width of the step-out would vary depending upon pit slope; and
- Pit slopes would vary from 42 (º) to 53 º depending upon location.

The pit slope stability study is presented in Appendix C of the 2015 Plan Modification (Knight Piésold 2014a). This study verified previous geotechnical studies. Empirical data also show stability of the existing pit walls in the North, South, and Light bulb pits, which have been in place since the late 1980s. In general, the pit walls exposed in the three open pits at the Relief Canyon Mine are stable. Only minimal signs of local instability are evident in the pits and are mainly associated with intrusive contacts and fault intersections. Minor instability also occurs in locations where gabbroic dikes are exposed in cut slopes, due to highly expansive clay alteration along the dike contacts.

Conventional open pit mining methods (truck and shovel/loader) would be used to extract the ore and waste. Rock would be drilled and blasted for excavation using ammonium nitrate and fuel oil (ANFO) or other appropriate blasting agents as determined by rock characteristics. Explosives would be stored and used in accordance with the Mine Safety and Health Administration (MSHA) and Bureau of Alcohol, Tobacco, Firearm and Explosives regulations and any other applicable federal, state, or local statutes and regulations. Blasting material would be kept in appropriate magazines at a secure location near the pit. One blast per day is anticipated, and the total amount of explosives used would vary depending on the size of the working face of the pit.

Bench heights may vary depending upon mining requirements or rock geotechnical properties. The typical bench height is expected to be 20 feet. Pit slope inter-ramp angles are expected to average between 42° and 53° based on typical slope heights of 40 feet with ten-foot minimum width safety benches. Overall slope angles would be somewhat flatter due to the inclusion of haul roads. Rock mass stability analyses indicate high safety factors for slopes developed in massive limestone, siltstone, shale, limestone, and the breccia bodies.

The average life-of-mine stripping ratio is projected to be approximately 3:1 waste to ore. Ore would be mined at an average rate of 16,440 tons per day (tpd). The average annual ore production rate would be approximately six million tons per year with the total (waste rock plus ore) mining rate not to exceed about 100,000 tpd. Mining would be conducted on a seven-day per week schedule, two 12-hour shifts per day.

Table 2.1-2 presents a list of mining equipment that may be used during peak mining years.

Table 2.1-2: Mine Mobile Equipment Requirements for the Proposed Action

Description	Number
Front-end Loaders /Hydraulic Shovel	2-4
Rear-dump Trucks	6-12
Rotary Drills	2-4
Bulldozers	2-4
Wheel Dozer	1-2
Graders	1-2
Water Truck 10,000 gal	2
Service/Tire Trucks	3-4
ANFO Truck	1
Light Plants	6-12
Pickup Trucks	8-12

2.1.3 Waste Rock Storage

Mining is anticipated to generate approximately 28.2 million tons of overburden and waste rock. Roughly 22 million tons of the mined waste rock would be stored in the proposed Waste Rock Storage Area 5 on private land in Section 17, T27N, R34E; the remainder would be placed in the existing Waste Rock Storage Area 4. Approximately 150,000 tons of overburden alluvium and waste rock comprised mainly of Grass Valley Formation materials would be used to cover the old heap leach pads (Cells 1 through 4), overlain by approximately 150,000 tons of alluvium (growth media). Approximately 800,000 tons of growth media encountered during facility development and mining would be salvaged and placed into the growth media stockpile locations shown on Figure 2.1.1. A cross section of Waste Rock Storage Area 5 is shown on Figure 2.1.3; a summary of basic design parameters and dimensions for Waste Rock Storage Area 5 is shown in Table 2.1-3.

Prior to construction, vegetation would be cleared from the footprint of Waste Rock Area 5 and the available growth media would be salvaged and placed in the four growth media stockpiles near Waste Rock Storage Area 5 shown on Figure 2.1.1. Trucks would place the waste rock in 50-foot lifts.

The final configuration for Waste Rock Storage Area 5 has been designed to provide long-term stability and to promote surface runoff to minimize ponding of water and infiltration, and to limit erosion and channel scour.

Table 2.1-3: Waste Rock Storage Area 5 Design Parameters and Dimensions Summary

Waste Rock Storage Area 5	Width (feet)	Length (feet)	As-built Slope	Reclaimed Slope	Maximum Height (feet)	Crest Elevation (feet)
	2,200	1,900	3H : 1V	3H : 1V	250	5,350

H = horizontal; V = vertical

2.1.3.1 Geochemical Characterization

A geochemical characterization study was conducted to assess the acid generating potential (ARD) and leachate quality (ARD/Metal Leaching [ML]) of the Relief Canyon Mine (Knight Piésold 2014b). The primary objective of the geochemical characterization program was to provide data for evaluating potential environmental impacts and mitigation methods as part of the permitting process. Specific objectives included the following:

- Develop a geochemical database, sufficient to address geochemical implications for the site at a level consistent with that required for the Project design and permitting;
- Develop estimates of the acid generating and ML potential of geologic mine wastes;
- Provide leaching rates for various geological materials suitable for water quality modeling;
- Develop site-specific ARD criteria for mine planning and closure; and

- Develop a geochemical assessment report for submission with various permit applications.

The results of the geochemistry evaluation are summarized in this section and presented in detail in Appendix E of the 2015 Plan Modification.

A summary of the waste rock types to be mined at the Project and their relative percentages of the total waste to be mined is shown in Table 2.1-4.

Table 2.1-4: Waste Rock Distribution by Lithology

Lithology	Waste Distribution Percentage
Alluvium	13
Grass Valley Formation	37
Limestone - Cane Spring Formation, Deformed Limestone, and Limestone Breccia	42
Gabbro	7
Pale Green Volcanic	1
Total	**100**

To characterize ARD/ML of the deposit materials to be mined at the Project, a weighted approach was used to assess variability of the waste rock types shown in Table 2.1-4. Forty samples from 20 boreholes were selected to characterize the spatial and lithological variation of the deposit. All 40 of the samples were subjected to Acid Base Accounting (ABA) procedures. Twelve of these samples were selected for Meteoric Water Mobility Procedure (MWMP) testing, with eight subjected to sequential MWMP testing. The number of samples collected was based on geologic data collected from bore hole logging to identify lithotypes, professional judgment and guidelines presented by the United States Environmental Protection Agency (EPA) and the Mine Environmental Neutral Drainage (MEND) manual.

The ABA tests performed on the waste rock produced during mining under the Proposed Action indicate this material is non-reactive and is not expected to generate acid upon exposure to weathering. These test results are consistent with the test results performed by the Project's previous operator. The results of historic ABA testing for the Relief Canyon Mine showed that all samples were acid neutralizing with positive net neutralizing potential. Based on the MWMP test results, this material is not expected to leach metals long term

2.1.3.2 Waste Rock Management

The ABA and MWMP geochemical characterization tests indicate the Relief Canyon Mine waste rock is non-potentially acid generating (non-PAG) and non-ML; therefore, a waste rock management plan to segregate and manage PAG or ML rock types is not anticipated to be necessary. However, in the event that mining encounters a significant volume of a different rock type with unknown leaching characteristics, ABA and MWMP tests would be performed on this material to determine its leachate characteristics. If the geochemical characterization tests indicate this material is PAG or ML, the material would be subject to the special management measures to encapsulate the material with inert waste rock in Waste Rock Storage Area 5 pursuant to the Relief

Canyon Mine Adaptive Waste Rock Management Plan (Knight Piésold 2016: 2015 Plan Modification Appendix I).

2.1.3.3 Operation of the New Heaps

Conventional heap leach operating procedures similar to the procedures described as stated in the approved plan would be used. Figure 2.1.4 illustrates a generalized cross section of the new heap leach pad loaded to the ultimate 200-foot height. Table 2.1-5 summarizes the basic heap design parameters. The approved Quality Assurance Plan for constructing the new heaps is included in Appendix F of the 2015 Plan Modification.

Table 2.1-5: Heap Leach Facility Design Parameters Summary

Lift Height (feet)	Heap Height[1] (feet)	Crest Elevation (feet amsl)	Capacity (million tons)
20 (nominal) - 40	200	4,980	21

[1]Maximum height above original ground surface.

The approved heap leach facilities have an engineered liner system consisting of a compacted low permeability soil layer overlain by a high density polyethylene (HDPE) liner and leak detection system designed in accordance with the requirements in Nevada Administrative Code (NAC) 445A.432 through 445A.438 to contain leach material and solution. The heap leach pads would be operated as zero-discharge facilities.

Dilute sodium cyanide solution would be applied to the leach material on the pad at a rate of approximately 0.003 gallons per minute (gpm) per square foot. Solution would percolate through the leach material to the slotted pipes placed above the synthetic liner, flowing via pipes in lined ditches to the pregnant solution tank contained on a liner. Sodium cyanide would be added to the barren solution line near the pregnant solution tank using a positive displacement pump. The sodium cyanide storage area would be located near the northeast corner of the pregnant pond in a lined area tied into the pond. In the event of a leak, solutions would drain to the lined pond.

The approved design for the heaps is for ten, 20-foot lifts, for a total heap height of 200 feet. The heap stacking for the Proposed Action would be in lifts of 20 feet nominal thickness and up to 40 feet to allow for operational flexibility and optimization of metal recovery. The total heap height would remain at 200 feet. The overall slope during final regrading and reclamation of the pad would be 3H:1V with the regraded material maintained within containment (Figure 2.1.4).

The heap leach facility is surrounded by an existing diversion ditch that prevents run-on from entering the heap leach and process facilities. Storm water runoff from the heap is maintained within containment and channeled to the lined process ponds.

2.1.4 Crushing Operation

The mined ore would either be crushed prior to being placed on the heap leach pads or placed directly on the pads as run-of-mine ore. (see Figure 2.1.1) Ore that is being crushed would be transported by conveyors from the primary crusher to a screening system and a secondary crusher.

Ore from the stockpile would be fed into the crusher using a loader. The optimal crushing size would depend on the ore type. The crushing facilities would be placed on a synthetic liner in areas where cyanide or other ore processing reagents are used to prevent contact with the underlying soil. The cement for agglomeration would be added downstream of the secondary crusher located just east of the heap facilities. Process solution would be added just after the cement addition point near the head of the overland conveyor in conjunction with the ore agglomeration. The agglomerated ore would be transported by overland and grasshopper conveyors or trucks to the heap leach pad.

2.1.5 Processing

The existing ADR facility in the process plant building would be used for gold recovery. These facilities are designed to process 3,000 gpm of pregnant solution. The process plant building is designed to house the following gold processing and recovery components: carbon-in-column tanks; acid wash facilities; carbon elution; electrowinning cells; carbon regeneration kiln; carbon handling and sizing equipment reagent mixing and storage; a refinery; and a retort.

Authorized gold recovery system components yet to be constructed include carbon stripping, electrowinning cells, a carbon regeneration kiln, a carbon soak tank, a doré furnace, and a mercury abatement system that includes a scrubber and a retort (BLM 2008). Gold Acquisition Corp. has submitted design specifications for the necessary mercury control equipment to the NDEP, Bureau of Air Pollution Control (BAPC) for their review and approval. The Nevada Mercury Control Program requires control of mercury emissions from all thermal units and compliance with Nevada Maximum Achievable Control Technology and Federal Maximum Achievable Control Technology regulatory standards.

The authorized components such as the carbon regeneration kiln, mercury retort, furnace, stripping tank and electrowinning cells require Class I Operating Permit to Construct (OPTC) and Mercury Operating Permit to Construct (MOPTC). The Class I OPTC was submitted on May 14, 2015, and the MOPTC was submitted on November 24, 2014, to the BAPC. Mercury recovered from the mercury emissions control equipment would be disposed of at an off-site authorized mercury storage facility in compliance with the Mercury Export Ban Act of 2008. The Project processing facilities would produce doré that would be shipped off site for further refining. Figure 2.1.5 presents the submitted process flow sheet for these facilities.

2.1.6 Water Supply, Delivery, and Storage

Water from the existing water production wells, PW-1 and PW-2, would continue to be pumped to the fresh water storage tank as shown on Figure 2.1.1 and gravity fed to the plant buildings for distribution for use. The Proposed Action is anticipated to require up to 600 gpm of water year round. It may be necessary to construct up to three new water wells located in Section 17, T27N, R34E, because mining would ultimately mine out the current production well locations. The new wells would produce water from the Cane Spring Formation, the same formation as PW-1 and PW-2.

A potable water system, consisting of a reverse-osmosis water treatment system and 4,500-gallon fiberglass water storage tank, would be located inside the ADR processing plant. Potable water would be supplied in accordance with Nevada Bureau of Safe Drinking Water regulations.

2.1.7 Roads

The mine road layout required for the Proposed Action is shown on Figure 2.1.1, and a typical road cross section is shown on Figure 2.1.6. As shown on Figure 2.1.1, most of the new roads are located between the expanded pit and Waste Rock Storage Area 5.

Project roads would be designed to handle mine construction, maintenance, and operations vehicles. Haul road running surfaces outside of the pit would be approximately 100 feet wide to accommodate haul trucks. Secondary roads would be approximately 30 feet in width. The actual road disturbance width may be wider, depending on topography. Roads would be bermed in accordance with MSHA regulations and best management practices (BMPs) would be used where necessary to control erosion. These activities would be implemented using appropriate BMPs as established by the NDEP and the Nevada Division of Conservation Districts in the Handbook of Best Management Practices, adopted by the State Environmental Commission December 7, 1994. Fugitive dust emissions would be controlled using water or a chemical dust suppressant application (such as magnesium chloride or lignin sulfonate) where appropriate per the Dust Control Plan associated with the Surface Area Disturbance Permit issued by BAPC.

2.1.8 Workforce and Transportation

The total number of people employed during construction would be approximately 50. During the operations phase, this number would increase to approximately 80. Following the cessation of mining, leaching would continue, and reclamation would be ongoing with a reduced workforce of up to 18 people. During closure and reclamation, up to ten people would be on site. It is anticipated the majority of employees would reside in Lovelock, Winnemucca, Imlay, and Fernley with some employees living in Fallon and other areas.

Employees would commute to the mine in their own vehicles from nearby communities via US Interstate 80 (I-80) and Coal Canyon Road. The parking area currently located by the administration building would be expanded to accommodate the anticipated vehicles.

2.1.9 Exploration

BLM has currently authorized nine acres of surface disturbance for exploration drilling activities, road building, and drill sites outside of the pits. The Proposed Action would expand the exploration areas to the areas shown on Figure 2.1.2. The exploration roads shown in Figure 2.1.2 represent the general areas to be explored. Exact locations for the proposed sites and roads would be further refined with geologic mapping and sampling prior to road construction. As shown in Table 1.2-1, the Proposed Action would create 17.5 acres of new surface disturbance.

The proposed activities would consist of standard exploration drilling and may include geophysical surveys, trenching, and bulk sampling. Results of the exploration drilling, could lead to

geotechnical investigations, water exploration, and monitor well installation. Drilling activities may occur during any time of the year as weather conditions at the Project generally make year-round exploration feasible.

In order to verify the surface disturbance, GPS mapping would be conducted at the end of every field season and the resulting disturbance calculations submitted in conjunction with the Annual Reclamation Report provided to NDEP and BLM by April 15 of each subsequent year. This report would also provide the BLM and NDEP with annual documentation of surface disturbance locations and any completed concurrent reclamation as required by Nevada Revised Statute (NRS) 519A and NAC 519A.

The following sections describe general operating procedures, construction techniques, and equipment Gold Acquisition Corp. anticipates using to conduct the proposed exploration activities. These activities would be implemented using the appropriate BMPs established by the NDEP and the Nevada Division of Conservation Districts, 1994, Handbook of Best Management Practices, adopted by the State Environmental Commission December 7, 1994.

2.1.9.1 Exploration Equipment

Table 2.1-6 shows the general types and number of equipment commonly used for exploration activities.

Table 2.1-6: Equipment Associates with Exploration Activities

Equipment	Quantity
Truck-mounted, track-mounted, or articulated buggy-mounted reverse circulation (RC) drill rigs	Up to four
Pad-mounted, truck-mounted, track-mounted, or articulated buggy-mounted core rigs	Up to six
2,000- to 3,500-gallon water trucks	Up to six
All-terrain vehicles	Up to two
Pipe trucks	Up to six
Excavators equipped with a pneumatic hammer if necessary for road construction	Up to two
Caterpillar D7 or D8H bulldozers or equivalent	Up to two
Auxiliary air compressors	Up to six
Portable light plant/generators	Up to six
Portable chemical toilets	Up to six
Portable tanks	Up to six

Drilling supplies would be stored in the existing sample and supply storage area near the plant building and on private land near the pits. A contractor-supplied and maintained chemical toilet would be available at the exploration areas. Fuel stored at this site would be in a lined area with secondary containment sized to hold 110 percent of the largest volume tank.

2.1.9.2 Exploration Roads

Where terrain dictates, 12 feet wide roads would be constructed. Road grades would be kept at ten percent or less where possible, using balanced cut and fill construction. All exploration road

construction would follow appropriate BMPs as established by the NDEP and the Nevada Division of Conservation Districts in the Handbook of Best Management Practices, adopted by the State Environmental Commission December 7, 1994.

Approximately 57,800 feet of road would be constructed for the exploration activities included in the Proposed Action. If the road locations differ substantially from those shown in Figure 2.1.2, Gold Acquisition Corp. would provide a map of the modified road locations prior to construction in order to give BLM and NDEP the opportunity to review the road layout. Road maintenance would be conducted as needed with erosion control features monitored during the spring and fall and after major storm events.

2.1.9.3 Drill Sites

New drill site disturbance would be kept to the minimum necessary for safe access and a safe working area. Drill sites would typically require a working area approximately 100 feet long by 30 feet wide and would avoid drainages. Sediment traps (sumps) would be constructed within the footprint at each drill site to collect drill cuttings and manage drilling fluids.

RC rotary drilling equipment may be used to drill pre-collars for some of the core holes, which would be drilled to test deeper targets. A maximum of eight RC holes may be left open at any time.

Water or nontoxic approved drilling fluids would be utilized during drilling. Water for drilling would be obtained from site production wells. A total of eight people (the drill crew, project geologists, etc.) may be working at any time at a drill site. Drilling activities may occur on a 24-hour per day schedule for some drill rigs.

All refuse generated at a drill site would be disposed of on a daily basis at an authorized landfill consistent with applicable regulations. In the event hazardous or regulated materials such as diesel fuel are spilled, the measures outlined in the Spill Contingency Plan (Appendix G of the 2015 Plan Modification) would be taken to control the spill. The BLM and NDEP would be notified of any reportable spills and all applicable reporting procedures would be followed.

Drill holes would be plugged in accordance with NRS 534, NAC 534.4369, and NAC 534.4371, and guidance from the BLM. In the event ground water is encountered, drill holes would be plugged pursuant to NAC 534.420. No drill holes would be left open at the end of the Project.

If casings are set in a borehole, either the boreholes would be completed as wells and plugged pursuant to NAC 534.420, or the casings would be completely removed from the boreholes and then be plugged pursuant to NAC 534.4369 and NAC 534.4371. The upper portion of the borehole may be permanently cased if the annulus is completely sealed from the casing shoe to the surface pursuant to NAC 534.380.

2.1.9.4 Storm Water Controls

Storm water management measures would include: installing water bars in appropriate locations to control runoff and erosion; using sumps to trap cuttings and manage drilling fluids; installing

silt fences, weed-free straw bales, or other sediment control structures at appropriate locations; having suitable spill control and cleanup equipment and supplies readily available; and implementing concurrent reclamation measures.

2.1.9.5 Trenching

One or more trenches may be constructed to conduct near-surface mapping and sampling. The trenches would be an average of 15 feet wide by 5 feet deep, and up to 100 feet long including the spoil piles. The trenches would be constructed with a ramp to facilitate safe ingress and egress of Project personnel and wildlife. The trenches would be reclaimed at the end of the field season following the year in which they were built. Prior to constructing any trenches, a map of the proposed trench locations would be provided to give BLM and NDEP the opportunity to review and approve the trench locations.

2.1.10 Ancillary Facilities

The ancillary facilities required for the Proposed Action that are already present in the Project Area are listed below:

- Overhead and buried power lines;
- Electrical generators;
- Storm water controls;
- Fuel storage facility;
- Site security;
- Buildings including administration, safety/security, warehouse, and associated parking;
- On-site sewage disposal (septic) systems;
- Class III-waivered landfill in Section 18;
- Communication facilities;
- Monitoring wells;
- Two water production wells;
- Growth media stockpiles;
- Fencing; and
- Laydown yards.

The ancillary facilities that need to be expanded, or added for the Project include the following:

- Additional electrical generators;
- Expanded fuel storage facilities near the process plant;
- Reagent storage facilities
- Analytical laboratory;
- Potable water system;
- Fuel storage, truck shop, truck wash area, ready line, and Petroleum Contaminated Soils (PCS) storage area, in the contractor's yard;
- Additional parking;
- Class III-waivered landfill in Waste Rock Storage Area 5 in Section 17;

- Additional communication facilities;
- Additional or replacement monitoring wells and piezometers;
- New water production wells;
- Additional growth media stockpiles;
- Additional or reconfigured fencing; and
- Additional yard/materials storage area.

2.1.10.1 Power Supply

The site currently receives electrical service from a NV Energy high-voltage (13.2 kilovolt-amps) transmission line. The NV Energy line as currently configured cannot provide sufficient current; therefore, the use of on-site generators is planned. An electrical generator would be installed at the crusher, and two generators in the processing plant area. An emergency generator is currently located at the process plant to maintain solution circulation and emergency operations support in the event of temporary power loss. All on-site generators would be included in the air quality permit for the Project.

2.1.10.2 Reagent, Fuel, and Explosives

Reagents, fuel, and explosives would be transported to the Relief Canyon Mine on trucks from suppliers via I-80 and Coal Canyon Road. Cyanide would arrive at the site as 30 percent strength solution in Nevada Department of Transportation (NDOT)-approved tankers. The solution would be off-loaded in a secure and lined area by certified and trained drivers and would be pumped into the barren tank or barren line. A hand-held hydrogen cyanide gas monitor would be kept in the plant office and calibrated frequently in accordance with MSHA standards. Cyanide solution would be added to the barren solution, which would be recirculated back to the heap to continue the leaching process.

Most reagent tanks would be located outside of the process facilities in secondary containment. The secondary containment would hold 110 percent of the largest volume tank or tanks in series, and if located outside, would have additional capacity to hold the 100-year, 24-hour storm event. The fuel storage area is currently located near the emergency generator in a lined area with secondary containment with 110 percent containment capacity of the largest tank or tank in series. This fuel storage area would be expanded and a new fuel storage area constructed at the contractor's yard with the same specifications.

The floor of the reagent areas would be sealed to prevent spills from entering cracks or permeating the concrete and being released to the environment. Table 2.1-7 presents the reagents that would be used, the approximate volumes of reagents and products generated that would be stored on site, and the number of shipments of reagents to the site and shipments of used products from the site anticipated per year. These estimates may vary depending on the metallurgical conditions encountered during operations. Reagents with similar chemical compositions could be substituted if the need arises. The BLM and NDEP would be notified of any proposed changes for their review and approval.

Table 2.1-7: Fuels, Reagents, Used Products, Volumes, and Shipments

Reagent	Storage	Amount/ Delivery	Anticipated Trucks/ Month	Approximate Consumption per Day
Fuels and Reagents Used				
Sodium cyanide	40 tons	20 tons	9	12,000 pounds (lbs)
Sodium hydroxide	40 tons	20 tons	2	1,950 lbs
Lime	100-ton silo	30 tons	15.5	15.5 tons
Cement	250-ton silo	30 tons	44	44 tons
Off-road Diesel Fuel	2 - 15,000-gallon tanks	6,000 gallons	50	10,000 gallons
Highway Diesel Fuel	2,000-gallon tank	1,800 gallons	1.6	100 gallons
Gasoline	5,000-gallon tank	4,500 gallons	1.7	250 gallons
Automatic Transmission Fluid	500-gallon tank	400 gallons	1.5	20 gallons
Engine Oil	1,000-gallon tank	900 gallons	2.0	60 gallons
Hydraulic Fluid	1,000-gallon tank	900 gallons	1.5	45 gallons
Gear Oil	1,000-gallon tank	900 gallons	1.3	40 gallons
Antifreeze	500-gallon tank	400 gallons	1.1	15 gallons
Ammonium Nitrate	50-ton silo	30 tons	25	50,000 lbs
Ammonium Nitrate Emulsion	45-ton silo	30 tons	5	10,000 lbs
Propane	20,000 gallons	10,000 gallons	4	1,200 gallons
Antiscalent	5 tons	5 tons	0.5	63 lbs
Carbon	5 tons	2 tons	2.6	175 lbs
Borax Flux	2 tons	1 ton	1	66 lbs
Used Products Generated				
Used Oil	2,000-gallon tank	2,000 gallons	2.5	165 gallons
Used Antifreeze	500-gallon tank	500 gallons	0.9	15 gallons

To facilitate collection of spilled fuels, a sump would be located at one end of the containment so spills could be pumped using a portable pump. Other smaller quantities of hydrocarbons and regulated materials would be located at the truck shop, warehouse, and process area. These materials would be kept indoors in proper storage with secondary containment.

Explosive agents would be purchased, transported, stored, and used in accordance with the Bureau of Alcohol, Tobacco, Firearms, and Explosives (BATFE); Department of Homeland Security provisions; MSHA regulations and other applicable federal, state, or local legal requirements. ANFO, ammonium nitrate prill, would be stored in a silo in a secure area, separate from fuel oil or diesel. Explosive agents, boosters, and blasting caps would be stored within a secured area near the pits.

2.1.10.3 Buildings

New Buildings

New buildings required for the Proposed Action include a truck shop, a truck wash facility, and an analytical laboratory. The truck shop includes maintenance bays to support mobile equipment maintenance as well as offices, a lunchroom, locker rooms with showers, and crew meeting rooms. Lubricants and antifreeze would be managed and stored in the area as required by MSHA and other state and federal regulations. Oil totes of different sizes for certain types of oils would be used throughout the shop area. Individual tote capacity would be less than 500 gallons and would have built-in secondary containment or would be stored within secondary containment for larger tanks. Small quantities of solvents, paints, and other materials would be stored at the truck shop and managed according to state and federal regulations.

The truck wash facility would be located adjacent to the truck shop within the contractor's yard. Wash water would be directed to a settling basin where water and solids would be separated. Water would be treated with an oil-water separator and recirculated. Solids collected from the settling basin would be tested and handled as PCS if necessary.

The analytical laboratory would be located near the warehouse as shown on Figure 2.1.1. The laboratory would include separate areas for sample preparation, wet analysis, a metallurgical laboratory, a balance room, and offices. Reagents used in the analytical and metallurgical test procedures would be stored at the laboratory and generally include small quantities of nitric acid, sulfuric acid, hydrochloric acid, hydrofluoric acid, and sodium hydroxide. Cyanide would be used in the lab for hot cyanide tests, which would utilize two sinks: one for acidic solutions and a separate one for basic cyanide solutions. The cyanide solution would drain back to the plant solution and the acid would have its own sump and be buffered before being pumped back into the process loop. Fire assay reagents would generally include litharge, borax, carbon, silica, and sodium carbonate. Small quantities of other reagents may be used periodically.

Existing Buildings

A warehouse, which is located near the process plant building, would continue to be used to store supplies and small equipment.

The mine administration building containing the reception area, offices, a meeting room, and a safety/security area is located near the parking lot as shown on Figure 2.1.1, and would also continue to be used.

All buildings would have hand-held fire extinguishers available in accordance with MSHA regulations and industry standards.

2.1.10.4 Septic System

The on-site sewage disposal (septic) system and leach field are located near the administrative building, process plant, and warehouse. Biosolids would be pumped as necessary by a licensed

sewage waste hauler and transported to a licensed repository. No industrial waste is authorized for disposal in the permitted on-site sewage disposal system.

2.1.10.5 Waste Management

Used lubricants and solvents would be characterized according to the Resource Conservation and Recovery Act (RCRA) requirements and would be stored appropriately. Gold Acquisition Corp. currently holds Conditionally Exempt Small Quantity Generator ID No. NEV 000 083 709, which would be changed to Small Quantity Generator status prior to mine startup. The addition of the on-site fire assay laboratory would likely require a different RCRA status due to the need to dispose of cupels and crucibles. The appropriate RCRA status would be maintained throughout the life of the Project. A waste management plan to identify the wastes generated at the site and their appropriate means of disposal is included in Appendix G of the 2015 Plan Modification. Employees who deal with these wastes would be trained in their proper handling, storage, and emergency procedures relevant to their responsibilities; the firm selected to transport and dispose of these materials would be certified by the EPA, NDOT, and NDEP, as required. It is anticipated transport would occur on a monthly basis.

The hazardous waste storage area would be located next to the truck shop. Hazardous waste would be stored according to state, federal, and local regulations on a covered and sealed concrete pad with secondary containment berms near the truck shop until removal and disposal at an authorized facility.

Used oil and coolant would also be stored in secondary containment. The materials would be either recycled or disposed of in accordance with state, federal, and local regulations. Used coolant and oil would not be mixed. Empty containers would be disposed of or recycled according to federal, state, and local regulations.

The existing Class III-waivered landfill #F444 issued by the NDEP Bureau of Waste Management (BWM), and authorized by the BLM in NVN-064634 would be closed. A new landfill on private land would be integrated into Waste Rock Storage Area 5 (see Figure 2.1.1) following the authorization by NDEP BWM as either a new Class III-waivered facility or an amendment to the existing waiver. The facility would be designed and operated to comply with NAC 444.731 through 444.747. Only non-hazardous wastes would be disposed of in the landfill. The initial landfill trench would be located in the lower level of the waste rock facility where the ground water elevation is approximately 150 feet below the ground surface. The landfill trench would be covered weekly and its location surveyed and documented throughout the operating life of the facility. When the trench reaches capacity, a subsequent trench would be designated for the next landfill location and the same procedure would be followed. The filled landfill would be covered with waste rock material as Waste Rock Storage Area 5 is constructed around and above the filled landfill trench.

Upon completion of all mining, processing, final permanent closure, and reclamation operations at the Project, the final landfill location would be permanently closed by placing and compacting suitable cover material to a minimum uniform depth of 24 inches over the top of the final landfill location. The cover would be graded to allow for proper surface runoff drainage.

2.1.10.6 Ready Line

Haul trucks and other mobile mine equipment would be temporarily staged when not in use at the ready line located at the contractor's yard. The equipment would be parked during shift changes and when required for light maintenance. The area would be lighted for safety and security.

2.1.10.7 Communication Facilities

Communication facilities currently exist at the site, but modifications are planned to add wireless links to the water wells for water level control in the fresh water tank and to the crushing and process systems to monitor flows/tanks, control flows/tank levels, and control process loops. A voice repeater would be added to the existing equipment at the Muttlebury communications site authorized by the BLM right-of-way NVN 083323.

2.1.10.8 Petroleum Contaminated Soil Storage Area

Prior to operation, a PCS management plan, would be developed and submitted for approval by the NDEP and BLM. It is expected that PCS resulting from spills or leaks of hydrocarbons would be removed from the spill site and placed in a lined PCS storage area prior to shipment to an appropriately permitted facility.

2.1.10.9 Monitoring Wells

The ground water monitoring well network required in Water Pollution Control Permit (WPCP) NEV2007105 and approved in the 2008 Plan is in place for the heap leach facilities. These monitoring wells are shown in Figure 2.1.1.

The ground water monitoring program (SWS 2015: Appendix D of the 2015 Plan Amendment) in place for the Project collects information from 17 water monitoring wells and 15 piezometers. The ground water monitoring wells would continue to be monitored according to the requirements of WPCP NEV2007105. Piezometers located in areas slated for mining as part of the Proposed Action would be eliminated and replaced as necessary to continue documenting the elevation of the ground water below the pits and in the vicinity of the mine.

2.1.10.10 Growth Media Stockpiles

Growth media stockpiles would be placed as shown on Figure 2.1.1. These stockpiles would be in place for varying lengths of time, and would be seeded with a BLM-approved seed mixture and protected from run-on and runoff until final placement. BMPs such as silt fences or staked certified weed-free straw bales would be used as necessary to contain sediment resulting from direct precipitation. These BMPs have been established by the NDEP and the Nevada Division of Conservation Districts in their Handbook of Best Management Practices, adopted by the State Environmental Commission December 7, 1994.

2.1.10.11 Fencing

BLM- and Nevada Department of Wildlife (NDOW)-approved barbed wire fencing is in place to minimize the intrusion of livestock, wild horses, and other wildlife into the heap leach processing area. Eight-foot high chain-link fences are in place around the lined ponds. Fencing and/or cattle guards are in appropriate locations as shown on Figure 2.1.1. There is a security gate near the administration building to control access to the processing facilities.

2.1.10.12 Yards

Yards are defined as relatively flat areas that may be used for equipment and supply storage, access, supplies, and buffer areas between facilities. Figure 2.1.1 illustrates the locations of the yards. Table 1.2-1 includes disturbance acres for the yards.

2.1.11 Reclamation

Reclamation of all mine, mineral processing, and exploration components would consist of reshaping or recontouring, placement of growth media, and revegetation with a BLM-approved seed mix. Post-reclamation topography is shown on Figure 2.1.8. Gold Acquisition Corp. would seek a reclamation exemption for the open pit highwalls and benches pursuant to NAC 519A.250 because revegetation of these areas is not possible due to access restrictions and safety concerns.

2.1.11.1 Drill Hole, Monitoring Wells, and Water Well Plugging and Abandonment

Except for the RC rotary holes, which may be drilled as pre-collars for some of the core holes, all drill holes (i.e., boreholes) would be plugged prior to the drill rig moving from the drill site in accordance with NRS 534, NAC 534.4369, and NAC 534.4371. If any drill hole produces artesian flow, the drill hole would be contained pursuant to NRS 534.060 and NAC 534.378 and would be sealed by the method described in Subsection 2 of NAC 534.4371. If casings are set in a drill hole, either the drill hole must be completed as a well and plugged pursuant to NAC 534.420 or the casings would be completely removed from the drill hole and then be plugged according to NAC 534.4369 and NAC 534.4371.

Monitoring wells would be abandoned and reclaimed when no longer needed or during mine closure as required by NAC 534.4365.

Production wells would be plugged and abandoned when no longer needed or following the completion of the mining and closure of the mineral processing facilities according to NAC 534.420.

2.1.11.2 Regrading and Reshaping

With the exception of the open pit, all of the mine and exploration features at the Project would be regraded and reshaped to create slopes with long-term stability. The reclaimed features would be reshaped to blend into the surrounding topography with final landscape forms that mimic the local terrain and minimize angular, man-made appearing features.

Regrading and reshaping of all constructed drill sites and exploration roads would be completed to approximate the original topography. Fill material would be pulled onto the roadbeds to fill the road cuts and restore the slope to natural contours. All drill sumps would be filled and regraded. Water bars constructed for exploration roads may be left in place, particularly on steeper slopes, if their continued presence would serve to reduce the potential for erosion or to prevent the formation of rills.

Should any drainage be disturbed, it would be reshaped to approach the preconstruction contours. The resulting channel would be of the same capacity as up and downstream reaches and would be made non-erosive by use of surface stabilization techniques (rip-rap) where necessary, and ultimately revegetated. Following completion of earthwork, all disturbed areas would be broadcast seeded.

The configuration of the reclaimed waste rock storage areas and the new heap leach facilities is shown on Figures 2.1.3 and 2.1.4, respectively. The old heap leach configuration is shown on Figure 2.1.5.

2.1.11.3 Exploration Reclamation

In order to minimize erosion and sedimentation, interim reclamation measures would be implemented as necessary to stabilize drill roads and sites planned for future use. Sites at which no future work is planned would be reclaimed as soon as practicable.

2.1.11.4 Open Pit Reclamation

Pursuant to NAC 519A.250, a reclamation exemption is being requested for the pit highwalls and benches because revegetation of these areas is not possible due to access restrictions and safety concerns, which prohibit placing plant growth media and reseeding the pit highwall rock faces and benches.

Public safety would be provided for by restricting access to the site by constructing berms or fences or other barricades at strategic locations along the pit ramps to impede entrance. The area would also be properly signed to warn the public of the presence of the open pit.

The 2015 Plan Modification includes backfilling the North and South pits with roughly 80 feet of inert waste rock to achieve final pit bottom elevations in both pits of 5,163 feet amsl, to provide a 20-foot buffer zone above the pre-mining elevation of the ground water table as measured in 1984 in PW-2. This backfilling is being proposed to ensure there would not be a pit lake following mining in the event of similar ground water levels returning in the future.

2.1.11.5 Waste Rock Storage Area 5 Reclamation

Waste Rock Storage Area 5 would be built to facilitate reclamation. Each 50-foot lift would be offset in order to achieve an overall slope of 3H:1V. During final reclamation, the angle of repose bench faces would be resloped to an overall angle of 3H:1V as shown on Figure 2.1.3. The resloped waste rock storage area would then be covered with approximately six inches of growth media and reseeded with the approved seed mixture shown in Table 2.1-8. The planned reclamation of Waste

Rock Storage Area 5 would result in a natural looking, revegetated mound similar to the existing reclaimed waste rock storage areas at the Project.

Table 2.1-8: Approved Reclamation Seed Mixture

Common Name	Species*	Pure Live Seed (PLS) (lbs/acre)	Broadcast Seeding with Harrow (PLS) (lbs/acre)
Sandburg bluegrass	*Poa secunda*	1.0	1.2
Bottlebrush squirreltail	*Elymus elymoides*	2.0	2.4
Shadscale	*Atriplex confertifolia*	3.0	3.6
Four-wing saltbrush	*Atriplex canescens*	3.0	3.6
Nevada Ephedra	*Ephedra nevadense*	3.0	3.6
Total		**12**	**14.4**

** As directed by BLM, seed mixtures may vary during reclamation activities depending on success.*

2.1.11.6 Closure and Reclamation of the New Heaps

A Tentative Plan for Permanent Closure of the new heaps (Cells 6 and 7), as required by NAC 445A.398, is included in WPCP NEV2007105. A Final Plan for Permanent Closure would be prepared and submitted to the NDEP and the BLM two years prior to the anticipated final permanent closure of the heap leach facility operation, as per NAC 445A.447.

As approved, the closure design would entail recontouring by flattening the side slopes to 3H:1V or less by dozing the crest of the slope toward the toe of the slope. The spent heap leach ore would be recontoured so that the toe of the reclaimed slope lies within the extent of the pad liner, thereby covering the perimeter solution conveyance ditches, while not pushing the material off containment. A two-layer cover system consisting of a 12-inch layer of transition zone material (waste rock) overlain by a 12-inch layer of growth media cover (overburden) would be placed so the cover extends beyond the perimeter collection ditches and toes, out beyond the edge of the synthetic liner. The slopes and tops of the heaps, once covered with growth media, would be scarified. Growth media for the new heaps would be obtained from materials salvaged during construction of the heap leach pads and alluvium and overburden mined and salvaged from the expanded pits.

The recontoured heap would be revegetated with the seed mixture shown in Table 2.1-8. Seeding would occur in the fall or winter when water retention is highest in the grown media. See would be harrowed into the soil to a depth of approximately 0.25 inch. The plants on the heap would promote evapotranspiration (ET), which would reduce infiltration of meteoric water into the heap, thus minimizing the draindown solution and steady-state seepage that would report to the ET cells during closure. Operational monitoring data for draindown flows and chemistry would be used to confirm modeled flows and submitted as part of the Final Plan for Permanent Closure at least two years prior to the closure of the heap leach facility.

The general intent of solution management/fluid stabilization for Cells 6 and 7 is to evaporate as much draindown solution as possible, and as quickly as possible, in order to reduce both the volume and rate of solution draindown requiring long-term management and to facilitate closure and reclamation.

Draindown of the heaps would be considered complete when the depth of the solution in the process ponds is not greater than approximately one foot. At this point, the surface solution distribution piping would be removed and a steady-state heap draindown rate would be managed without pumping solution back to the heap for active evaporation.

The HLDE model for the 200-foot high heaps shows that evaporation is predicted to exceed draindown 15 months after heap closure begins, at which point the process ponds would be converted into ET cells to manage the residual draindown. This model considers the following factors: the physical conditions at the Project; the meteoric history; the anticipated evaporation; and the methods of evaporation of solutions. Seepage from the heap would be routed to the ET cells to manage remaining draindown solution and meteoric water that infiltrates through the reclaimed and revegetated heap.

Gold Acquisition Corp. recently provided BLM and NDEP with a report entitled "Technical Specifications and Operating Plans" prepared by Welsh Hagen (2015) that describes how the process ponds would be converted into the ET cells. The ET cells would be monitored for at least ten years to verify they are functioning as designed. Periodic maintenance would be performed as required.

2.1.11.7 Closure and Reclamation of the Old Heaps

Under the Proposed Action, Gold Acquisition Corp. proposes to modify the approved closure plan and close and reclaim Cells 1 through 4 in situ by placing overburden and waste rock to cover the top and side slopes of these heaps to reduce infiltration of meteoric water into the heaps. The currently approved closure plan for the old heaps (Cells 1 through 4) involves placing the previously leached ore on the new pads, re-leaching this material, and reclaiming the re-leached material on the new pads.

The old heaps have been in place since the late 1980s and are stable with side slopes that vary from steeper than 1.5H:1V to flatter than 3H:1V. In order to provide greater long-term stability, the steeper side slopes would be regraded to achieve flatter slopes within the boundary of the underlying containment, or a wedge of waste rock cover material would be placed adjacent to the steeper side slopes to locally buttress the steeper areas of the old heaps to achieve an overall slope configuration of 3H:1V. Figure 2.1.7 shows a typical cross section of the post-reclamation topography for the old, covered heaps.

Preliminary cover design modeling for a typical ET cover for the old heaps was performed (Knight Piésold 2014b). This modeling effort revealed the heap cover should be comprised of two layers. A 12-inch top layer consisting of growth media and a 12-inch thick layer of transition zone material on the bottom was recommended from the model. Waste rock from the pit would be used for the transition material layer. There would be a minimum of 12 inches of transition zone material on the heap; however, a thicker wedge of transition zone material would be used along the side slopes of the heaps in order to achieve the desired 3H:1V reclaimed slope configuration. Some slopes are currently steeper than 3H:1V. A 12-inch thick layer of overburden material would be mined from

the pit as the growth media layer. This same type of material was successfully used by previous operators to reclaim Waste Rock Storage Areas 1 through 4.

Following placement of the cover on Cells 1-4, and revegetation using the approved seed mix (Table 2.1-8). Any residual draindown occurring from Cells 1-4 would be routed to the process ponds. At final closure of the Project, the process ponds would be converted into a passive ET cell system.

2.1.11.8 Growth Media

Soils, alluvium, and overburden capable of serving as growth media would be salvaged and stockpiled during construction of the expanded facilities. The locations of the growth media stockpiles are shown on Figure 2.1.1. Growth media salvaged during construction of the exploration roads and drill pads would be stored in the fill slope adjacent to the roads. Amendments are not considered necessary in those areas where sufficient growth media are available. The site-wide growth media salvage goal would be to collect a sufficient quantity of growth media to cover the reclaimed waste rock storage areas and heap leach area with a minimum of 12 inches of growth media.

2.1.11.9 Revegetation

The existing facilities and the expanded facilities associated with the Proposed Action would be revegetated following regrading and recontouring. The approved seed mix shown in Table 2.1-8 for the Project includes drought tolerant species. Seed mixtures would be certified weed-free and seeds would be tested for purity, and percent live seed prior to use.

The revegetation plan is designed to return disturbed areas to conditions similar to the existing dominant vegetation community. Revegetation of the reclaimed features would be performed with the goals of stabilizing mine features, reducing runoff and erosion, providing forage for wildlife and livestock, controlling invasive weeds, and reducing visual impacts.

An appropriate fast growing seed mixture would be used for interim reclamation of the growth media stockpiles and cut and fill slopes located along roads and operation yards. Interim reclamation efforts would emphasize erosion control, weed management, and sustaining soil productivity. The cut and fill slopes for the exploration roads would not typically be revegetated unless the road is needed for several years in which case some of the steeper fills would be stabilized by spreading mulch or revegetating the fill on an interim basis.

Seedbed preparation and seeding would take place in the fall after regrading of disturbed areas. All reclaimed areas would be broadcast seeded with a cyclone-type bucket spreader or a mechanical blower. Broadcast seed would be covered by harrowing, raking, or other site-specific appropriate methods as necessary to provide seed cover and enhance germination. Reclaimed surfaces would be left in a textured or rough condition (small humps, pits, etc.) to enhance moisture retention and revegetative success while minimizing erosion potential. No additional mulching is planned.

Removal or Stabilization of Building, Structures, and Support Facilities

Facility and building decommissioning, site demolition and equipment, and material salvage would be accomplished as follows:

- Mine facilities, conveyors, crushers, offices, shops and other infrastructure would be demolished (disassembled), removed (salvaged), or hauled to solid or hazardous waste landfills, as appropriate.

- Decommissioning of equipment which has had contact with cyanide solution and process ponds would be salvaged/recycled for use at another authorized facility, closed *in situ* (and remain on containment), or disposed of offsite as hazardous waste at an appropriate authorized facility.

- Equipment, tanks, and ponds in contact with acid, hydrocarbon, petroleum-based solutions, cyanide solutions, etc. would be properly rinsed, while on containment, prior to disposal off-site or in the on-site landfill.

- Following decontamination, demolition, and salvage of facilities, soil and fill materials would be visually inspected for spills and sampled as necessary to determine the type and extent of contamination. If present and based on the type and extent of contamination, remediation plans would be developed for agency review and approval. Material that could not be treated *in situ* would be excavated and disposed of in an off-site solid or hazardous waste landfill, as appropriate.

- Concrete foundations, culverts and pipelines and other non-reactive, non-combustive, non-corrosive, and non-hazardous demolition waste would be broken up and placed in Waste Rock Storage Area 5.

- Reagents and explosives would be removed and appropriately disposed of.

- Surface pipelines would be buried in place, removed or salvaged and disposed of appropriately. Pipelines located more than 3 feet below the ground surface would have their openings plugged with concrete or other suitable materials and left in place.

- The NV Energy overhead power line would remain in place because it continues to the south, beyond the Project Area, and supplies power to the nearby Nevada Iron property and other minor users. The on-site generators would be removed once power is no longer needed during closure and reclamation activities.

2.1.11.10 Road and Fence Reclamation

The main access road that provides access from the heap leach facilities and the open pits would remain open to provide continued access to the private lands but would be reclaimed to a 20-foot wide running surface. Other Project roads that do not provide access to private lands and that do not have a defined post-mining use would be reclaimed when they are no longer needed. Roads

required for access to monitoring points would remain open until monitoring is no longer required at which time these roads would be reclaimed. Pursuant to NAC 519A.250, reclamation of in-pit haul roads is not proposed. To provide for public safety, the pit access roads would be blocked with rock or earth berms.

The roads that would be closed and reclaimed would be ripped to reduce compaction. Roads with major cut or fill would be graded to blend into the surrounding topography and to generally reestablish the existing drainage patterns. Growth media would be removed from the windrowed or regular growth media stockpiles and redistributed on the ripped and regraded roads. Erosion control features would be implemented as appropriate on roads to be reclaimed. Reclaimed roads that could experience continued unauthorized use after reclamation would be blocked with earth or rock berms to eliminate vehicle access.

As determined by the BLM, roads on public lands suitable for public access or which continue to provide public access consistent with BLM land management objectives would not be closed. As directed by the BLM, some roads that remain open may be partially reclaimed to reduce the width of the road. The access road to the Project from the Coal Canyon Road would continue to be used for monitoring and other purposes. Project fences would be removed at the end of the Project, unless the BLM directs leaving some fences in place.

2.1.11.11 Concurrent and Interim Reclamation

Reclamation would be performed concurrently in areas no longer needed for mineral exploration or development. Interim reclamation would be implemented on lands disturbed during the course of mining or exploration that would not be redisturbed for a prolonged period but are anticipated to be needed for future mining or exploration. Interim reclamation would be performed on such lands to reduce erosion and sedimentation from disturbed soils. The surface of these areas would be scarified and the approved seed mixture shown in Table 2.1-8 would be applied. As described in the Weed Management Plan, herbicide would be applied as necessary to areas reclaimed on an interim basis to control noxious weed species proliferation (Appendix H: 2015 Plan Modification).

2.1.11.12 Post Closure Management

Post-closure management would extend until the reclamation of the site or component has been accepted by the BLM and NDEP. A minimum ten-year post-closure management period is assumed, following completion of reclamation construction on any site. For sites reclaimed early in the operations, management of the reclaimed sites would occur concurrently with operational site management. Annual reports showing reclamation progress would be submitted to the BLM and NDEP as required by the WPCP and Nevada Reclamation Permit.

2.1.11.13 Post-Reclamation Monitoring and Maintenance

Following completion of the closure and reclamation activities, monitoring and maintenance activities would occur as necessary to satisfy performance guidelines. Maintenance activities may include one or more of the following:

- Sediment removal from the diversion ditch uphill of the heap leach facilities as necessary to maintain its capacity for the 100-year, 24-hour storm event;

- Erosion control BMPs would be maintained or removed when no longer needed. These activities would be implemented following the Nevada Division of Conservation Districts Handbook of Best Management Practices, adopted by the State Environmental Commission December 7, 1994;

- Diverting surface water to promote attainment of reclamation standards;

- Stabilization of rills, gullies, other erosion features or slope failures that have exposed mine waste;

- Noxious weed control;

- Reseeding or reapplication of reclamation treatments that would occur in areas where it has been determined through monitoring and agency consultation that reclamation has not yet met reclamation standards; and

- Temporary storm water control structures and BMPs would be constructed and installed as needed until perennial vegetation is reestablished.

2.1.11.14 Proposed Reclamation Schedule

Table 2.1-9 shows the estimated schedule of Project-related disturbance and reclamation and closure activities. When exploration or mining activities have concluded in all or portions of a facility such as exploration roads no longer needed, reclamation activities would be scheduled to occur as soon as practical and safe. Interim reclamation would be performed on areas needed for future use, to minimize erosion and sedimentation. Post-closure monitoring would be performed to meet BLM and NDEP requirements. The post-closure monitoring period would last until the BLM and NDEP agree that post-closure monitoring is no longer required.

2.1.12 Applicant-Committed Environmental Protection Measures

The following Applicant-Committed Environmental Protection Measures (EPMs) are proposed and are consistent with the general requirements established in the BLM's Surface Management Regulations at 43 CFR 3809 and the Bureau of Mining Regulation and Reclamation (BMRR) mining reclamation regulations, as well as water, air quality, and other environmental protection regulations and guidelines.

Table 2.1-9: Reclamation Schedule

	2015	2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027		2028	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	1st	2nd	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	nd
Mining																											
Heap Leaching																											
Earthworks Reclamation																											
Process Fluid Stabilization																											
Structural Reclamation																											
Fence Removal																											
Ground Water Monitoring																											
Final Reclamation																											
Post-Closure Monitoring*																											

*The post-closure monitoring period would last until the BLM and NDEP agree that post-closure monitoring is no longer required.

Air Quality

- The Relief Canyon Mine is operated in compliance with the Class II Air Quality Operating Permit No. AP1041-2441.01 issued by the NDEP BAPC for the Project. Air emissions, including point and fugitive sources, would be controlled in accordance with the air quality operating permits obtained for the Project and would be controlled in accordance with BMPs. These activities would be implemented using the appropriate BMPs.

- The following practices would be used for the control of fugitive dust from mining activities and exhaust emissions:

    - Use dust abatement techniques on unpaved, unvegetated surfaces;
    - Conduct regular maintenance on equipment to ensure proper function;
    - Post and enforce speed limits;
    - Comply with NDEP BAPC Air Quality Operating Permits; and
    - Use dust abatement techniques before and during surface clearing activities by enforcing a Dust Control Plan.

Cultural and Paleontological Resources

- Pursuant to 43 CFR 10.4(g), the BLM-authorized officer would be notified, by telephone, and with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR 10.2). Further pursuant to 43 CFR 10.4, all activities in the vicinity would immediately stop and not recommence until a notice to proceed is issued by the BLM-authorized officer.

- All field personnel would be informed of the Archaeological Resources Protection Act of 1979 (ARPA) and the Native American Graves Protection and Repatriation Act of 1990 (Public Law [P.L.] 101-601) (NAGPRA) responsibilities and their associated penalties. Policies would be established to protect cultural resources and minimize the potential for inadvertent impacts to sites.

- Any scientifically important paleontological deposits would not be knowingly disturbed, altered, injured, or destroyed. In the event that previously undiscovered paleontological resources are discovered in the performance of any surface disturbing activities, the item(s) or condition(s) would be left intact and immediately brought to the attention of the BLM-authorized officer. If significant paleontological resources are found, avoidance, recordation, and/or data recovery would be required.

- Any cultural resource discovered during the course of activities on federal land would be immediately reported to the authorized officer by telephone, with written confirmation. The permit holder would suspend all operations in the immediate area of such discovery and protect it until an evaluation of the discovery can be made by the authorized officer. This evaluation would determine the significance of the discovery and what mitigation measures are necessary to allow activities to proceed. The proponent would be responsible for the cost of evaluation and mitigation. Operations would resume only upon written authorization to proceed from the authorized officer.

Fire Management

- All applicable local, state, and federal fire laws and regulations would be complied with and all reasonable measures would be taken to prevent and suppress fires in the Project Area.

- All equipment used in the Proposed Action drilling efforts would be properly muffled and equipped with suitable and necessary fire suppression equipment, such as fire extinguishers and hand tools.

- In the event the proposed Project activities start or cause a wildland fire, the proponent would be responsible for all the costs associated with the suppression. The following precautionary measures would be taken to prevent and report wildland fires:

    - All vehicles would carry fire extinguishers and a minimum of ten gallons of water;

    - Adequate fire-fighting equipment (i.e., shovel, Pulaski, extinguishers);

    - Vehicle catalytic converters would be inspected often and cleaned of brush and grass debris;

    - Welding operations would be conducted in an area free from or mostly free from vegetation; and

    - Wildland fires would be reported immediately to the BLM Central Nevada Interagency Dispatch Center at (775) 623-3444. To the extent known 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.

Geotechnical Monitoring

- Geotechnical monitoring, consisting of geologic structure mapping, ground water monitoring, and slope stability analyses, would be conducted during active mining to assist in optimizing the final pit designs. Slope movement monitoring also would be conducted to evaluate the safety of the pit high walls. Operational procedures for controlling blasting and bench scaling would facilitate the mining of stable pit walls.

Hazardous or Solid Wastes

- Construction, operation, and maintenance activities would comply with applicable federal, state, and local laws and regulations regarding the use of hazardous substances and the protection of air and water quality.

- Hazardous wastes would be stored in an area with secondary containment in appropriate containers, dumpsters, or barrels which would be clearly labeled. Storage containers would

be in good repair with no defects and suitable for off-site shipment under NDOT requirements.

- Hazardous wastes would be shipped to an approved location by a certified vendor in accordance with RCRA requirements.

- The spill contingency measures outlined in the Spill Contingency Plan (Appendix G of the 2015 Plan Modification) would be followed. Measures would include spill response, cleanup, and reporting procedures.

- Employee training would include appropriate landfill disposal practices and instruction on the types of solid wastes that can be placed in the landfill, and wastes that are prohibited from being disposed of in the landfill. Used solvent, liquids drained from aerosol cans, accumulations of mercury fluorescent lights and used antifreeze would be accumulated, labeled, and disposed of in compliance with applicable state and federal regulations. A sign would be posted at the new landfill to be developed in conjunction with Waste Rock Storage Area 5 that outlines appropriate disposal practices and lists materials that must not be disposed of in the landfill.

Night Skies

- Buildings, active mining areas, active dump points, and the process area would use artificial lighting at night to allow for safe and efficient operations and to comply with MSHA illumination requirements. The following measures would be applied to reduce impacts from lighting to the night sky and to protect visual resources:

    - 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.

    - The use of dimmers, timers, and motion sensors would be installed where appropriate.

    - Fugitive dust would be minimized in order to reduce “sky glow,” by reducing the light reflectance from the dust particles.

Noxious Weeds, Invasive and Non-native Species

- Heavy equipment moving in to the Project Area would be cleaned with high pressure water or air to remove any weed seeds prior to moving onto the site.

- Certified weed-free seed would be used for reclamation seeding.

- Reclamation and active areas are monitored for infestations of noxious weeds and invasive species.

- A Noxious Weed Monitoring and Control Plan (Appendix H of the 2015 Plan Modification) would be prepared and implemented. Management strategies would include

prevention (i.e., monitoring of new weed infestations, and awareness and education), implementation of planting practices (practices that reduce the potential for weed establishment), and treatment (i.e., mechanical treatment, prescribed burning, chemical treatment, and biological treatment). The results from annual monitoring and treatment would be reported to the BLM and serve as the basis for updating the plan and developing ongoing annual treatment programs.

Protection of Survey Monuments

- All survey monuments, witness corners, reference monuments, bearing trees, and line trees would be protected against destruction, obliteration, or damage. Public land survey system monuments would be protected and preserved in accordance with Nevada BLM Instruction Memorandum (IM) No. NV-2007-003. If, in the course of operations, any monuments, corners, or accessories are destroyed, coordination with the BLM would occur.

- Registered monuments that would be covered or destroyed in the normal course of events by the implementation of the 2015 Plan Modification would be replaced by the proponent at the completion of operations, using GPS technology.

Public Safety

- Public safety would be maintained throughout the life of the Project by excluding unauthorized access to the mining areas through fencing, security, and traffic-control measures.

- Personnel would be on site 24 hours per day, seven days per week.

- All vehicles would be driven at a prudent speed appropriate for the steepness of the road, weather conditions, and other factors to enhance public safety, protect wildlife and livestock, and minimize dust emissions.

- All equipment and other facilities would be maintained in a safe and orderly manner.

- All trenches, sumps, and other small excavations that pose a hazard or nuisance to the public, wildlife, or livestock would be adequately fenced to preclude access.

- Post-mining configuration of access roads would be established in coordination with the BLM and NDEP with a focus on public safety.

Range Management

- A stock watering trough outside of the mine area would be provided to attract cattle away from the mining operation.

Special Status Species

- In order to avoid or minimize impacts to Lahontan beardtongue (*Penstemon palmeri* var. *macranthus*), occurrences would be flagged by a qualified biologist concurrently with the migratory bird clearance survey. Disturbing individual plants would be avoided wherever possible. If impacts to the plants are not avoidable, the affected plants would be transplanted outside of disturbance areas.

- In order to avoid or minimize impacts to sand cholla (*Corynopuntia pulchella*), Disturbing individual plants would be avoided wherever possible. If avoidance is not possible, the sand cholla would be transplanted to an area within or adjacent to the Project Area that supports the habitat requirements of the species. Cholla stems would be cut at a joint or node and stored in temporary plant storage sites, where they would be allowed to harden for a period of two weeks prior to transplanting.

- If surface disturbance would occur during the breeding season (March 1 through August 31) in Packard Flat, clearance-level surveys for the western burrowing owl would be performed. Surveys would be conducted no more than ten days and no less than three days prior to initiation of disturbance. Surveys must follow established BLM standards and protocols, and should be approved by the BLM biologist prior to being implemented. If active burrows are located, BLM and NDOW would be consulted to determine an appropriate buffer to be maintained around the burrows to prevent destruction or disturbance of burrows until the birds are no longer present.

Vegetation

- Revegetation of disturbance areas would be conducted as soon as practicable to reduce the potential for wind and water erosion, minimize impacts to soils and vegetation, help prevent the spread of invasive and nonnative species in disturbance areas, and facilitate post-mining land uses. Concurrent reclamation would be conducted to the extent practical to accelerate revegetation of disturbance areas. Sediment and erosion control measures and revegetated areas would be inspected periodically to ensure long-term erosion control and successful reclamation.

- Any seed mixes and mulches used for reclamation would be certified weed free.

Water Resources and Erosion Protection

- BMPs would be designed in response to site-specific conditions to minimize erosion and to control sediment runoff. These activities would be implemented using the BMPs established by the NDEP and Nevada Division of Conservation Districts in the Handbook of Best Management Practices, adopted by the State Environmental Commission December 7, 1994. Revegetation of disturbed areas would reduce the potential for wind and water erosion.

- Sediment control structures and water diversions would be used where necessary to control run-on and runoff, and to prevent unnecessary or undue degradation. Examples of sediment control structures that could be used include, but would not be limited to, fabric and/or straw bale (certified weed-free) filter fences, siltation or filter berms, mud pits, and downgradient drainage channels. Sediment sumps would be constructed at each drill site to settle and contain drill cuttings. The proponent would return all roads to their original condition.

- Potential impacts to ground water would be limited by plugging surface drill holes per NRS 534, NAC 534.4369, and NAC 534.4371.

- Only approved fluids would be used in the drilling process.

- In compliance with WPCP NEV2007105, all process components have been designed and would be constructed and operated in accordance with NAC 445A. The process facilities are designed, built, and managed to result in zero discharge. The heap leach pad facilities have an engineered liner system consisting of a compacted low-permeability soil layer overlain by an HDPE liner and leak detection systems in accordance with NAC 445A design criteria.

Wildlife

- Land clearing or other surface disturbance associated with the activities within the Project Area would be conducted outside of the avian breeding season, whenever feasible, to avoid potential destruction of active bird nests or young birds in the area. When surface disturbance must be created during the avian breeding season (March 1 through August 31), a qualified biologist would survey the area prior to land clearing activities in accordance with current BLM protocols. Surveys would be conducted no more than 14 days and no less than 3 days prior to initiation of disturbance. If the vegetation has been fully cleared from the work area within the 14-day clearance survey time frame, no additional clearance survey would be required for the disturbed area. If active nests are located, or if other evidence of nesting (i.e., mated pairs, territorial defense, carrying nesting material, transporting of food) is observed, a protective buffer (the size depending on the habitat requirements of the species and location of the nest) would be delineated after consultation with the BLM resource specialist and the entire area avoided, preventing destruction or disturbance to nests until birds are no longer actively breeding or rearing young, or until the young have fledged.

- Mortality information would be collected in accordance with the NDOW Industrial Artificial Pond Permit. Wildlife protection policies would be established that would prohibit the feeding or harassment, or hunting of wildlife.

- As part of the existing monitoring plan for wildlife, the top of the heap leach pad (s) would be operated to minimize pooling of cyanide solution and monitored daily. If any ponding is found on the surface, the cause would be determined and measures taken to eliminate

the solution accumulation. Measures could include solution delivery system repair, adjustment of solution application rates, and ripping of the heap leach pad surface.

- The process ponds would be fenced to exclude wildlife and covered with netting to prevent birds from coming into contact with the process solutions in the ponds.

- Wildlife mortalities would be reported in accordance with the NDOW Industrial Artificial Pond Permit.

2.2 Alternatives to the Proposed Action

The analysis of alternatives in this EA is based on the following criteria: a) public or agency concern; b) technical feasibility; c) potential to reduce an environmental impact of the Proposed Action; d) ability to meet the purpose of and need for the Proposed Action; and e) compliance with regulatory and legal guidance (i.e., Mining and Mineral Policy Act of 1970).

The following section of the EA discusses alternatives to the Proposed Action and identifies one alternative, the No Action Alternative, to be analyzed in the remainder of the EA, in addition to the Proposed Action.

2.2.1 No Action Alternative

Under the No Action Alternative, exploration drilling program would continue, mining and heap leaching activities could continue on previously authorized surface disturbance. Following the completion of these activities, the closure and reclamation of the Relief Canyon exploration, mine, and heap leach facilities would take place.

2.2.2 Alternatives Considered but Eliminated from Further Analysis

2.2.2.1 Alternative Waste Rock Dump on Land Administered by the BLM

Under this alternative the waste rock dump would be located on land administered by the BLM instead of on private land. This scenario would not have any environmental advantage because the haul time and distances would be longer than the Proposed Action resulting in an increase in the air emissions. This alternative would also disturb more public land. This alternative has been eliminated from detailed consideration.

2.2.2.2 No Pit Backfill Alternative

Under this alternative there would be no pit backfill. This alternative would result in larger waste rock dumps, increased emissions due to longer haul times and routes, a greater disturbance footprint, and an increased potential for a pit lake. This alternative has been eliminated from detailed consideration because there would be no environmental advantage.

3 THE AFFECTED ENVIRONMENT

The BLM is required to consider specific elements of the human environment that are subject to requirements specified in statute or regulation or by executive order. Table 3.0-1 below outlines the Supplemental Authority elements that must be considered in all environmental analyses, as well as additional resources deemed necessary for evaluation by the BLM (Table 3.0-2).

Table 3.0-1: List of Supplemental Authority Elements Considered for Analysis

Supplemental Authority	Not[1] Present	Present/ Not Affected	Present/May be Affected[2]	Rationale/Reference Section
Air Quality			X	See Sections 3.1 and 4.1.
Area of Critical Environmental Concern	X			This element is not present within the Project Area or vicinity and is not further analyzed in this EA.
Cultural Resources		X		See Sections 3.2 and 4.2.
Environmental Justice	X			Based on a review of existing baseline data, no minority or low-income groups would be disproportionately affected by health or environmental effects as a result of implementation of the Proposed Action. This element is not present within the Project Area or vicinity and is not further analyzed in this EA.
Farmlands (Prime or Unique)	X			This element is not present within the Project Area or vicinity and is not further analyzed in this EA.
Floodplains	X			This element is not present within the Project Area or vicinity and is not further analyzed in this EA.
Migratory Birds			X	See Sections 3.4 and 4.4.
Native American Concerns		X		See Sections 3.5 and 4.5.
Noxious Weeds, Invasive Non-native Species			X	See Sections 3.3 and 4.3.
Threatened or Endangered Species	X			This element is not present but is discussed further in Section 3.13 (Special Status Species).
Wastes-Hazardous/Solid		X		See Sections 3.6 and 4.6.
Water Quality – Surface and Ground			X	Surface water is not present within the Project Area or vicinity and is not further analyzed in this EA. Ground water is present. Sections 3.7 and 4.7 discuss hydrology and Section 3.8 and 4.8 discuss geochemistry in relation to ground water quality.
Wetlands and Riparian Zones	X			This element is not present within the Project Area or vicinity and is not further analyzed in this EA.
Wild and Scenic Rivers	X			This element is not present within the Project Area or vicinity and is not further analyzed in this EA.

Supplemental Authority	Not[1] Present	Present/ Not Affected	Present/May be Affected[2]	Rationale/Reference Section
Wilderness	X			This element is not present within the Project Area or vicinity and is not further analyzed in this EA.

[1]A Supplemental Authority element determined to be "Not Present" or "Present/Not Affected" is not carried forward for further analysis or discussed further in the EA.
[2]A Supplemental Authority element determined to be "Present/May be Affected" is carried forward for further analysis and discussion in the EA.

Table 3.0-2: Resources or Uses Other Than Supplemental Authorities

Additional Affected Resources	Not Present	Present/ Not Affected	Present/ May be Affected	Rationale/Reference Section
Geology and Mineral Resources			X	See Sections 3.8 and 4.8. Geochemistry is discussed in these sections.
Lands and Realty		X		No ROWs or realty resources are anticipated to be affected by the Project and is not further analyzed in this EA.
Lands with Wilderness Characteristics	X			The Relief Canyon Project Area is located in wilderness characteristics inventory unit NV-020-418. Wilderness characteristics for this unit was reviewed. Historical inventories had determined this area did not qualify for further inventory and should be dropped from the wilderness review process. An updated inventory was conducted for this unit in 2013, which concluded the area does not meet the criteria for Lands with Wilderness Characteristics. No further analysis is recommended.
Noise		X		Noise levels would be similar to current levels but would last throughout the life of the mine and through reclamation (see Chapter 2). This element is not expected to be an issue for this Project and is not further analyzed in this EA.

Additional Affected Resources	Not Present	Present/ Not Affected	Present/ May be Affected	Rationale/Reference Section
Paleontological Resources	X			Paleontological resource data analyzed for the Proposed Action include the Potential Fossil Yield Classification (PFYC) system and known fossil localities in the project vicinity. The Project Area contains Quaternary Age or younger alluvium (PFYC Class 3- Moderate or Unknown Potential) and Jurassic-Triassic mudstone, siltstone, sandstone, sparse volcanic, and carbonate rock associated with the Prida Formation (PFYC Class 4a- High Potential). No known fossil locations are within one mile of the project area, and while sections of the Prida Formation to the northeast contain known fossil localities, recent geologic analysis of the Relief Canyon Mine concluded this area of the formation is lithologically different (Fifarek et al. 2014). Due to the extensive deformation events within the Project Area, the PFYC rating is Class 2 (Low Potential). Per BLM Instructional Memorandum 2009-011; therefore, no further environmental analysis is necessary.
Public Safety, Transportation, and Access			X	See Sections 3.9 and 4.9.
Rangeland Management			X	See Sections 3.11 and 4.11.
Recreation	X			This resource is not present within the Project Area. No access to recreation areas would be impacted; therefore, recreation is not further analyzed in this EA.
Social Values and Economics			X	See Sections 3.10 and 4.10.
Soils			X	See Sections 3.12 and 4.12.
Special Status Species (Plants and Wildlife)			X	See Sections 3.13 and 4.13.
Vegetation			X	See Sections 3.14 and 4.14.
Visual Resources		X		The major VRM classification for the area is Class IV where the level of change to the characteristic landscape can be high. A small portion (7.7 acres) of the pit expansion is classified as VRM II; however, there is already an open pit in Class IV adjacent to this VRM II classification. The visual aspects of form, line, color, and texture would be similar to the existing conditions. In addition, the EPMs in 2.1.12 ensure diminished impacts from lighting to night skies; therefore, visual resources are not further analyzed in this EA.
Water Quantity			X	This resource is discussed in Sections 3.7 and 4.7.
Wild Horses and Burros	X			This resource is not present within the Project Area or vicinity and is not further analyzed in this EA.
Wildlife (General)			X	See Sections 3.15 and 4.15.

Supplemental Authorities

3.1 Air Quality

3.1.1 Regulatory Framework

Ambient air quality and the emission of air pollutants are regulated under both federal and state laws and regulations. The Federal Clean Air Act (FCAA), and the subsequent Clean Air Act Amendments of 1990 (CAAA), require the United States (U.S.) EPA to set National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. The FCAA and the CAAA establish NAAQS for six pollutants, known as criteria pollutants because the ambient standards set for these pollutants satisfy the human health-based and/or environmentally based criteria (scientific based guidelines) specified in the FCAA. The criteria pollutants and their currently applicable NAAQS set by the EPA are listed in Table 3.1-1. The most recent revisions include amendments to standards for the following pollutants (dates represent publication in the Federal Register [FR]): particulate matter less than ten microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) (EPA 2013); ozone (O_3) (EPA 2008a); lead (Pb) (EPA 2008b); nitrogen dioxide (NO_2) (EPA 2010a); sulfur dioxide (SO_2) (EPA 2010b); and carbon monoxide (CO) (EPA 2011). All updated standards are effective in all states on the "effective" dates noted in the FR.

The attainment status with the NAAQS is achieved when the existing background concentrations for criteria air pollutants are less than the minimum allowable ambient concentrations defined in the NAAQS.

NAC 445B.22097 sets the Nevada Ambient Air Quality Standards (Nevada AAQS). These standards of quality for ambient air are minimum goals, and are intended to protect the existing quality of the Nevada's air to the extent that is economically and technically feasible. The criteria pollutants and their currently applicable Nevada Standards are listed in the Table 3.1-2.

Table 3.1-1: National Ambient Air Quality Standards for Criteria Pollutants*

Pollutant [final rule cite]		Standards (Primary/Secondary)	Averaging Time	Level[1]
Carbon Monoxide (CO) [76 FR 54294, Aug 31, 2011]		primary	8-hour	9 ppm (10 mg/m^3)
			1-hour	35 ppm (40 mg/m^3)
Lead (Pb) [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3-month average	0.15 µg/m^3
Nitrogen Dioxide (NO_2) [75 FR 6474, Feb 9, 2010]		primary	1-hour	100 ppb (188 µg/m^3)
		primary and secondary	Annual	53 ppb (100 µg/m^3)
Ozone (O_3) [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm (150 µg/m^3)
Particulate Matter [Dec 14, 2012]	$PM_{2.5}$	primary	Annual	12 µg/m^3
		secondary	Annual	15 µg/m^3
		primary and secondary	24-hour	35 µg/m^3
	PM_{10}	primary and secondary	24-hour	150 µg/m^3
Sulfur Dioxide (SO_2) [75 FR 35520, Jun 22, 2010]		primary	1-hour	75 ppb (196 µg/m^3)
		secondary	3-hour	0.5 ppm (1,300 µg/m^3)

*as of January 2015 (EPA 2015)

[1]milligrams per cubic meter (mg/m^3); micrograms per cubic meter (µg/m^3); parts per million (ppm); and parts per billion (ppb)

Table 3.1-2: Nevada Ambient Air Quality Standards for Criteria Pollutants

Pollutant		Averaging Time	Level
Carbon Monoxide (CO)	Less than 5,000 feet. above mean sea level	8-hour	9 ppm (10,500 µg/m^3)
	At or greater than 5,000 feet. above mean sea level		6 ppm (7,000 µg/m^3)
	At any elevation	1-hour	35 ppm (40,500 µg/m^3)
Lead (Pb)		Quarterly arithmetic mean	0.15 µg/m^3
Nitrogen Dioxide (NO_2)		Annual arithmetic mean	0.053 ppm (100 µg/m^3)
Ozone (O_3)		1-hour	0.12 ppm (235 µg/m^3)
Ozone (O_3)	Lake Tahoe Basin, #90	1-hour	0.10 ppm (195 µg/m^3)
Particulate Matter as PM_{10}		Annual arithmetic mean	50 µg/m^3
		24-hour	150 µg/m^3
Sulfur Dioxide (SO_2)		Annual arithmetic mean	0.030 ppm (80 µg/m^3)
		24-hour	0.14 ppm (365 µg/m^3)
		3-hour	0.5 ppm (1,300 µg/m^3)
Hydrogen Sulfide (H_2S)		1-hour	0.08 ppm (112 µg/m^3)

The Project is within Hydrographic Basin 101A, which is designated as unclassified. The attainment status with respect to the applicable air quality standards (NAAQS and Nevada AAQS) for the Proposed Action is presumed to be in attainment (Enviroscientists 2015c).

As defined by the EPA, greenhouse gases (GHGs) include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. Combustion of fossil fuels results in emissions of GHGs. Ongoing scientific research has identified the GHG emissions and changes in biological carbon sequestration due to land management activities are believed to have contributed to global climate change. On September 22, 2009, the EPA issued a GHG Reporting Rule that requires suppliers of fossil fuels, manufacturers of vehicles and engines, and industrial facilities that emit 25,000 metric tons or more of carbon dioxide equivalent (CO_2e) to submit annual reports to the EPA.

3.1.2 Assessment Area

The Proposed Action would occur in Hydrographic Basin 101A.

3.1.3 Existing Environment

Air quality in the Project Area is governed by both factors of pollutant emissions and meteorological conditions. The Project Area is located within an Air Quality Management Area that is currently in "attainment-unclassifiable" for all pollutants having an air quality standard (40 CFR 81.329). There are no CO, NO_2, SO_2, or Pb non-attainment areas located within the State of Nevada. Washoe County, Nevada (where the city of Reno is located), is the PM_{10} non-attainment area closest to the Project Area, located more than 110 miles to the west.

At present, the BAPC does not conduct ambient air quality monitoring in the vicinity of the Project. The closest Nevada Air Pollution Control Program monitoring stations are located in Fallon for PM_{10} and O_3 monitoring and Fernley for PM_{10}, $PM_{2.5}$, and O_3 monitoring. In addition, O_3 data is collected by the National Park Service at the Interagency Monitoring of Protected Visual

Environments (IMPROVE) Site in Great Basin National Park located in White Pine County, Nevada.

The Fallon station is approximately 70 miles southwest of the Project Area; the Fernley station is approximately 75 miles southwest of the Project Area. These are State and Local Air Monitoring Sites for continuous monitoring of the pollutants. The latest NDEP Trend Report stated there were no exceedances reported for the PM_{10} and O_3 standards for the Fallon station, and no exceedances reported for the PM_{10}, $PM_{2.5}$, and O_3 standards for the Fernley station. between 2000 and 2010 (NDEP 2013a).

3.1.3.1 Background Concentrations

The BAPC recommends using appropriate background concentrations as a suitable background value to approximate pre-existing pollutant concentrations. For unmonitored rural areas, such as the Project Area, the BAPC recommends background values of 10.2µg/m^3 for the PM_{10} 24-hour averaging period, 8.0µg/m^3 for the $PM_{2.5}$ 24-hour averaging period, 2.3µg/m^3 for the $PM_{2.5}$ annual averaging period, and zero for all other criteria pollutants. The BAPC considers these values appropriate for remote mining facilities. The BAPC's practice for particulate analyses is to use measured concentrations from the IMPROVE monitoring stations as representative background concentration for rural Nevada mine sites (Enviroscientists 2015c).

3.1.3.2 Existing Project Emissions

All of the areas within the Project Area are currently active. The existing Project contains sources of air pollutants such as the existing ADR facility, crushing system, generators, and on-site off-road equipment for exploration and mining operations and reclamation activities.

Air emission estimates were calculated based on the maximum operations for each applicable time period, using EPA approved AP-42 emission factors (EPA 2009a) for the existing Project and information provided by Gold Acquisition Corp. Table 3.1-3 shows the emissions, in tons per year (tpy), for the existing Relief Canyon Mine. Table 3.1-4 shows the hazardous air pollutants for the existing Relief Canyon Mine. Table 3.1-5 shows the GHG emissions for the existing Relief Canyon Mine.

Table 3.1-3: Existing Relief Canyon Mine Emissions Summary

Source Category	PM	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC
Point Sources Emissions	110.46	42.07	8.63	100.14	0.48	35.52	2.63
Fugitive Sources Emissions	0.065	0.060	0.060	1.30	0.021	9.84	0.61
Project Total (tons/year)	**110.53**	**42.13**	**8.69**	**101.44**	**0.50**	**45.36**	**3.23**

Source: Enviroscientists 2015

Table 3.1-4: Existing Relief Canyon Mine Hazardous Air Pollutants

Hazardous Air Pollutants	Facility Total (tpy)
Benzene	0.039
Toluene	0.015
Xylenes	0.010
Formaldehyde	0.013
Actealdehyde	0.0077
Acrolein	0.0011
Naphthalene	0.0060
Mercury	0.015
Total	**0.11**

Source: Enviroscientists 2015

Table 3.1-5: Existing Relief Canyon Mine Greenhouse Gas Emissions

Pollutants	Metric Tons
CO_2e	11,214

Source: Enviroscientists 2015

3.2 Cultural Resources

3.2.1 Regulatory Framework

Title 54 United States Code (U.S.C.) § 300101, et seq., commonly known as the National Historic Preservation Act of 1966 as amended (NHPA), and the Archaeological Resources Protection Act (ARPA) of 1979, as amended, are the primary laws regulating cultural resource preservation.

Title 54 U.S.C. § 306108, commonly known as Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on Historic Properties and affords the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Project-related actions may adversely affect any site, structure, or object that is, or can be, included in the National Register for Historic Places (NRHP).

3.2.2 Assessment Area

The assessment area for cultural resources is the Project Area.

3.2.3 Existing Environment

Approximately 2,753 acres within the Project Area were surveyed to Class III standards. Approximately 221 acres of existing facilities within the Project Area were excluded from the cultural survey. BLM Reports CRR2-3259 (ASM 2014) and CRR2-3275 (ASM 2015) present the results of the cultural inventory. Nineteen newly identified archaeological sites and 39 isolated cultural resources were recorded in the Project Area. Identified site types include prehistoric flaked stone scatters, a lithic quarry site, a wild horse trap, a mineral claim, a prospect, mining sites, a mill site with an ethnohistoric component, historic refuse scatters, a utility line, and a historic road segment. Of the 19 archaeological sites in the Project Area, 18 are recommended as not eligible for listing in the NRHP. One site, 26PE4152/CrNV-63-12637, is recommended as not eligible for inclusion in the NRHP under Criteria A, B, and C, and unevaluated for NRHP listing under

Criterion D, pending subsurface testing and further archival research. Site 26PE4152/CrNV-63-12637 would be managed as though it is eligible. Based on the State Protocol Agreement between the Bureau of Land Management and the Nevada State Historic Preservation Office as amended through December 2014 (Protocol), isolates are categorically excluded from inclusion on the NRHP (BLM and State Historic Preservation Office [SHPO] 2014).

3.3 Invasive, Non-Native Species

3.3.1 Regulatory Framework

The Federal Noxious Weed Act of 1974 provides for control and management of non-indigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health. The act prohibits importing or moving any noxious weeds identified by regulation, and allows for inspection and quarantines to prevent the spread of noxious weeds.

Executive Order (EO) 13112, Invasive Species, directs federal agencies to prevent the introduction of invasive species, to provide for their control, and to minimize the economic, ecological, and human health impacts caused by invasive species. The policy set forth in BLM Manual 9015 - Integrated Weed Management requires all ground disturbing projects and any projects that alter plant communities be assessed to determine the risks of introducing and spreading noxious weeds (BLM 1992).

The Nevada Department of Agriculture (NDA) has responsibility for jurisdiction, management, and enforcement of the State of Nevada's noxious weed law. The legal definition of a noxious weed is "any species of plant which is, or is likely to be, detrimental or destructive and difficult to control or eradicate" (NRS 555.005). The plants on Nevada's noxious weeds list are mandated to be controlled on both private and public land. The NDA also maintains and updates the list of Nevada noxious weeds under the NAC 555.010. The Nevada noxious weeds listed on NAC 555.010 are further divided into the following categories of species: "A," "B," and "C."

3.3.2 Assessment Area

The assessment area for invasive, non-native species is the Project Area.

3.3.3 Existing Environment

A noxious weed inventory of the Project Area was conducted on June 7 through 14 and June 26 through 29, 2014. Four noxious weed species listed on the 2012 Nevada Noxious Weed List were observed within the Project Area: 1) hoary cress (*Cardaria draba*); 2) perennial pepperweed (*Lepidium latifolium*); 3) Russian knapweed (*Acroptilon repens*); and 4) saltcedar (*Tamarix ramossisima*) (Enviroscientists 2015a). The majority of the noxious weed occurrences were documented within the western portion of the Project Area in areas exhibiting signs of disturbance. These observations are shown on Figure 3.3.1. All of the weeds are Category C, with the exception of Russian knapweed which is Category B. The state requires Category B weeds to be controlled in areas where populations are not well established or previously unknown to occur and eradication of Category C weeds from nursery stock dealer premises. Site abatement of Category C weeds is conducted at the discretion of the state quarantine officer (NAC 555.010).

There were two noxious weed occurrences within the area affected by the Proposed Action – saltcedar and perennial pepperweed (Enviroscientists 2015a). The saltcedar occurrence was located in the area of the proposed pit expansion and the perennial pepperweed occurrence was located adjacent to proposed exploration disturbance (Figure 3.3.1).

Other invasive and non-native plant species observed within the Project Area that are not classified as noxious weeds in the State of Nevada included: annual rabbitsfoot grass (*Polypogon monspeliensis*); annual wheatgrass (*Eremopyrum triticeum*); burningbush (*Bassia scoparia*); cheatgrass (*Bromus tectorum*); clasping pepperweed (*Lepidium perfoliatum*); crossflower (*Chorispora tenella*); curveseed butterwort (*Ceratocephala testiculata*); herb sophia (*Descurainia sophia*); meadow barley (*Hordeum brachyantherum*); pale madwort (*Alyssum alyssoides*); prickly lettuce (*Letuca serriola*); prickly Russian thistle (*Salsola tragus*); red brome (*Bromus rubens*); redstem stork's bill (*Erodium cicutarium*); saltlover (*Halogeton glomeratus*); tall tumblemustard (*Sisymbrium altissimum*); and yellow salsify (*Tragopogon dubius*) (Enviroscientists 2015a).

3.4 Migratory Birds

3.4.1 Regulatory Framework

The Migratory Bird Treaty Act (MBTA) implements international treaties that provide for migratory bird protection. The act authorizes the Secretary of the Interior to regulate the taking of migratory birds. The act also provides that it shall be unlawful, except as permitted by regulations, "to pursue, take, or kill any migratory birds, or any part, nest or egg of any such bird", however, does not regulate their habitat. The list of species protected by the MBTA was revised in March 2010 and includes 1,007 species native to the United States.

EO 13186 directs federal agencies taking actions that are likely to have a measureable effect on migratory bird populations to develop and implement a Memorandum of Understanding (MOU) with the United States Fish and Wildlife Service (USFWS) that promotes the conservation of migratory bird populations.

The USFWS and the BLM signed, January 17, 2010, a MOU pursuant to EO 13186 to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration between the USFWS and the BLM, in coordination with state, tribal, and local governments. This MOU identifies specific activities where cooperation between agencies would contribute to the conservation of migratory birds.

3.4.2 Assessment Area

The assessment area for migratory birds is the Project Area. The assessment area for raptors included a one-mile buffer around the Project Area. The assessment area for nesting eagles included a ten-mile buffer around the Project Area.

3.4.3 Existing Environment

The NDOW provided a list from their database on March 23, 2015, of the various species of raptors (that use diverse habitat types), which may reside in the vicinity of the Project Area. There are 47 known raptor nest sites within ten miles of the Project Area (Enviroscientists 2015a).

On May 13, 2014, and June 10, 2014, aerial golden eagle and raptor surveys were conducted within and surrounding the Project Area (Wildlife Resource Consultants [WRC] 2014). The golden eagle and raptor survey had two primary objectives: 1) to identify suitable nesting habitat and nests for golden eagles and raptors within and near the Project Area; and 2) to determine raptor and golden eagle nest occupancy status and territory (or breeding area) distribution. A total of 50 golden eagle nest structures were identified at 37 nest sites within the ten-mile buffer surrounding the Project Area. Five of the 37 golden eagle nest sites were identified as occupied (i.e., either occupied and inactive or occupied and active), while two nest sites were classified as active (by definition, an active nest is an occupied nest). A minimum of 16 golden eagle breeding areas were delineated within the ten-mile buffer surrounding the Project Area. There were no golden eagle nests within the area of the Proposed Action (Enviroscientists 2015a). Three potential raptor nests were identified within or near the one-mile buffer surrounding the Project Area. Of these three raptor nests, the first raptor nest was identified as an inactive nest of an unidentified species, while a second nest was identified as an active red-tailed hawk nest. The third raptor nest was not surveyed in 2014; however, in 2013, the third raptor nest was identified as an active kestrel (*Falco* sp.) nest (WRC 2014). There were no raptor nests within the area of the Proposed Action.

Migratory bird clearance surveys were conducted on May 5 and May 27, 2014, in portions of the Project Area where exploration activities were occurring. Bird species observed within the Project Area during the surveys included the following: black-throated sparrow (*Amphispiza bilineata*), ash-throated flycatcher (*Myiarchus cinerascens*), common raven (*Corvus corax*) and American kestrel. There were no active nests within the area of the Proposed Action at the time of the surveys (Enviroscientists 2014).

3.5 Native American Religious Concerns

3.5.1 Regulatory Framework

Several federal laws require the BLM and other federal agencies to consult with affected tribes, tribal organizations and/or individuals with opportunities to participate in consultation and to advise on proposed projects that may have an effect on cultural sites, resources and traditional activities. These include the NHPA and ARPA noted above, as well as the American Indian Religious Freedom Act (AIRFA) (P.L. 95-341), the NAGPRA of 1990 (P.L. 101-601), and EO 13007 (1996, Indian Sacred Sites) and 13175 (2000, Consultation and Coordination with Indian Tribal Governments). These laws direct the BLM to make best efforts to identify sites, resources and activities of religious, traditional and/or cultural importance, and subsequently attempt to limit or even eliminate negative effects on those resources. The BLM also employs the BLM Manual Section 8120, Tribal Consultation Under Cultural Resource Authorities and guidance from National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties (TCPs), in its consultation process.

As defined in National Register Bulletin 38, a traditional cultural property (TCP) “can be defined generally as one that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining the continuing cultural identity of the community” (Parker and King 1998). Further, a TCP can be:

- A location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;

- A location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and
- A location where a community has traditionally carried out economic, artistic or other cultural practices important in maintaining its historical identity.

3.5.2 Assessment Area

The assessment area for Native American Religious Concerns is the Project Area.

3.5.3 Existing Environment

Letters requesting consultation on the Proposed Action were sent to several tribes. The Battle Mountain Band, Fallon Paiute Shoshone Tribe, and the Pyramid Lake Paiute Tribe received their letters on August 17, 2015; Lovelock Paiute Tribe received their letter on August 24, 2015; and the Winnemucca Indian Colony received their letter on September 24, 2015. No issues have been identified; however, consultation is ongoing.

3.6 Wastes – Hazardous or Solid

3.6.1 Regulatory Framework

Federal hazardous material and waste laws and regulations are applicable to hazardous substances used, stored, or generated by the Proposed Action. Applicable federal laws include the following: Hazardous and Solid Waste Amendments, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Toxic Substances Control Act, Superfund Amendments and Reauthorizations Act, RCRA, and the Safe Explosives Act. Pursuant to regulations promulgated under Section 102 of CERCLA, as amended, release of a reportable quantity of a hazardous substance to the environment in a 24-hour period must be reported to the National Response Center (40 CFR Part 302). A release of a reportable quantity on public land must also be reported to the BLM and BMRR. In 1999, the metal mining industry began submitting reports on the release of chemicals to the EPA and appropriate state agencies, under Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986; commonly referred to as the Toxics Release Inventory Program.

Nevada hazardous material and waste laws and regulations are applicable to hazardous substances used, stored, and generated by the Project. NAC 445A.240 requires immediate reporting of a release to the NDEP of a reportable quantity of a hazardous substance, listed in Table 302.4 in 40 Part CFR Part 302.

3.6.2 Assessment Area

The assessment area for wastes, hazardous or solid, is the Project Area.

3.6.3 Existing Environment

Materials (primarily petroleum products) currently being used or generated at the Relief Canyon Mine and the on-site amount of these materials are shown in Table 3.6-1.

Table 3.6-1: Existing Relief Canyon Petroleum Products

Product	Gallons
Diesel	1,000
Dyed Diesel	12,000
Gasoline	100
Used Oil	500
Propane	4,500

Used lubricants and solvents are characterized according to the RCRA requirements and are stored appropriately. An Emergency Response Plan to establish measures (WPCP: Appendix F Spill Response Best Management Practices) (Knight Piésold 2016) designed to prevent oil and oil-related products from spilling and affecting the environment on-site or off-site of the mine is maintained on site. Spills that meet or exceed the reportable spill criteria in the Emergency Response Plan would be reported to the required state and federal regulatory agencies.

Monthly inventories of hazardous materials are maintained at the mine and reported annually. Hazardous waste is stored according to state, federal, and local regulations on a covered and sealed concrete pad with secondary containment berms near the truck shop until removal and disposal at an authorized facility. Used oil and coolant are also stored in secondary containment. The materials are either recycled or disposed of in accordance with state, federal, and local regulations. Used coolant and oil would not be mixed. Used containers are disposed of or recycled according to federal, state, and local regulations.

A Class III-waivered landfill #F444 issued by the NDEP Bureau of Waste Management (BWM), which is also authorized by the BLM in NVN-064634 is located on site. The existing mine site landfill is located near the plant on public land in the S½SW¼ Section 18, T27N, R34E. The landfill is operated in compliance with NAC 444.731 through 444.747 for the on-site collection and disposal of Project-generated authorized non-hazardous inert solid waste. A new Class III-waivered landfill, to be authorized by BWM, would be integrated into Waste Rock Storage Area 5.

3.7 <u>Water Resources</u>

3.7.1 Regulatory Framework

The administration, preservation, and appropriation of water resources in Nevada include both state and federal regulations. The NDEP has primacy for administration of the Clean Water Act (CWA). The NDEP defines waters of the State of Nevada as water courses, waterways, drainage systems, and ground water. When a proposed project has the potential to directly or indirectly affect water, the State of Nevada is authorized to implement its own permit programs under the provisions of state law or the federal CWA. The NDEP requires compliance with National Pollution Discharge Elimination System permits related to discharge of wastewater to surface waters from discharge points.

The Nevada Water Pollution Control Law gives the State Environmental Commission authority to require controls on diffuse sources of pollutants, if these sources have the potential to degrade the quality of waters of the state. This same law also provides the state with authority to maintain water quality for public use, agriculture, existing industries, wildlife, and economic development. Nevada has been granted authority by EPA to enforce drinking water standards established under the CWA.

The administration and adjudication of water rights within the state is the responsibility of the NDWR, State Engineer's Office. Water appropriations are also obtained through the Nevada State Engineer.

3.7.2 Assessment Area

The assessment area is a combination of the USGS HUC 5 Packard Wash watershed and the Coeur Rochester ground water model boundary.

3.7.3 Existing Environment

A hydrogeological study and an evaluation of post-mining ground water level recovery and ground water baseline conditions at the Project (SWS 2015) were conducted. This hydrogeological study evaluated baseline ground water levels and projected ground water recovery beneath the North and South Pits after three years of mining (presumed to start in 2017 and end in 2019, depending on permit acquisition and other factors). This report was submitted to and accepted by the BLM. The report was also submitted to the NDEP BMRR as Appendix D of Gold Acquisition Corp.'s 2015 Plan Modification.

Hydrologic data were collected from the Relief Canyon site from 2012 to 2015, from Coeur Rochester Mining wells in Packard Valley from 2011 to 2013, and from the Buena Vista Mine from 2013 and 2014. The following tasks were performed to develop the hydrology baseline report (SWS 2015):

- Collected ground water levels from a network of 21 piezometers, two production wells, and seven monitoring wells on site; nine piezometers and wells owned by Coeur Rochester Mine in Packard Valley; and six wells owned by the Buena Vista Mine.
- Developed ground water elevation contour maps based on water elevation data obtained from the Relief Canyon piezometer and well network in 2012, 2013, and 2014;
- Designed and implemented an aquifer pumping test of the Relief Canyon water production wells, PW-1 and PW-2, to evaluate the hydrologic response to pumping these wells for 28 days followed by a 16-month aquifer recovery period;
- Assessed the regional and local ground water levels from 1984 through 2015;
- Performed a water budget and water balance model analysis;
- Estimated ground water levels beneath the North and South Pits at the end of three years of mining as well as subsequent post-mining water level recovery using two methodologies: graphical methods, and a water balance model; and
- Compiled and evaluated ground water, ephemeral pit lake, and spring chemistry.

3.7.3.1 Ground Water

Three hydrogeologic units control ground water flow within the Project Area: 1) an alluvial ground water system in the Quaternary alluvium within Packard Wash; 2) a fractured bedrock ground water system in the Grass Valley Formation; and 3) a fractured bedrock ground water system in the Cane Springs Formation. The Quaternary alluvium consists of interlayered silt, sand, clay, and gravel with moderate hydraulic conductivity. Ground water flow in the alluvial aquifer generally follows topography, and flows from east to west toward the center of the Packard Valley and then flows south to the Carson Sink. The Grass Valley Formation is composed predominantly of low permeability argillite, siltstone, and sandstone. The Cane Springs Formation is composed primarily of high permeability limestone, but contains siltstone and mafic flows including diabase. Ground water within the bedrock aquifers also generally flows from east to west until it encounters the South Humboldt Thrust Fault and possibly the range front fault zone that appear to act as barriers that cause ground water to flow toward the south. Hydraulic conductivity within the Grass Valley Formation is generally low with limited connectivity to the alluvial and Cane Springs aquifers. Hydraulic conductivity of the Cane Springs Formation is relatively high although the aquifer is thought to be compartmentalized by numerous faults, fractures, and karst features.

The elevation of the water table in the Cane Springs Formation aquifer in the mine area fluctuates in response to pumping and to precipitation levels, with higher elevations measured following periods of above average precipitation. For example, the water level elevation in production well PW-2 was 5,143 feet amsl in 1984. This ground water elevation may have been influenced by the very high precipitation levels in 1983, which may have produced an anomalously high recharge rate. The water levels in PW-1 and PW-2 declined due to production pumping at rates up to 178 gpm from 1984 through 1993. The water level in PW-1 was measured in 1991 at an elevation of 5,063 feet amsl.

The water levels then recovered in both wells to elevations of 5,120 to 5,121 feet amsl in October 2005 after 12 years of no production pumping. The 5,120 feet amsl recovery level appears to represent the ground water elevation following an average period of precipitation in 2004 and the first half of 2005 and little or no pumping of the wells. This recovered water level elevation may also be influenced by evaporative losses from the open pits, which have bottom elevations of 5,120 to 5,122 feet amsl, and are fractured due to blasting by previous mining.

Production pumping in wells PW-1 and PW-2 has occurred from 2007 to 2015 at rates of 12 to 14 gpm. Ground water levels in PW-1 and PW-2 and the on-site piezometers completed in the Cane Springs Formation aquifer declined from nine to 22 feet between 2012 and 2014.

Comparison of the on-site water levels to water levels measured at Coeur Rochester, at the northern end of Packard Valley, and the Buena Vista Mine at the southern end were made to determine the reason for the ground water decline. The Coeur Rochester piezometer, NP11-Test, completed in the older Weaver Formation adjacent to the range front fault 3.5 miles north of Relief Canyon, also experienced a decline of 11.9 feet from 2012 to 2014, which was attributed to production pumping at Coeur. Other Coeur Rochester bedrock wells in Packard Valley and bedrock wells at the Buena Vista Mine south of Packard Valley only declined at rates of zero to 0.1 feet/month as compared to Cane Springs Formation wells and piezometers at Relief Canyon, which declined at an average rate of 0.7 feet/month. This indicates the decreased precipitation and recharge from 2011 to 2014 only slightly affected regional ground water levels and that Relief Canyon production

well pumping and evaporative losses from the open pits are the main reason for the faster rates of decline in the Cane Springs Formation wells and piezometers at the mine.

Ground water levels measured in the Grass Valley Formation near the Relief Canyon Mine declined between zero and 16 feet from 2012 to 2014 depending on proximity to the range front fault with piezometers adjacent to the fault declining up to 16 feet. The rate of decline in the piezometers near the range front fault zone is similar to the Cane Springs Limestone wells at rates of 0.7 feet/month. The observed decline in the ground water levels observed in the Grass Valley Formation piezometers near the range front fault zone is likely due to continued production pumping, evaporative losses from the blasting-related fractures in the bottom of the open pits, with a minor component from reduced local recharge rates.

Ground water levels measured in monitoring wells completed in Quaternary alluvium near the Relief Canyon Mine heap leach pads were unchanged between 2009 and 2015 but one alluvial piezometer upgradient of the heap leach pads declined at a rate of 0.1 feet/month from 2013 to 2015. Ground water levels measured in Coeur Rochester alluvial monitoring wells in Packard Valley and Buena Vista Mine alluvial wells between 2012 and 2014 declined at rates up to 0.4 feet/month with most wells declining at rates of 0.1 feet/month. The lack of water decline in the Packard Valley alluvial aquifer near the heap leach pads is believed to be due to limited direct precipitation recharge of the alluvium due to the low elevations and because of differing hydrogeologic conditions. The alluvial aquifer is believed to be recharged primarily by ground water flow from the surrounding mountain range and spring discharge, with a minor component of the total recharge occurring during intense storm events, as infiltration directly into the alluvium. The ground water flow across the range front fault from the bedrock to the alluvial aquifers is very slow due to the low permeability of the fault zone. Therefore, the reduced local recharge due to drought conditions during the past four years in the mountain range has not yet affected ground water levels in the alluvium in the area of the Relief Canyon Mine but has affected alluvial wells elsewhere in Packard Valley with a rate of decline of generally 0.1 feet/month.

3.7.3.1.1 Pumping Test

A 28-day pumping test of PW-1 and PW-2 in February 2014 at pumping rates up to 600 gpm produced significant and extensive drawdown of up to 20 feet in the Cane Springs Formation rocks underlying the pit area. However, drawdown was not observed in the alluvial aquifer or in the Grass Valley Formation during the 28-day pumping test with the exception of Grass Valley Formation piezometers along the range front fault zone. The observed drawdown in the wells and piezometers completed in the Cane Springs Formation indicate that pumping production wells PW-1 and PW-2, which are completed within the fractured and compartmentalized carbonate system, would control the elevation of the future water table under the North, South, and Lightbulb Pits during mining and pumping activities.

The observed drawdown and limited rate of water level recovery observed in the 28-day recovery period and the subsequent 16 months through July 2015 suggest that production pumping continues to affect water levels in the Cane Springs Formation. By July 2015, ground water elevations within the Cane Springs Formation had recovered to within 12 to 30 feet of the February 2014 pre-pumping test levels during a period of continued pumping. Water balance modeling indicates recharge during normal precipitation and inflow along the range front fault from the north is 57 gpm to the Cane Springs Formation in the area of the Relief Canyon pits. The continued

pumping of PW-1 and PW-2 at 12 to 14 gpm thus represents 21 to 26 percent of the normal recharge rate.

3.7.3.2 Ground Water Quality

3.7.3.2.1 Alluvial Ground Water Quality

Alluvial ground water quality data from the monitoring wells surrounding the heap leach pads are summarized in quarterly and annual reports submitted to BLM and NDEP. Water quality data were collected in 2005 from the Windmill well, which is located near the intersection of Coal Canyon Road and Packard Valley Road (2015 Plan Modification, Appendix D).

Ground water, in Relief Canyon monitoring wells MW-08-1, MW-08-2, and MW-08-3, is a calcium chloride type. These three wells are installed into the alluvial aquifer on the east side of Packard Valley. The Windmill well, installed into the alluvial aquifer on the west side of Packard Valley, is a sodium chloride type. The observed differences in water type are most likely due to different source rocks. The ground water in the Relief Canyon monitoring wells is derived in part from limestone source rocks east of the mine. The source rocks for the alluvial ground water on the west side of the valley in the Windmill well may contain evaporate minerals such as halite (NaCl) from a past playa or are volcanic source rocks along the north and west sides of the valley. It appears that chloride and Total Dissolved Solids (TDS) increase toward the center of the valley. Water quality generally met the Nevada Reference Values (NRVs) with occasional exceedances for arsenic (concentrations up to 0.039 mg/L) in some Relief Canyon monitoring wells and the Windmill well and an exceedance for TDS in the Windmill well. The TDS concentrations ranged from 350 to 660 milligrams per liter (mg/L) in the Relief Canyon monitoring wells and were 1,100 mg/L in the Windmill well. The pH of the alluvial ground water was neutral in all wells.

3.7.3.2.2 Bedrock Ground Water Quality

Ground water quality information has been obtained from ongoing sampling of PW-1 and PW-2 since 1984 and 1988, respectively, sampling of the North and Lightbulb Pit piezometers when they were installed, and sampling of the Grass Valley Formation monitoring well, MW-13-01 (SWS 2015). Water quality samples were not taken when the South Pit piezometer was installed because the piezometer is in close proximity to the production wells.

Ground water quality in PW-1, PW-2, Lightbulb Pit, and North Pit are mixed sodium bicarbonate and calcium sulfate type. The Grass Valley Formation ground water is a calcium chloride type. The Grass Valley Formation water type is the same as sampled in the alluvial monitoring well MW-08-1.

TDS concentrations ranged from 480 to 680 mg/L in the production wells, from 710 to 820 mg/L in the samples from the Lightbulb and North Pit piezometers, and was 830 mg/L in the Grass Valley Formation (MW-13-01). The pH of the bedrock ground water is neutral.

Water quality in PW-1 and PW-2 was good with several exceedances above the NRV for arsenic in each well, with concentrations up to 0.024 mg/L, and several exceedances for iron that were likely the result of water with suspended solids due to insufficient purging before sampling. Ground water quality in the pit piezometers was also good, although arsenic and manganese concentrations slightly exceeded the NRV in the Lightbulb Pit. Water quality in the Grass Valley

Formation in MW-13-01 had the highest TDS and exceeded the NRV for aluminum and manganese.

3.7.3.2.3 Spring Water Quality

Springs located in the general area include Antelope Spring, Black Knob Spring, and Willow Creek Spring. Spring samples were collected in December 2012 and the following flow rates measured:

- Antelope Spring 0.25 gpm
- Black Knob Spring 25 gpm
- Willow Creek Spring Not measured

Antelope Spring was a sodium chloride type, and Black Knob Spring and Willow Creek Spring are calcium chloride and calcium bicarbonate types.

Water quality generally met the NRV in Black Knob Spring and Willow Creek Spring with TDS concentrations ranging from 240 to 400 mg/L. However, the TDS concentration in Antelope Spring was 1,800 mg/L, greater than the NRV of 1,000 mg/L. Arsenic concentrations exceeded the NRV in Willow Creek Spring and the chloride concentration exceeded the NRV in Antelope Spring.

3.7.3.3 Pit Lakes

3.7.3.3.1 Ephemeral Pit Lakes

Review of BLM and NDEP files revealed no record of pit lake formation prior to 1998 (Dyer Engineers 2005). In 1998, visual inspection of the North and South Pits indicated a pit lake with a reported depth of approximately 20 feet or an elevation of 5,141 feet amsl. This corresponds with a period of 16 inches of annual rainfall or more than 270 percent of normal rainfall indicating the pit lakes were formed from a combination of surface water runoff and ground water levels at or above the base of the pits. The pit lakes were reportedly present through 1999 but were declining in depth and dried up in 1999. Pit lakes were observed again from May 2000 to May 2001 with a depth of eight feet (elevation 5,129 to 5,130 feet amsl) and were gone by November 2001. No pit lakes were observed from November 2001 until June 2005. Pit lakes were present from June 2005 through June 2006 as verified by topographic mapping in June 2006 that indicated ponded water in both the North and South Pits with elevations of 5,129.9 feet amsl in the North Pit and 5,130.6 feet amsl in the South Pit. This indicates approximately seven to eight feet of water within the pits. The source of the pit lake water is likely from a combination of spring snowmelt accumulating as surface water in the pits and a ground water elevation near the bottom of the pits.

3.7.3.3.2 Ephemeral Pit Lake Water Quality

Pit lake water was sampled in 2000 and 2006 in the North and South Pits (SWS 2015). Pit lake elevations in 2000 and 2006 were approximately 5,130 feet amsl indicating approximately seven to eight feet of water in the pit lakes.

Pit lake water quality was different in the North and South Pit lakes although both have calcium sulfate type water and neutral pH values from 7.9 to 8.1. The North Pit piezometer also had a calcium sulfate type indicating ground water beneath the North Pit had the same water type.

TDS values in the North Pit lake ranged from 1,900 to 2,100 mg/L with sulfate concentrations of 1,100 mg/L, arsenic concentrations of 0.014 to 0.044 mg/L, and antimony concentrations of 0.004 to 0.008 mg/L. Only arsenic concentrations in the South Pit Lake exceeded the NRV.

The TDS, sulfate, and arsenic concentrations exceeded the NRV in both 2000 and 2006 while in 2000 the antimony concentration only exceeded the NRV. The increased TDS and sulfate concentrations are partly a result of evapoconcentration within the pit lake as ground water in the North Pit piezometer had TDS and sulfate concentrations of 710 and 230 mg/L, respectively (SWS 2015).

The South Pit Lake had much lower TDS concentrations (770 to 1,000 mg/L), and much lower sulfate concentrations (330 to 440 mg/L) than the North Pit Lake, but the arsenic concentrations (0.053 to 0.064 mg/L) were higher than the North Pit Lake (SWS 2015).

The geology in and around the North Pit is more variable than the South Pit and more gabbro is exposed in the pit wall rocks in the North Pit. Both pit areas have abundant neutralizing potential as shown by the neutral pH. but the South Pit lacks thick sections of clay-matrix and limestone breccias, jasperoids, and variably silicified breccia alteration types. Also the deformed limestone unit below the massive limestone crops out only in the North Pit. These differences in geologic units beneath the two pits appear to be the reason for the differences in water chemistry between the two pit lakes (SWS 2015).

Other Resources

3.8 Geology and Minerals

3.8.1 Regulatory Framework

On lands open to location under the General Mining Law of 1872, as amended, the BLM administers the surface acres of public land and federal subsurface mineral estate under the Mining Law and the FLPMA. The BLM has been charged by the U.S. Congress with the management of activities on public lands under the General Mining Law. The BLM implements this management through the 43 CFR 3809 surface management regulations.

3.8.2 Assessment Area

The Assessment Area is the Project Area.

3.8.3 Existing Environment

The Relief Canyon mine area is located along the eastern side of Packard Flat, a topographic low approximately two miles in width and five miles in length. This valley lies between the southern portion of the Humboldt Range and the middle to northern portion of the West Humboldt Range. Packard Flat is believed to be bounded on the eastern and western margins by Basin and Range style fault zones. Figure 3.8.1 shows the Project Area geology.

3.8.3.1 Stratigraphy

The Project Area is underlain by Quaternary alluvium and colluvium west of the open pits. Alluvial fans underlie the heap leach pads and ponds west of the open pits and consist of unconsolidated material derived from outwash deposits from the adjacent ranges. The alluvium is composed of lenticular, interbedded units of sand, silty sand, gravelly sand, gravel, sandy gravel, silty gravel, clayey gravel, gravelly silt, clayey silt, and silty clay. Alluvial thickness in monitoring wells in the area of the HLPs exceeds 180 feet.

The primary rocks exposed in the mine area include the Grass Valley Formation and the Cane Springs Formation. The contact between the Grass Valley formation and underlying limestone units is a thrust fault, locally called the South Humboldt Thrust.

The Grass Valley Formation crops out in the southeast part of the Relief Canyon mine area. The Formation is in fault contact with massive limestone as well as the thin-bedded unit. This fault is informally known as the South Humboldt Thrust. The Grass Valley Formation consists mostly of olive-gray, noncalcareous, thinly bedded argillite, siltite, and quartzite. This formation is poorly exposed in the north. Thickness can range from 2,000 feet in the north to 300 feet in the south part of the Project Area. Numerous small faults are common in the Grass Valley Formation (Johnson 1977).

Detailed geologic mapping is shown on Figure 3.8.1. Two principal carbonate units have been identified: a massive to thick bedded limestone and a thin bedded, foliated, and deformed limestone. These informal units may correlate with the Cane Springs Formations. Throughout the Project Area, the massive limestone displays significant dissolution and karst development. This is particularly true at the thrust contact with the overlying Grass Valley Formation. The thin bedded, foliated, and deformed limestone exhibits numerous northwest trending folds. Many thrust faults are also found within these limestone units. Siltstone, undifferentiated mafic units, and diabase units are included within the Cane Springs Formation.

As shown on Figure 3.8.1, other rock units exposed in the northern part of the Project Area include mafic dikes, thin-bedded limestones of the Prida Formation, and Weaver Formation spherulitic tuffs, air fall and water lain ash, shale/siltstone, fine-grained volcaniclastic rocks, tuffs, and lithic tuffs.

3.8.3.2 Geologic Structures

The Relief Canyon pit area structure contains a large number of faults and fractures. Stratigraphic unit thickness and lithology can vary greatly over short distances within the pit. The South Humboldt Thrust is the major structural feature in the area of the Relief Canyon mine and forms the contact between the overlying Grass Valley Formation and the underlying Cane Springs Formation. A second unnamed, low angle thrust fault separates the massive thick bedded limestone of the Cane Springs Formation (TRlm) from the thin bedded deformed limestone of the Cane Springs Formation (TRl). A third unnamed fault separates the thin bedded, deformed limestone of the Cane Springs Formation (TRl) from the underlying upper volcanic unit (TRv). Numerous additional north-south and northeast striking, steeply dipping faults and fractures are present in the Relief Canyon pit area and are broadly related to the formation of a regional anticline structure. Finally, a range front fault is located west of the North and South Pits and forms the contact between the bedrock deposits of the Humboldt Range and the alluvium.

3.8.3.3 Geochemistry

A geochemical characterization study was conducted to assess the ARD and leachate quality (ARD/ML) of the waste rocks at the Relief Canyon Mine (Knight Piésold 2014b). The results of the geochemistry evaluation are summarized in this section and presented in detail in Appendix E of the 2015 Plan Modification. A summary of the waste rock types to be mined at the Project and their relative percentages of the total waste to be mined is shown in Table 2.1-4.

To characterize ARD/ML of the materials to be mined at the Project, a weighted approach was used to assess variability of the waste rock types shown in Table 2.1-4. Forty-four samples from 22 boreholes were selected to characterize the spatial and lithological variation of the deposit. All 44 of the samples were subjected to ABA procedures. Sixteen of these samples were selected for MWMP testing, with twelve subjected to sequential MWMP testing. The MWMP simulates the release of metals into the environment during exposure of the waste rock to precipitation events representing the first flush of stored-up oxidation products. The Sequential MWMP provides further insight into the evolution of water quality as it percolates through the waste rock facility. The number of samples collected was based on geologic data collected from bore hole logging to identify lithotypes, professional judgment and guidelines presented by the EPA and the MEND manual.

The samples were analyzed in a Nevada Certified Laboratory. The tests performed included paste pH, ABA Modified Sobek procedure – Michigan State University Reclamation Research Unit (EPA-600/2-78-054), and MWMP (American Society for Testing and Materials 2007b; NDEP 1990) tests.

The ABA tests performed on the waste rock to be produced during mining under the Proposed Action indicate this material is non-reactive and is not expected to generate acid upon exposure to weathering. The standard (single-leach) MWMP tests indicated some of the samples leached arsenic, antimony, aluminum, sulfate, TDS, or chloride at concentrations greater than their respective NRV. However, the results from sequential MWMP tests indicate the “first flush” of solutes observed in the single-leach MWMP test were followed by lower concentrations with the additional rounds (up to four) of leaching conducted under the sequential MWMP testing protocol. After four rounds of leaching, concentrations of arsenic and antimony were below their respective NRV in all but one sample for antimony and one sample for arsenic.

3.9 Public Safety, Transportation, and Access

3.9.1 Regulatory Framework

The NDOT is responsible for maintaining and improving Nevada's highway system, which includes U.S. highways and Interstate highways within the state's boundaries. The Pershing County Road Department is responsible for maintaining Coal Canyon Road and Packard Flat Road.

3.9.2 Assessment Area

The assessment area for public safety includes the Coal Canyon Road, Packard Flat Road, and the Project Area.

3.9.3 Existing Environment

The Project is located in a generally unpopulated area. Access to the Project is via I-80 and the Coal Canyon Road, which is a paved, two-lane road maintained by Pershing County. Vehicular traffic consists of cars, four-wheel drive trucks, and highway rated haulage trucks. The road traverses open range and is not fenced.

3.10 Social and Economic Values

3.10.1 Regulatory Framework

The Pershing County Master Plan 2012 provides guidance for future land use and community and economic development in Pershing County. Two guiding principles that are relevant to economics and social values related to the Project include:

- Fostering Economic Development - The County's resource based economy is subject to serious fluctuations as mineral prices shift, mines open and close and agricultural production varies. Agricultural employment has decreased as operations have become more mechanized. More economic stability is needed, particularly in the form of more secure middle wage jobs. The industrial park in Lovelock could become a valuable asset if the County is able to attract potential end users of the park. Mining will continue to be a boom/bust market that should be buffered with greater employment diversity. Quality medical and educational facilities are other important elements of economic development activities.

- Coordinating Growth and Service Provision - Increased cooperation between the County, city, state and federal agencies will enhance each jurisdiction's effectiveness. City/County growth coordination is particularly important in the area surrounding Lovelock. Cooperation between the County and the BLM would be important to maintain access to public lands, to provide for a variety of appropriate uses and to review potential land swaps. Coordination with the school district would be needed to help secure appropriate sites and to ensure that student demands do not exceed school capacities.

The Humboldt County Regional Master Plan 2012 includes the following economic development goals to economics and social values relevant to the Project:

- To achieve a diversified and stable economy that is compatible with planned growth and quality of life objectives, provides adequate employment and business opportunities for current and future generations, and strengthens the tax base;

- To maintain and enhance natural resource-based industries including mining, agriculture, ranching, recreation and tourism, and seek value-added manufacturing of these resources; and

- To promote economic development that provides continuing employment, economic vitality, increased tax base, and is consistent with the plan's goals and policies.

The Lyon County Comprehensive Master Plan 2010 includes the following economic goal relevant to the Project:

- Diverse Economy – The economy will continue to be strong and diverse; attracting businesses that employ residents in primary jobs, as well as service jobs that meet the needs of local residents.

There are no relevant goals in the Churchill County 2010 Master Plan.

3.10.2 Assessment Area

The assessment area for economics and social values comprises Pershing County, Humboldt County, Lyon County, and Churchill County (Figure 3.10.1). The assessment area is based on the location of the Relief Canyon Mine in Pershing County and the potential resident locations of future mine employees in Pershing County, Humboldt County, Lyon County, and Churchill County.

3.10.3 Existing Environment

3.10.3.1 Population and Demographics

The population of Nevada grew by approximately 35 percent between 2000 and 2010 and is estimated to have grown another approximate five percent between 2010 and 2014. Populations of counties in the assessment area are shown below in Table 3.10-1. Humboldt County saw a population increase between 2010 and 2014 similar to the state, while Lyon County's growth was approximately half of the state's growth, and Churchill County only experienced a 0.9 percent growth between 2010 and 2014. Pershing County experienced a population decline of approximately 0.6 percent between 2000 and 2014.

Table 3.10-1: Population Statistics and Estimates of Assessment Area

Area	2000 Census	2010 Census	2014 Estimates	Percent Change 2010 to 2014
Pershing County	6,693	6,753	6,714	-0.6
Humboldt County	16,106	16,528	17,388	5.2
Lyon County	34,501	51,980	53,344	2.6
Churchill County	23,982	24,877	25,103	0.9
Nevada	1,998,257	2,700,551	2,843,301	5.3

Source: NSDO 2015a, 2015b, 2015c

Table 3.10-2 shows that Pershing County varies from Humboldt County, Lyon County, Churchill County, and the State of Nevada as a whole with respect to gender and age. Specifically, population and demographic statistics for Pershing County are somewhat skewed given that approximately 1,680 men, or approximately 25 percent of its total population, are incarcerated at the Lovelock Correctional Center (Nevada Department of Corrections 2015).

Table 3.10-2: Demographic Statistics of Assessment Area

Demographics	Pershing County	Humboldt County	Lyon County	Churchill County	State of Nevada
Gender, 2014					
Female, percent	36.7	47.8	49.4	49.4	49.7
Male, percent	63.3	52.2	50.6	50.6	50.3
Age					
Persons under five years of age, percent, 2014	4.6	7.8	5.3	6.5	6.2
Persons under 18 years of age, percent, 2014	18.5	27.3	22.4	23.3	23.4

Demographics	Pershing County	Humboldt County	Lyon County	Churchill County	State of Nevada
Persons 65 years of age and over, percent, 2014	13.8	10.6	19.7	18.0	14.2
High School graduate or higher, percent of person's age 25+ (2009-2013)	78.9	82.9	84.3	89.2	84.6
White alone persons, not Hispanic or Latino, percent, 2014	66.5	66.5	76.3	74.3	51.5
Persons of Hispanic or Latino origin, percent, 2014	23.3	26.1	15.8	13.3	27.8
American Indian and Alaska Native persons, percent, 2014	4.4	5.0	3.2	5.2	1.6
Black or African American persons, percent, 2014	4.2	1.2	1.3	2.2	9.1

Source: US Census Bureau 2015

3.10.3.2 Income, Employment, and Economy

Based on 2014 figures, employment in Nevada is dominated by the leisure and hospitality service industry and the trade, transportation, and utilities sector. The leisure and hospitality industry (inclusive of gaming, hotel, recreation, and food service) has the highest proportion of employment with approximately 28 percent of the state's workforce in the sector The next largest employment sector is trade, transportation, and utilities with approximately 19 percent of the jobs statewide.

Approximately one percent of jobs statewide is in the natural resource and mining industries (NDETR 2014a). Employment by major industry in the assessment area with statewide employment by the same sector is shown in Table 3.10-3.

Mining has been, and continues to be, important to the economic well-being of Nevada. Nevada leads the nation in production of gold and provides the highest average salary of any other super sector in Nevada (Applied Analysis 2014a; 2014b). Nevada gold production accounted for approximately 69 percent of total United States production and approximately 5.9 percent of world production (Applied Analysis 2014a). Average earnings for metal mining workers in 2014 totaled $91,936, compared to $88,608 for all mining workers, and $44,720 for all workers statewide (NDETR 2014b).

The 2014 average annual wage in Pershing County totaled $50,425. The average annual wage for a worker in the natural resources and mining sector was $73,153. The average annual wage for an employee in the leisure and hospitality sector was $16,496 (NDETR 2014a).

The 2014 average annual wage for a worker in Humboldt County was $52,549. The average annual wage for a worker in the natural resources and mining sector was $86,514. The average annual wage for an employee in the leisure and hospitality sector was $17,697 (NDETR 2014a).

The 2014 average annual wage for a worker in Lyon County was $38,731. The average annual wage for a worker in the natural resources and mining sector was $57,600. The average annual wage for an employee in the leisure and hospitality sector was $17,756 (NDETR 2014a).

The 2014 average annual wage for a worker in Churchill County was $41,563. The average annual wage for a worker in the natural resources and mining sector was $31,326. The average annual wage for an employee in the leisure and hospitality sector was $17,092 (NDETR 2014a).

Table 3.10-3: Employment by Sector in 2014 for Assessment Area and State of Nevada

Sector	Pershing County	Humboldt County	Lyon County	Churchill County	State of Nevada
Private Sector Industries	1,158	6,561	10,112	5,989	1,055,775
Natural Resources and Mining	705	2,315	946	295	16,754
Construction	--	363	550	454	63,189
Manufacturing	29	247	2,063	450	41,451
Trade, Transportation, and Utilities	191	1,425	3,219	1,865	229,794
Information	--	63	16	96	13,679
Financial Activities	22	112	349	230	55,095
Professional and Business Services	15	426	753	513	156,000
Education and Health Services	23	289	467	917	113,282
Leisure and Hospitality	139	1,160	1,470	954	335,846
Other services	25	161	272	214	29,932
Government	712	1,497	2,030	1,686	146,881
Unclassified	9	1	7	1	755
Total All Industries	**3,028**	**14,620**	**22,254**	**13,664**	**2,258,433**

Source: NDETR 2014a

3.10.3.3 Public Finance

Taxes paid by mining operations are a primary source of revenue for the State of Nevada, counties, and local governments. Major tax categories paid by mining companies include: sales and use taxes on purchases; property taxes; modified business taxes; and Net Proceeds of Minerals (NPM) taxes. Based on information from the Nevada Department of Taxation and industry surveys, estimated state and local taxes paid by the mining industry in 2012 were approximately $431 million, including approximately $176 million in NPM taxes (Applied Analysis 2014c).

NPM taxes are primarily paid to the county where the ore is mined. NPM taxes distributed for all mining operations across the State of Nevada in fiscal year 2013-14 totaled approximately $33.8 million. NPM taxes paid to Pershing County for all active operations totaled approximately $1.5 million over that same time frame. NPM taxes paid to Humboldt County for all active operations totaled approximately $2.3 million over that same time frame. NPM taxes paid to Lyon County for all active operations totaled $145,999 over that same time frame. NPM taxes paid to Churchill County for all active operations totaled approximately $499,405 in fiscal year 2013-14 (Nevada Department of Taxation 2015).

3.10.3.4 Housing

Pershing County

In 2014, there were 2,416 housing units in Pershing County. Based on an approximate 66 percent owner-occupied housing unit rate, approximately 1,594 units were owner-occupied and approximately 822 were renter occupied. This compares to an average owner-occupied housing rate of approximately 57 percent in Nevada as a whole. The median value of owner-occupied housing units in Pershing County (2009-2013) totaled $138,100 (U. S. Census Bureau 2015); compared to a median value of $169,100 in Nevada as a whole.

Humboldt County

In 2014, there were 7,275 housing units in Humboldt County. Based on an approximate 71 percent owner-occupied housing unit rate, approximately 5,165 units were owner-occupied and approximately 2,110 were renter occupied. The median value of owner-occupied housing units in Humboldt County (2009-2013) totaled $147,400 (U. S. Census Bureau 2015).

Lyon County

In 2014, there were 22,399 housing units in Lyon County. Based on an approximate 70 percent owner-occupied housing unit rate, approximately 15,679 units were owner-occupied and approximately 6,720 were renter occupied. The median value of owner-occupied housing units in Lyon County (2009-2013) totaled $133,400 (U. S. Census Bureau 2015).

Churchill County

In 2014, there were 10,686 housing units in Churchill County. Based on an approximate 62 percent owner-occupied housing unit rate, approximately 6,625 units were owner-occupied and approximately 4,061 were renter occupied. The median value of owner-occupied housing units in Churchill County (2009-2013) totaled $153,300 (U. S. Census Bureau 2015).

3.10.3.5 Community Facilities and Services

Community service providers for education, law enforcement, fire protection, ambulance services, and health care are summarized below.

Pershing County

The Pershing County School District (PCSD) includes one high school, one middle school, and two elementary schools. The high school, middle school, and one elementary school are located in Lovelock, while the other elementary school is located in Imlay. The high school serves approximately 200 students and the middle school enrolled 152 students during the 2014-2015 school year (PCSD 2015).

The Nevada Division of Public and Behavioral Health (DPBH) provides community health nursing (CHN) services to residents of all ages and incomes in Pershing County (DPBH 2015). There is a CHN office in Lovelock that provides the following services: cancer screenings; adult and child immunizations; well child and healthy kids' examinations; fluoride varnishes; chronic disease education; lead testing; and family planning. Health care services in Pershing County are also provided by the Pershing General Hospital in Lovelock, which includes a long-term care facility, physician's clinic, family practice, podiatrist, and vascular surgeon (Pershing General Hospital 2015).

Law enforcement in Pershing County is provided by the Pershing County Sheriff's Department, the City of Lovelock Police Department, and Nevada Highway Patrol (NHP). Fire protection and ambulance services for Pershing County are provided by the Lovelock Fire Department (Pershing County 2015). In addition, the Lovelock area is home to the Lovelock Correctional Center, which serves as a medium security prison for approximately 1,680 inmates. Staff includes 213 protective services staff as well as 48 other professional and administrative staff (Nevada Department of

Corrections 2015). The BLM provides fire protection and suppression activities on federal lands within Pershing County. There is one fire station serviced by the BLM Winnemucca District in Pershing County, the Lovelock Fire Station located in Lovelock, Nevada. This station is housed with the Lovelock Fire Department through a cooperative agreement with the City of Lovelock and the BLM (BLM 2015b).

Humboldt County

The Humboldt County School District serves approximately 3,500 students in 11 schools: three Kindergarten (K)-4 schools; one 5-6 middle school; one 7-8 junior high; and one 9-12 high school located in Winnemucca. There are also four K-8 schools and one K-12 school in rural areas throughout Humboldt County (Humboldt County School District 2015). Great Basin College maintains a center in Winnemucca (Great Basin College 2015).

The DPBH also provides CHN services to residents of all ages and incomes in Humboldt County (DPBH 2015). There is a CHN office in Winnemucca and provides the same services as the CHN office in Lovelock. Health care and emergency services are provided by the Humboldt General Hospital and include the following: cardiac rehabilitation; laboratory services; long-term care; nutrition/dietary services; obstetrics; radiology; respiratory therapy; social services; a surgery center; and a wellness center (Humboldt General Hospital 2015).

Law enforcement in Humboldt County is provided by the Humboldt County Sheriff's Department, Winnemucca City Police, and NHP. Fire protection is provided by the Winnemucca Volunteer Fire Department (VFD). The Winnemucca Rural Fire Department, an all-volunteer department, provides fire protection services to the Grass Valley area of Humboldt County and a portion of Pershing County. The BLM provides fire protection and suppression activities on federal lands within Humboldt County. There are three fire stations serviced by the BLM Winnemucca District in Humboldt County: Winnemucca station; McDermitt station; and the United States Forest Service Paradise Valley Station, which is supervised by the BLM through a cooperative agreement (BLM 2015b).

Lyon County

The Lyon County School District serves approximately 8,082 students in 18 schools: four pre-Kindergarten (PK)-4 schools; three PK-6 schools; one PK-8 school; one PK-12 school; one 5-6 school; two 7-8 schools; one 5-8 school; one 5-12 school; and four 9-12 schools (Nevada Department of Education 2015).

The DPBH also provides CHN services to residents of all ages and incomes in Lyon County (DPBH 2015). There are CHN offices in Dayton, Fernley, Silver Springs, and Yerington that provide the same services as the CHN offices in Lovelock and Winnemucca. Renown Medical Group provides primary and urgent care services in Fernley and Silver Springs.

Law enforcement in Lyon County is provided by the Lyon County Sheriff's Office, Yerington Police Department, and NHP. Fire protection and emergency medical services are provided by the Central Lyon County Fire Protection District (FPD), the Mason Valley FPD, the North Lyon County FPD, and the Smith Valley FPD (Lyon County 2015). The BLM provides fire protection and suppression activities on federal lands within Lyon County through the BLM Carson City District Office.

Churchill County

The Churchill County School District serves approximately 3,488 students in seven schools: two PK schools; one K-1 school; one 2-3 school; one 4-5 school; one 6-8 school; and one 9-12 school (Nevada Department of Education 2015).

The DPBH also provides CHN services to residents of all ages and incomes in Churchill County (DPBH 2015). There is one CHN office in Fallon that provides the same services as the CHN offices in Lovelock, Winnemucca, Dayton, Fernley, Silver Springs, and Yerington. Banner Churchill Community Hospital in Fallon provides the following services: cancer care; diagnostic imaging; emergency care; emergency medical services; heart care; infusion center; laboratory services; maternity services; nutrition; rehabilitation services; surgical services; and women's services (Banner Health 2015).

Law enforcement in Churchill County is provided by the Churchill County Sheriff's Office, City of Fallon Police Department, and NHP. Fire protection is provided by the Fallon/Churchill VFD (Churchill County 2015). The BLM provides fire protection and suppression activities on federal lands within Churchill County through the BLM Carson City District Office.

3.11 Rangeland Management

3.11.1 Regulatory Framework

The BLM is committed by policy and directed by law (the Taylor Grazing Act of 1934, as amended and supplemented, the FLPMA, and the Public Rangeland Improvement Act of 1978) to manage forage in a sustained yield basis and to improve the condition of the public rangelands.

Regulations (43 CFR 1601.05(b) and CFR 4100.08) require the BLM to manage livestock grazing on public lands under the principles of multiple use and sustained yield. To accomplish these goals, livestock grazing is permitted on public rangelands within specific administration areas called allotments. The grazing permits have mandatory terms and conditions per 43 CFR 4130.3-1(a), including kind and number of livestock, period of use, allotment(s) to be used, and the amount of use in animal unit months (AUMs). BLM grazing permits are managed to attain allotment specific objectives and the Standards for Rangeland Health. Permits are evaluated periodically by the BLM to determine whether management goals are being met or making progress towards being met.

3.11.2 Assessment Area

The assessment area for rangeland management is the Project Area.

3.11.3 Existing Environment

The Project Area is located primarily within the South Rochester Allotment, with a small portion in the northwest corner of the Project Area located in the Coal Canyon-Poker allotment. The South Rochester Allotment consists of approximately 170,807 acres of public land. Based on GIS data analysis, there are approximately 171,740 BLM-administered acres supporting 1,386 AUMs within the South Rochester allotment. The Coal-Canyon Poker Allotment consists of approximately 97,829 acres of public land supporting 3,699 AUMs. Natural drainages and other

surface water features support livestock grazing within the allotments. BLM-and NDOW-approved barbed wire fencing is in place to minimize the intrusion of livestock into the heap leach processing area. Eight-foot high chain-link fences are in place around the lined ponds. Fencing and/or cattle guards are in appropriate locations as shown on Figure 2.1.1. There is a security gate near the administration building to control access to the processing facilities.

3.12 Soils

3.12.1 Regulatory Framework

The BLM Regulations for surface management of public land mined under the General Mining Law of 1872 (30 U.S.C. § 22 et seq.) are provided in 43 CFR 3809. Specifically, 43 CFR 3809.1 required mining-related activities to minimize impacts to soil resources. Guidance for reclamation is provided in the BLM Handbook H-3042-1 (1992).

State of Nevada laws and regulations, NAC 445A.350 - NAC 445A.447 (Mining Facilities) and NAC 519A.010 - NAC 519A.415 (Regulation of Mining Operations), were developed to implement the requirements of the NRS 445A.300 - NRS 445A.730 (Water Pollution Control) and NRS 519A.010- NRS 519A.290 (Reclamation of Land Subject to Mining Operations). The purpose of these statutes are in part to ensure that the lands disturbed by mining operations are reclaimed to safe and stable conditions, which includes soil conservation through erosion control.

3.12.2 Assessment Area

The assessment area for soil is the Project Area.

3.12.3 Existing Environment

The existing environment in the Project Area consists of 347 acres of existing disturbance occupied by mine facilities and areas cleared of vegetation and soil. The majority of the upper elevations of the Project Area are composed of outcrop and thin soil layers. Physiographic features occurring in the Project Area include fan remnants with slopes ranging from two to 15 percent and mountains with slopes ranging between 30 and 75 percent. The general soil texture associated with the fan remnant features include very to extremely gravelly loam to gravelly loam. Soil texture associated with the mountain feature is primarily extremely cobbly loam. According to the Natural Resource Conservation Service (NRCS), five soil associations were identified within the Project Area.

Bubus very fine sandy loam; Eastwell-Shabliss-Blackhawk association; Oxcorel-Beoska association; Pufer, very steep-Atlow Pufer association; Puffer-Mulhop-Rock outcrop association; and Snapp-Oxcorel association. Soil associations within the Project Area are shown on Figure 3.12.1 and listed in Table 3.12-1.

Biological Soil Crusts

Using a GIS predictive model developed by the Winnemucca BLM, approximately one third of the Project Area covers soils that have a moderate potential for the presence of biological soil crusts. The remaining Project Area covers soils that exhibit low potential for biological soil crust. Also the amount of existing disturbance apparent from air photo imagery suggests an even higher total area of low potential.

Table 3.12-1: Soil Associations within the Project Area

Association	Soil Series	Range in Depth to Restrictive Feature	Landscape position/ % Slope	Profile Soil Texture	Permeability	Erosion Hazard by Water	Erosion Hazard by Wind
Bubus very fine sandy loam 0 to 2 percent slopes (932)	Bubus and similar soils (100%)	More than 80 inches	Lake plains / 0 to 2 percent slope	0 to 13 inches: very fine sandy loam 13 to 60 inches: stratified sandy loam to silt loam	Well drained, low runoff	High	High
Eastwell-Shabliss-Blackhawk association (1550)	Eastwell and similar soils (35)	10 to 20 inches to duripan	Fan remnants / 2 to 8 percent slope	0 to 6 inches: very gravelly loam 6 to 12 inches: very gravelly loam 12 to 20 inches: cemented 20 to 60 inches: very cobbly loam	Well drained, very high runoff	High	High
	Shabliss and similar soils (30)	10 to 20 inches to duripan	Partial ballenas / 30 to 50 percent slope	0 to 3 inches: gravelly loam 3 to 19 inches: loam 19 to 30 inches: cemented 30 to 60 inches: very gravelly loamy sand	Well drained, very high runoff	High	High
	Blackhawk and similar soils (20)	10 to 20 inches to duripan	Partial ballenas / 30 to 50 percent slope	0 to 3 inches: gravelly loam 3 to 14 inches: gravelly very fine sandy loam 14 to 30 inches: cemented 30 to 48 inches: very gravelly sandy loam 48 to 60 inches: extremely gravelly coarse sand	Well drained, very high runoff	High	High
Oxcorel-Beoska association (669)	Oxcorel (45%)	More than 80 inches	Fan remnants / 2 to 8 percent slope	0 to 8 inches: gravelly very fine sandy loam 8 to 34 inches: clay 34 to 60 inches: very gravelly sandy loam	Well drained, very high runoff	Moderate	Moderate
	Beoska (40%)	More than 80 inches	Fan remnants / 2 to 8 percent slope	0 to 13 inches: gravelly very fine sandy loam 13 to 25 inches: clay loam 25 to 44 inches: stratified gravelly sandy loam to gravelly very fine sandy loam 44 to 60 inches: stratified very gravelly sandy loam to extremely gravelly very fine sandy loam	Well drained, very high runoff	Moderate	Moderate

Association	Soil Series	Range in Depth to Restrictive Feature	Landscape position/ % Slope	Profile Soil Texture	Permeability	Erosion Hazard by Water	Erosion Hazard by Wind
Puffer, very steep – Atlow-Puffer association (957)	Puffer and similar soils (40%)	4 to 14 inches to lithic bedrock	Mountains / 50 to 75 percent slope	0 to 2 inches: very cobbly loam 2 to 11 inches: very gravelly loam 11 to 21 inches: unweathered bedrock	Well drained, very high runoff	Low	Low
	Atlow and similar soils (30%)	4 to 20 inches to lithic bedrock	Mountains / 50 to 75 percent slope	0 to 4 inches: very flaggy loam 4 to 15 inches: very gravelly clay loam 15 to 25 inches: unweathered bedrock	Well drained, very high runoff	Low	Low
	Puffer and similar soils (15%)	4 to 14 inches to lithic bedrock	Mountains / 15 to 30 percent slope	0 to 2 inches: very cobbly loam 2 to 11 inches: very gravelly loam 11 to 21 inches: unweathered bedrock	Well drained, very high runoff	Low	Low
Puffer-Mulhop-Rock outcrop association (955)	Puffer and similar soils (45%)	4 to 14 inches to lithic bedrock	Mountains / 30 to 50 percent slope	0 to 2 inches: very cobbly loam 2 to 11 inches: very gravelly loam 11 to 21 inches: unweathered bedrock	Well drained, very high runoff	Low	Low
	Rock outcrop (20%)	-	Mountains	-	-	-	-
	Mulhop and similar soils (20%)	4 to 14 inches to lithic bedrock	Mountains / 30 to 50 percent slope	0 to 6 inches: very gravelly loam 6 to 17 inches: very gravelly loam 17 to 27 inches: unweathered bedrock	Well drained, very high runoff	Low	Low
Snapp-Oxcorel association (750)	Snapp (50 %)	More than 80 inches	Fan remnants / 2 to 8 percent slope	0 to 9 inches: very fine sandy loam 9 to 28 inches: gravelly clay 28 to 39 inches: gravelly clay loam 39 to 60 inches: extremely gravelly loamy sand	Well drained, high runoff	High	High
	Oxcorel (40 %)	More than 80 inches	Fan remnants / 2 to 8 percent slope	0 to 8 inches: gravelly very fine sandy loam 8 to 34 inches: clay 34 to 60 inches: very gravelly sandy loam	Well drained, high runoff	High	High

Source: NRCS Web Soil Survey 2015, Survey Area Data: Version 11, August 18, 2014.

3.13 Special Status Species

3.13.1 Regulatory Framework

Special status species are those plants and animals that are listed, candidate, or proposed for listing under the ESA of 1973 (16 U.S.C. 1531 et seq.), as amended, State of Nevada listed species, and species managed as "Sensitive" by the BLM. The ESA provides for the conservation of federally listed plant and animal species and their habitats. The BLM Manual 6840 provides management policy for federally listed species and BLM- designated Sensitive species.

The Bald and Golden Eagle Protection Act prohibits the take or possession of bald and golden eagles with limited exceptions. Take, as defined in the act, includes "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." Disturb means to agitate or bother a bald or golden eagle to a degree that causes or is likely to cause, based on the best scientific information available, injury to an eagle; a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior. An important eagle use area is defined as an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding and the landscape features surrounding a nest, foraging area, or roost site. The BLM also has policy guidance for addressing potential impacts of projects on golden eagles (IM No. NV 2010-034). This memorandum indicates that the BLM Field Manager must notify applicants during the permitting process that construction and operation of a facility may result in take and that it is the applicant's responsibility to consult with the USFWS and obtain any applicable permits. The BLM should also provide applicants federal guidelines for inventory and monitoring protocols. Bald and golden eagles are discussed under migratory birds in Section 3.4.

3.13.2 Assessment Area

The assessment area for special status species, other than raptors, is the Project Area. The assessment area for raptors includes a one-mile buffer around the Project Area. The nesting eagle assessment area includes a ten-mile buffer around the Project Area.

3.13.3 Existing Environment

The USFWS, Nevada Natural Heritage Program (NNHP), and NDOW were contacted to obtain information on sensitive species that have the potential to occur within the Project Area (Enviroscientists 2015a). In addition, the BLM Sensitive list was evaluated for species with the potential to occur within the buffer areas around the Project Area.

No federally listed endangered, threatened, or candidate species or critical habitats are known to occur within the Project Area. Data from the NNHP database indicates that one special status plant species, Lahontan milkvetch (*Astragalus porrectus*), was previously recorded within the vicinity of the Project Area. The NNHP also specified that habitat within or near the Project Area may also be available for the following special status species: windloving buckwheat (*Eriogonum anemophilum*), a Nevada BLM sensitive plant species, and Nevada suncup (*Camissonia nevadensis*), a NNHP vulnerable plant species; Nevada viceroy (*Limenitis archippus lahontani*), a NNHP Critically Imperiled wildlife species; Townsend's big-eared bat (*Corynorhinus*

townsendii), a Nevada BLM Sensitive wildlife species, and pallid bat (*Antrozous pallidus*), a Nevada BLM Sensitive wildlife species (Enviroscientists 2015a).

The BLM lists 82 Sensitive species with the potential to occur regionally, which includes the Project Area. The BLM determined that the Project Area may provide suitable habitat for 53 of the 82 Sensitive species, which included 18 plants, 13 birds, 19 mammals, and three insects (Enviroscientists 2015a). Field surveys conducted in 2014 (Enviroscientists 2014) documented two Nevada BLM Sensitive plant species and two Nevada BLM Sensitive bird species as utilizing habitat within the Project Area. A third plant species, Lahontan milkvetch, a NNHP vulnerable species, was also present. The two Nevada BLM Sensitive plant species were Lahontan beardtongue (*Penstemon palmeri var. macranthus*) and sand cholla (*Grusonia pulchella*). The two Nevada BLM Sensitive avian species were golden eagle (*Aquila chrysaetos*) and Western burrowing owl (*Athene cunicularia hypugaea*) (Enviroscientists 2015a).

3.13.3.1 Plants

A special status plant survey was conducted in June 2014 (Enviroscientists 2014) as a component of baseline botanical surveys for the Project. Figure 3.13.1 shows the survey tracks over the Project Area. The special status plant survey followed the protocols established in the Survey Protocols Required for National Environmental Policy Act (NEPA)/ESA Compliance for BLM Special Status Plant Species provided by the BLM. During a special status species habitat evaluation conducted on site by the BLM in the spring of 2014, the BLM identified the occurrence of sand cholla (*Grusonia pulchella*) within the Project Area.

A systematic survey was conducted for sand cholla throughout the areas of the proposed Project disturbance and a surrounding 300-foot buffer (Focused Survey Area) that overlapped with suitable habitat for this BLM sensitive plant species.

Although sand cholla was specifically targeted during the special status plant species survey, all special status plant species with potential habitat within the Project Area were of focus during the survey. A Global Positioning System (GPS) track log was taken during all surveys in order to ensure proper coverage of the Project Area with emphasis on areas of potential habitat for special status species and within the Focused Survey Area (Enviroscientists 2015a).

Lahontan Beardtongue (BLM Sensitive)

Twenty-seven occurrences of Lahontan beardtongue were observed within or near drainages throughout the Project Area. The drainages were dry during the botanical surveys, and the surface soil textures within the drainages generally ranged between gravelly loam to gravelly, sandy loam. All drainages within the Project Area were surveyed as potential habitat for Lahontan beardtongue. Three or more occurrences of Lahontan beardtongue were in the area of the Proposed Action in the vicinity of the proposed exploration roads (Figure 3.13.2) (Enviroscientists 2015a).

Lahontan Milkvetch (NNHP Vulnerable)

Three occurrences of Lahontan milkvetch were recorded within the Project Area. The first occurrence was observed along the southwestern boundary of the Project Area (i.e., the southwestern occurrence), while the other two Lahontan milkvetch occurrences were adjacent to one another in the southeastern portion of the Project Area (i.e., the southeastern occurrences). There are no occurrences of Lahontan milkvetch within the area of the Proposed Action (Enviroscientists 2015a).

Sand Cholla (BLM Sensitive)

Eighty-one occurrences of sand cholla were recorded within the Project Area. Eighty of the 81 sand cholla occurrences were observed in the Inter-Mountain Basins Mixed Salt Desert Scrub and Disturbed Inter-Mountain Basins Mixed Salt Desert Scrub vegetation communities. A single occurrence of sand cholla was observed within the Disturbed Landscape/Road community within the central-east portion of the Project Area near the southwest corner of the existing mine pits. Eight occurrences of sand cholla are within the area of the Proposed Action (Figure 3.13.2) (Enviroscientists 2015a).

3.13.3.2 Wildlife

On August 1, 2014, an on-site bat habitat assessment was performed by the NDOW and Enviroscientists. On December 10 and 11, 2014, focused wildlife surveys were conducted in the areas of potential habitat for bats, greater sage-grouse, and pygmy rabbit within the Project Area.

The results of the bat surveys indicated only minimal and temporary bat use and unlikely habitat for maternity, hibernacula, or long-term roosting, therefore bats will not be discussed further. Similarly, pygmy rabbit, pygmy rabbit sign, and suitable pygmy rabbit habitat were not observed within the Project Area during the focused wildlife survey and they will not be discussed further (Enviroscientists 2015a).

Occupied western burrowing owl burrows were identified in the Project Area during the botanical surveys in June of 2014. Due to the occurrence of these burrows, western burrowing owls were present within the Project Area and further surveys for western burrowing owl were deemed unnecessary.

No surveys were conducted for the dark kangaroo mouse (*Microdipodops megacephalus*), pale kangaroo mouse (*Microdipodops pallidus*), or Preble's shrew (*Sorex preblei*), because a take permit was not issued due to the mortality risk associated with trapping small mammals. Given the presence of suitable habitat in the Project Area, these three species are assumed to be present for the purpose of this analysis (Enviroscientists 2015a).

3.13.3.3 Birds

Greater Sage-grouse (BLM Sensitive)

A greater sage-grouse survey and habitat assessment was conducted in December 2014. No greater sage-grouse or sign was observed within the Project Area. The surveyed area within the Project Area was determined to be unlikely habitat for greater sage-grouse, as encroachment by Utah juniper trees occurred throughout the sagebrush-dominated vegetation communities (Enviroscientists 2015a). In addition, NDOW reported that there are no known greater sage-grouse lek sites in the vicinity of the Project Area.

According to the 2014 greater sage-grouse habitat map developed by the U. S. Geological Survey (USGS) for the State of Nevada's Sagebrush Ecosystem Program (IM No. NV-2015-017), the area containing disturbance associated with the Proposed Action is either not habitat or classified as Other Habitat Management Area (OHMA) (Figure 3.13.3). The OHMA area within the Project because the area lacks the following key habitat features as defined by the Sagebrush Ecosystem Technical Team (SETT) (2014): water sources (SWS 2015), riparian and wet meadows; sagebrush cover greater than 65 percent within the landscape for seasonal habitat use; and cover by shrub species other than big sagebrush (*Artemisia tridentata*). High levels of disturbance within the Project Area from livestock and feral horse grazing and mineral exploration activities have altered the native landscape conditions within the Project and have promoted the prevalence of invasive and non-native annual plant species such as cheatgrass and saltlover.

Western Burrowing Owl (BLM Sensitive)

No focused wildlife surveys were conducted for the western burrowing owl because the presence of western burrowing owl within the Project Area was assumed based on the owl signs (pellets, whitewash, cricket carcasses, and feathers) documented during the botanical surveys. Three occupied western burrowing owl burrows were recorded within the Inter-Mountain Basins Mixed Salt Desert Scrub vegetation community.

3.13.3.4 Mammals

Dark Kangaroo Mouse (BLM Sensitive)

The dark kangaroo mouse is restricted to the Great Basin Desert. Based on calculations derived from Hafner and Upham 2011, the dark kangaroo mouse distribution is estimated to extend over 32.5 million acres across Nevada. Its preferred habitat occurs on fine gravelly soil, primarily valley bottoms and alluvial fans with big sagebrush, rabbitbrush (*Chrysothamnus* spp.), and horsebrush (*Tetradymia* spp.) vegetation. The dark kangaroo mouse would likely occur in Inter-Mountain Basins Big Sagebrush Shrubland and Great Basin Xeric Mixed Sagebrush Shrubland. Breeding for the dark kangaroo mouse occurs from April to September. No specific surveys were conducted for the dark kangaroo mouse. Given the presence of suitable habitat, the species is assumed present for this analysis.

Pale Kangaroo Mouse (BLM Sensitive)

Based on information from the California BLM (2015a), the ranges of the dark and pale kangaroo mice overlap, but pale kangaroo mice have a much narrower range. They prefer habitats in high, cold deserts (they are most commonly found in Nevada but California has a small population in Inyo and Mono counties). Pale kangaroo mice live in burrows about one foot below the ground. Their burrows are not extensive and are not used for food storage. The burrows are built in windblown sand and may be up to six feet long. They mainly feed on seeds and grains, but they also eat insects when they are available. They hunt in open areas with no canopy to protect them. The breeding season is from March to September. During years with high rainfall, vegetation is abundant and females may have multiple litters. In dry years, females may not reproduce. Given the presence of suitable habitat, the species is assumed present for this analysis.

Preble's Shrew (BLM Sensitive)

Preble's shrew has been found mostly in sagebrush and grassland habitats and occasionally in coniferous forest, marshes, and riparian areas. Based on information available via NatureServe (2014) and NNHP species information, Preble's Shrew habitat extends throughout northern Nevada in Elko, Humboldt and Washoe Counties potentially extending through 13.6 million acres. Preble's shrew usually occurs in sagebrush-grassland habitats often when vegetative cover is between 40 percent and 60 percent. Potentially suitable foraging and nesting habitat occurs within the Project Area in the Inter-Mountain Basins Big Sagebrush Shrubland habitat. No surveys were conducted for Preble's shrew in the Project Area; however, based on the presence of acceptable habitat the species is assumed present.

3.14 Vegetation

3.14.1 Regulatory Framework

The FLPMA, Public Rangelands Improvement Act of 1978, 43 CFR 4180, and the NDEP BMRR revegetation standards, *Guidelines for Successful Revegetation for the Nevada Division of Environmental Protection, the Bureau of Land Management and the U.S.D.A. Forest Service,* provide the direction, goals, and objectives for vegetation management and reclamation success on BLM-administered public land in the Project Area.

3.14.2 Assessment Area

The assessment area for vegetation includes the area that would be affected by the proposed expansion of the mine and ancillary facilities.

3.14.3 Existing Environment

The assessment area is located at the southern end of the Humboldt Range within Packard Flat at elevations ranging from 4,650 to 6,923 feet amsl. Baseline botanical surveys within the Project Area were conducted from June 7 through June 14, 2014, and June 26 through June 29, 2014 (Enviroscientists 2015a). The landscape exhibited disturbed conditions as a result of previous

mining activities, ongoing mineral exploration, and continuous grazing by livestock and feral horses. Dirt roads associated with mining, mineral exploration, and ranching were present throughout the area of the Proposed Action.

Through the use of definitions provided by the Southwest Regional Gap Analysis Project (SWReGAP) (USGS GAP 2005) and Peterson (2008), the following nine vegetation communities were delineated within the area of the Proposed Action: 1) Inter-Mountain Basins Mixed Salt Desert Shrub; 2) Disturbed Inter-Mountain Basins Mixed Salt Desert Scrub; 3) Inter-Mountain Basins Rabbitbrush-Big Sagebrush Drainage; 4) Inter-Mountain Basins Big Sagebrush Shrubland with Encroaching Utah Juniper; 5) Great Basin Black Sagebrush-Utah Juniper Woodland; 6) Great Basin Sagebrush-Utah Juniper Woodland; 7) Great Basin Xeric Mixed Sagebrush Shrubland; 8) Limestone Outcrop; and 9) Disturbed Landscape/Road (Figure 3.3.1). The following discussion is a description of the communities comprising an acre or greater within the area of the Proposed Action.

Inter-Mountain Basins Mixed Salt Desert Scrub

The Inter-Mountain Basins Mixed Salt Desert Scrub vegetation community is present in the Waste Rock Dump 5 and the Relief Canyon Pit areas. The Inter-Mountain Basins Mixed Salt Desert Scrub vegetation community is dominated by the following shrub species: shadscale saltbush, yellow rabbitbrush, bud sagebrush, and Nevada jointfir (*Ephedra nevadensis*). Sandberg bluegrass, a perennial grass species, is also prevalent in this vegetation community along with the two invasive and non-native annual species saltlover and cheatgrass. Gooseberryleaf globemallow (*Sphaeralcea grossulariifolia*) is scattered throughout the Inter-Mountain Basins Mixed Salt Desert Scrub vegetation community but in low densities.

Disturbed Inter-Mountain Basins Mixed Salt Desert Scrub

The Disturbed Inter-Mountain Basins Mixed Salt Desert Scrub vegetation community is present in the heap leach pad area. The degradation in this community is primarily a result of livestock grazing. The Disturbed Inter-Mountain Basins Mixed Salt Desert Scrub vegetation community generally contains the same plant species as the adjacent Inter-Mountain Basins Mixed Salt Desert Scrub community. The difference between these two vegetation communities occurs with the dominant plant species. The Disturbed Inter-Mountain Basins Mixed Salt Desert Scrub community is dominated by the invasive and non-native annual plant species saltlover and cheatgrass. The common shrub species within the Disturbed Inter-Mountain Basins Mixed Salt Desert Scrub vegetation community are shadscale saltbush, yellow rabbitbrush, and bud sagebrush.

Inter-Mountain Basins Rabbitbrush-Big Sagebrush Drainage

The Inter-Mountain Basins Rabbitbrush-Big Sagebrush Drainage vegetation community is present in the Waste Rock Dump 5 and the Relief Canyon Pit areas. The vegetation community occupies prominent ephemeral drainages in which water flows from the Humboldt Range in the eastern portion of the Project Area west to Packard Flat during large precipitation events. The soils within the Inter-Mountain Basins Rabbitbrush-Big Sagebrush Drainage community are cobbly and very gravelly loam.

The three shrub species, rubber rabbitbrush, yellow rabbitbrush, and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), are codominant within the Inter-Mountain Basins Rabbitbrush-Big Sagebrush Drainage vegetation community. The perennial grass species Sandberg bluegrass is another prominent plant species within this vegetation community. The invasive and non-native annual plant species saltlover and cheatgrass are also abundant in the Inter-Mountain Basins Rabbitbrush-Big Sagebrush Drainage community. Native forb species are not abundant in this vegetation community, but common forb species that are scattered throughout the community include tufted Townsend daisy (*Townsendia scapigera*), Palmer's buckwheat (*Eriogonum palmerianum*), and tufted evening primrose (*Oenothera caespitosa*).

Inter-Mountain Basins Big Sagebrush Shrubland with Encroaching Utah Juniper

The Inter-Mountain Basins Big Sagebrush Shrubland with Encroaching Utah Juniper vegetation community is present in the Relief Canyon Pit and the proposed exploration roads areas. The Inter-Mountain Basins Big Sagebrush Shrubland with Encroaching Utah Juniper contains only scattered Utah juniper and is still dominated by Wyoming big sagebrush. Yellow rabbitbrush, Mormon tea (*Ephedra viridis*), and slender buckwheat (*Eriogonum microthecum*) are also common shrub species within this vegetation community, while Sandberg bluegrass is a prevalent perennial grass, and cheatgrass, an invasive and non-native annual grass, was also abundant. The vegetation community also contains a diverse assortment of forb species, but no single species contributes an absolute cover of five percent or more. Common forb species include cushion buckwheat (*Eriogonum ovalifolium*), spiny phlox (*Phlox hoodii*), longleaf phlox (*Phlox longifolia*), tapertip hawksbeard (*Crepis acuminata*), roughseed cryptantha (*Cryptantha flavoculata*), scabland fleabane (*Erigeron bloomeri*), Bruneau Mariposa lily (*Calochortus bruneaunis*), and woollypod milkvetch (*Astragalus purshii*).

Great Basin Black Sagebrush-Utah Juniper Woodland

The Great Basin Black Sagebrush-Utah Juniper Woodland is present in the area of the proposed exploration roads. Similar to the Inter-Mountain Basins Big Sagebrush Shrubland with Encroaching Utah Juniper vegetation community, the presence of Utah juniper in the Great Basin Black Sagebrush-Utah Juniper Woodland community is likely the result of Utah juniper encroaching into the black sagebrush shrubland. However, the density and cover of Utah juniper in the Great Basin Black Sagebrush-Utah Juniper Woodland community is higher than compared to that in the Inter-Mountain Basins Big Sagebrush Shrubland with Encroaching Utah Juniper vegetation community. Black sagebrush and Utah juniper are codominant species, while Wyoming big sagebrush, Mormon tea, rubber rabbitbrush, and yellow rabbitbrush are also abundant shrub species within this vegetation community. Sandberg bluegrass is a prevalent perennial grass, and spiny phlox and tapertip hawksbeard are scattered throughout the community.

Great Basin Sagebrush-Utah Juniper Woodland

The Great Basin Sagebrush-Utah Juniper Woodland vegetation community is present in the proposed exploration roads areas. It is a distinct association of plant species that supports black sagebrush, Wyoming big sagebrush, and Utah juniper as codominant plant species. Although Utah Juniper is a codominant plant species, shrubs dominate this landscape. Rubber rabbitbrush, yellow

rabbitbrush, and Mormon tea are also prevalent shrub. Two invasive and non-native annual grass species, cheatgrass and red brome (*Bromus rubens*) were abundant throughout this vegetation community. The following perennial grass species are scattered throughout the community: Sandberg bluegrass; squirreltail; and Indian ricegrass.

Limestone Outcrop

The Limestone Outcrop community is present in the area of the Relief Canyon pit and the proposed exploration roads. Large limestone rock outcrops dominate the landscape, and the rock outcrops are sparsely covered by various plant species. The most common plant species are Utah juniper, Wyoming big sagebrush, Nevada jointfir, yellow rabbitbrush, cheatgrass, and Sandberg bluegrass.

Disturbed Landscape/Road

The Project Area contains many large areas that are disturbed by roads, cattle and feral horse grazing, mineral exploration, and mining and mineral processing activities. The Disturbed Landscape/Road community is present in the Relief Canyon pit, waste rock storage facilities, processing plant, administrative buildings, and the heap leach pad areas. This community is dominated by invasive and non-native annual plant species that include saltlover, cheatgrass, red brome, burningbush (*Bassia scoparia*), prickly Russian thistle, clasping pepperweed, and meadow barley (*Hordeum brachyantherum*). Due to previous reclamation efforts around the existing mining pits and on the waste rock storage facilities, native plant species also occupy the Disturbed Landscape/Road community. The most common shrub species within these portions of the Disturbed Landscape/Road community are rubber rabbitbrush and shadscale saltbush with scattered patches of Heermann's buckwheat (*Eriogonum heermannii*). Three native annual buckwheat species, Palmer's buckwheat, birdnest buckwheat (*Eriogonum nidularium*), and nodding buckwheat (*Eriogonum cernuum*), are abundant throughout the community. Two common perennial grass species are Sandberg bluegrass and crested wheatgrass (*Agropyron cristatum*) which are both grass species that are commonly included in seed mixes applied during reclamation efforts.

3.15 Wildlife

3.15.1 Regulatory Framework

Section 102.8 of the FLPMA states that the policy of the U.S.is to manage public land in a manner that protects the quality of multiple resources and provides food and habitat for fish, wildlife, and domestic animals. The Public Rangelands Improvement Act of 1978 directs the BLM to improve rangeland conditions with due consideration given the needs of wildlife and their habitats. Wildlife and fish resources and their habitat on public land are managed cooperatively by the BLM and NDOW under a MOU as established in 1971. The MOU describes the BLM's commitment to manage wildlife and fisheries resources habitat, and the NDOW's role in managing population. The NDOW administers state wildlife management and protection programs as set forth in NRS Chapter 501, Wildlife Administration and Enforcement, and NAC Chapter 503, Hunting, Fishing, and Trapping; Miscellaneous Protective Measures. NRS 501.110 defines the various categories of wildlife in Nevada, including protected categories. NAC 503.010, 503.080, 503.110, and 503.140

list the wildlife species currently placed in the state's various legal categories, including protected species, game species, and pest species.

3.15.2 Assessment Area

The assessment area for general wildlife is the Project Area.

3.15.3 Existing Environment

On January 15, 2014, the NDOW provided data with information on the known or potential occurrence of wildlife resources in the vicinity of the Project. According to the NDOW, the entire Project Area and the four-mile buffer surrounding the Project Area are considered occupied habitat for the pronghorn antelope (*Antilocapra americana*). The eastern mountainous portion of the Project Area and the western and eastern portions of the four-mile buffer surrounding the Project Area serve as occupied mule deer (*Odocoileus hemionus*) habitat. There are no known bighorn sheep (*Ovis canadensis*) or elk (*Cervus elaphus*) distributions that occur within four miles of the Project Area (Enviroscientists 2015a).

The NDOW identified the following non-special status wildlife species as having been observed in the vicinity of the Project Area: Great Basin fence lizard (*Sceloporus occidentalis longipes*); western fence lizard (*Sceloporus occidentalis*); and zebra-tailed lizard (*Callisaurus draconoides*). The following NDOW-listed species of conservation priority also have the potential to occur in the Project Area: desert horned lizard (*Phrynosoma platyrhinos*), long-nosed leopard lizard (*Gambelia wislizenii*); Townsend's big-eared bat (*Corynorhinus townsendii*); and western small-footed myotis (*Myotis ciliolabrum*).

4 ENVIRONMENTAL CONSEQUENCES

The following sections describe the direct and indirect environmental consequences that would result from implementation of the Proposed Action and No Action alternatives. The existing conditions for each resource below can be found in Chapter 3.

4.1 Air Quality

4.1.1 Proposed Action

Criteria Air Pollutants

Dispersion modeling was used to assess potential air quality impacts resulting from pollutant sources associated with Proposed Action activities. These impacts include the operation of stationary and mobile equipment and fugitive emission sources associated with mining and heap leaching activities.

Air emission estimates were calculated based on the maximum material throughput for each applicable time period, using EPA approved AP-42 emission factors (EPA 2009) for the Proposed Action. Table 4.1-1 shows the emissions, in tpy, that were used in the modeling analysis.

Table 4.1-1: Modeled Emission Rates for the Project

Source Category	PM*	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC*	Pb
Point Sources Emissions	3.35	2.90	2.81	101.97	0.49	35.92	2.78	0.000
Fugitive Sources Emissions	302.36	121.60	14.08	186.58	7.23	382.70	8.30	0.002
Project Total (tons/year)	**305.71**	**124.50**	**16.90**	**288.55**	**7.72**	**418.62**	**11.08**	**0.002**

*PM and volatile organic compounds (VOC) (not modeled)
Source: Enviroscientists 2015

The results of the NEPA dispersion modeling for the Project Area are presented in Table 4.1-2. This table shows the highest modeled results with the appropriate background concentrations at any point of public access for all pollutant-averaging time combinations, the location (in Universal Transverse Mercator [UTM] North American Datum 1983 [NAD 83] coordinates) of the highest modeled public access receptor, and the lowest applicable standard (NAAQS or Nevada AAQS) for each of the pollutant-averaging time combinations.

Table 4.1-2 shows the emissions from stationary and mobile equipment and fugitive dust emissions associated with the Proposed Action, including background concentrations, would not exceed the NAAQS or Nevada AAQS.

Table 4.1-2: Highest Modeled Air Pollutant Concentrations from the Proposed Action at Receptor Points Accessible to Public

Pollutant	Averaging Time	Met. Data Year	Highest Modeled Receptor Point			Applicable Ambient Standard ($\mu g/m^3$)
			Receptor Location[1]		Dispersion Modeling Results ($\mu g/m^3$)[2]	
			UTM Easting (m)	UTM Northing (m)		
PM_{10}	24-Hour	2010-2014	396791	4451525	60.91	150
$PM_{2.5}$	24-Hour	2010-2014	396790	4451450	13.30	35
	Annual	2010	398334	4452557	3.57	12
SO_2	1-Hour	2010-2014	396757	4451182	3.65	196
	3-Hour	2012	396787	4451175	3.19	1,300
	24-Hour	2010	396786	4451080	0.74	365
	Annual	2011	396786	4451055	0.08	80
CO	1-Hour	2010	400084	4452530	496.93	40,000
	8-Hour	2011	399934	4452532	126.14	10,000
NO_2	1-Hour	2010-2014	400059	4452530	175.21	188
	Annual	2010	399134	4452544	6.89	100

[1] All coordinates in UTM projection, NAD 83.
[2] Background concentration values are included.
Source: Enviroscientists 2015

Hazardous Air Pollutants

HAPs emissions were calculated to determine if the Project constituted a major HAPs source. HAPs emissions from the Project would result from the handling of earthen materials, the combustion of the hydrocarbon fuels, the operation of thermal units, and the handling and use of various chemicals. The inventory considers all stationary sources, as well as the process fugitive emissions from mining the open pit and placement of the waste rock in the WSRAs and the processing operations in the heap leach area. The fugitive dust from hauling, waste rock disposal, and blasting are included.

A summary of the total HAPs emissions that would be emitted from the Project is presented in Table 4.1-3. The facility-wide HAPs emissions would be 1.52 tpy. Cyanide compounds would be the highest emitted single HAP at 1.17 tpy. These estimated emissions include both fugitive sources and emissions from the processing facility. The estimated mercury emissions also include emissions of mercury from the thermal units permitted under the MOPTC.

EPA thresholds for any single HAP or all HAPs combined are ten and 25 tpy, respectively. With the exception of Pb, there are no ambient air quality standards for HAPs. HAP emissions would have an incremental impact on the air quality in the vicinity of the Project Area.

Table 4.1-3: Hazardous Air Pollutants Emissions for the Proposed Action

HAPs	Facility Total (tpy)
Benzene	0.07
Toluene	0.029
Xylenes	0.020
Formaldehyde	0.035
Actealdehyde	0.021
Acrolein	0.0029
Naphthalene	0.011
Antimony	0.00039
Arsenic	0.037
Beryllium	0.0009
Cadmium	0.00043
Chromium	0.026
Cobalt	0.0019
Cyanide (Hydrogen Cyanide Compounds)	1.17
Lead	0.0024
Manganese	0.070
Mercury	0.015
Nickel	0.0061
Selenium	0.00034
Total	**1.52**

Source: Enviroscientists 2015

Greenhouse Gas Emissions

GHGs include CO_2, CH_4, N_2O, hydro fluorocarbons, per fluorocarbons, and sulfur hexafluorides. GHG emissions from the Project construction and operations specifically include CO_2, CH_4, and N_2O emissions from combustion units. Each GHG has been assigned a global warming potential (GWP) that relates to the potential of the gas to trap heat in the atmosphere over a specified period of time. A relative contribution method has been established by the Intergovernmental Panel on Climate Change (IPCC) to estimate a total GHG weighted emissions based on CO_2 as the reference gas with CO_2e equaling one GWP. The GWP equivalents for CH_4 and N_2O are 25 and 298, respectively. The GHG emission estimate for the Project is presented in Table 4.1-4.

Table 4.1-4: Proposed Project Greenhouse Gas Emissions

GHG	Metric Tons
CO_2e	27,135

Source: Enviroscientists 2015

The total Project CO_2e emissions of 27,135 metric tons per year is the GWP that is expected as a result of GHG emissions after the Proposed Action commences. The major portion of CO_2 GHG emissions are from fuel combustion. No GHG data exist for existing conditions at the proposed Project. For the purposes of this analysis, a baseline of zero GHG emissions has been established for reference conditions.

The analysis of Nevada's GHG emissions indicates that for 2010, statewide gross GHG emissions totaled 45 million metric tons (MMt) of CO_2e. GHG emissions are expected to increase during the projection period (2011-2030) with an average increase of about 0.3 MMt per year. Total gross GHG emissions are expected to reach 53 MMt CO_2e by the year 2030 (NDEP 2013b). GHG emissions from the proposed Project have a potential to introduce an additional 0.027 MMt CO_2e within the projected time frame. The amount of GHG emissions is less than one percent of the expected statewide GHG emissions and is considered minimal.

Nationally, the CO_2 emissions as a result of fossil fuel combustion (energy emissions) are projected to increase by 17 percent to 6,447 MMt by the year 2020. For non-energy CO_2 sources, emissions are expected to increase one MMt each year to 396 MMt by 2020. Energy-based CO_2 emissions make up over 99 percent of the total proposed Project GHG emissions. Because the CO_2 emissions from the proposed Project are equivalent to 0.027 MMt, the contribution of the Project to the national projected CO_2 emissions would be less than one percent and is considered minimal.

4.1.2 No Action Alternative

As a result of the No Action Alternative, the existing and authorized Project would continue to operate under current conditions. There would be a temporary increase in emissions during reclamation for approximately three years. Air emissions from the existing operations would not be expected to increase over current levels. See Section 3.1 for a discussion of the current emissions.

4.2 Cultural Resources

4.2.1 Proposed Action

There is one unevaluated site in the Project Area (ASM 2015). Gold Acquisition Corp. would avoid the unevaluated site during all Project activities. In addition, the Proposed Action identifies that inadvertent discoveries of previously undetected cultural resources would be treated as required under 43 CFR 10.4, 43 CFR 3809.420(8)(b), and Section IV of the Protocol. Any such discovery would be immediately reported to the authorized BLM officer. All operations in the immediate area of the discovery would be suspended, and the site would be protected until the authorized officer could develop an appropriate plan for management of the resource. No direct or indirect adverse effects to historic properties are anticipated as a result of implementation of the Proposed Action. Cultural resources are not further analyzed in this EA.

4.2.2 No Action Alternative

The No Action Alternative would not affect cultural resources in the Project Area.

4.3 Invasive, Non-Native Species

4.3.1 Proposed Action

Disturbed sites and recently seeded areas have potential to be invaded and colonized by undesirable species such as noxious weeds and invasive plants. Two noxious weeds – salt cedar and perennial

pepperweed – as well as several invasive species are known to occur in the area affected by the Proposed Action. Indirect impacts would include potential introduction of species from disturbed or reclaimed areas to undisturbed areas of native vegetation. Through implementation of the EPMs outlined in Section 2.1.12 and implementation of the Noxious Weed Monitoring and Control Plan (Enviroscientists 2015b), no appreciable impact is expected.

4.3.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, and mining and heap leaching activities could continue on previously authorized surface disturbance. Following the completion of these activities, the closure and reclamation of the exploration, mine, and heap leach facilities would take place. Ongoing weed control programs at the Relief Canyon Mine would continue. Successful reclamation of the existing disturbance area would occur sooner, as compared to the Proposed Action, resulting in a vegetation community that would be less susceptible to weed invasion.

4.4 Migratory Birds

4.4.1 Proposed Action

Potential direct and indirect impacts to migratory birds would result from vegetation removal and other activities associated with the Proposed Action; especially if activities disrupt habitats in the nesting and brood-rearing period. The number of acres of undisturbed habitat that would be removed as a result of the Proposed Action by vegetation type is summarized in Table 4.4-1.

Table 4.4-1: Undisturbed Vegetation in the Area of the Proposed Action

Vegetation Community	Acres
Disturbed Inter-Mountain Basins Mixed Salt Desert Scrub	3.9
Disturbed Landscape/Road	34.5
Great Basin Black Sagebrush - Utah Juniper Woodland	2.1
Great Basin Sagebrush - Utah Juniper Woodland	1.7
Great Basin Xeric Mixed Sagebrush Shrubland	0.2
Inter-Mountain Basins Big Sagebrush Shrubland with Encroaching Utah Juniper	17.7
Inter-Mountain Basins Mixed Salt Desert Scrub	114.2
Inter-Mountain Basins Rabbitbrush - Big Sagebrush Drainage	6.0
Limestone Outcrop	2.0

These foraging and breeding habitats are common and widespread in Nevada and the Great Basin. Loss of these areas as a consequence of the Proposed Action would have a negligible effect on species which nest in the area if construction of mine and ancillary facilities were to take place outside of the nesting and brood-rearing period. Raptors that forage over the Project Area would experience a reduced prey base due to a reduction in habitats that support small mammals and insects. Following mining, successful reclamation would create habitat for raptor prey. The reclaimed land would have more grass and forb forage and less mature shrub forage in the

immediate years after reclamation, which may result in a shift of avian species use within these areas. As the plant communities mature, larger shrubs may provide additional cover and nesting opportunities. Approximately 70 acres of habitat for some species would be permanently lost due to expansion of the Relief Canyon Mine pit, which would not be reclaimed. However, the open pit has potential to create an increase in cliff nesting habitat for raptors after mining activities are finished.

The Proposed Action would remove foraging habitat for the golden eagle, but no known nest sites would be directly affected. The proposed Project would expand the area of disturbance and noise from the existing mine footprint, which could displace the golden eagle from undisturbed habitat near the expanded mine facilities. The golden eagle typically forages over large areas, and the direct loss of habitat and displacement from habitat near the expanded mine facilities would be a negligible reduction in a regional context and would not likely affect population density or viability. The presence of the existing mine and ancillary facilities has probably habituated the birds that forage in the vicinity of the mine to human disturbances and noise associated with mining. The Proposed Action would be a relatively small expansion of the level of disturbance and would not differ in magnitude of noise and activity from the past levels associated with mining at the Project.

Nesting surveys for golden eagles and other raptors were conducted in 2014 and May and June of 2015 (WRC 2015). In 2014, there were two golden eagle nests within the one-mile buffer of the Project Area, but both were unoccupied. The closest active nest was approximately five miles from the Proposed Action. In 2015, there were seven active golden eagle nests, and twelve active nests occupied by other raptors, within the ten-mile buffer area. It is unlikely that the proposed mine expansion would affect the use of these nests. The recommended buffer to protect golden eagle nests from disturbance is 0.5 miles (Romin and Muck 1999). It is likely that the golden eagle nests identified in the survey are sufficiently far removed from the proposed expansion to avoid displacement from mine-related activities.

EPMs for migratory birds have been incorporated into the Proposed Action. The migratory bird protection measures outlined in Section 2.1.12 would reduce the potential for direct loss of nests (e.g., crushing) or indirect effects (e.g., abandonment) from increased noise due to surface clearing activities.

4.4.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, and mining and heap leaching activities could continue on previously authorized surface disturbance. Following the completion of these activities, the closure and reclamation of the Relief Canyon exploration, mine, and heap leach facilities would take place. There would be no impacts to migratory birds from the No Action Alternative because nesting bird surveys would be required during the nesting period (March 1 – August 31) and activities would be limited in the vicinity of any nests.

4.5 Native American Religious Concerns

4.5.1 Proposed Action

To date, no impacts to Native American Religious Concerns have been identified; however, consultation is ongoing and the BLM continues to provide opportunities for participation and input.

4.5.2 No Action Alternative

No changes would be made to existing and authorized activities at the Relief Canyon Mine under the No Action Alternative. No impacts to Native American Religious Concerns are anticipated.

4.6 Wastes – Hazardous/Solid

4.6.1 Proposed Action

Regulated petroleum products and hazardous materials that would be used, stored, and transported in association with the Project are listed in Table 2.1-7. Cyanide use and handling is discussed in the mining and processing sections (Sections 2.1.3.3, 2.1.4, 2.1.10.2, 2.1.10.3.1, 2.1.11.10, and 2.1.12). Under the Proposed Action, approximately 11,700 gallons per day of diesel fuel, gasoline, oil, lubricants, and other petroleum based materials, would be stored and used at the Project Area during the life of the mine.

The generation of wastes and the use of hazardous materials as a result of ongoing Project activities may result in the release of these wastes or materials. Vehicles traveling on public roads in the Project Area would result in the presence of hazardous materials and wastes (e.g., fuel, antifreeze, battery acid, lead tire weights, Hg switches, or catalytic converters) for the duration of travel. These impacts would be short term and the risk posed from these activities would exist throughout the duration of the Project. Therefore, although there would be an increase in hazardous material deliveries to the Project Area, it is assumed the probability of a transportation-related release would be low. EPMs outlined in Section 2.1.12, the Project Emergency Response Plan Spill Response Best Management Practices (WPCP: Appendix F) (Knight Piésold 2016), and adherence to Nevada hazardous material and waste laws and regulations would minimize the impacts from the Proposed Action to the environment by ensuring any release of hazardous materials would be handled and reported in accordance with applicable federal and state laws and regulations. NAC 445A.240 requires immediate reporting of a release of a reportable quantity of a hazardous substance to the NDEP, based on Table 302.4 in 40 Part CFR Part 302.

4.6.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, and mining and heap leaching activities could continue on previously authorized surface disturbance. Following the completion of these activities, the closure and reclamation of the Relief Canyon exploration, mine, and heap leach facilities would take place. Impacts associated with the No Action Alternative would be similar to but fewer than the Proposed Action.

4.7 Water Resources

4.7.1 Proposed Action

A rock characterization program was conducted to assess the potential for release of ARD and trace elements from waste rock that would be mined under the Proposed Action and exposed to oxygen and precipitation (Knight Piésold 2014b). The ABA tests performed on the waste rock indicate this material is not PAG and is not expected to generate acid upon exposure to weathering. The standard (single-leach) MWMP tests indicated some of the samples leached arsenic, antimony, aluminum, sulfate, TDS, or chloride at concentrations greater than their respective NRV. However, the results from sequential MWMP tests indicate the "first flush" of solutes observed in the single-leach MWMP test were followed by lower concentrations with the additional rounds (up to four) of leaching conducted under the sequential MWMP testing protocol. After four rounds of leaching, concentrations of arsenic and antimony were below their respective NRV in all but one sample for antimony and one sample for arsenic. The waste rock testing indicates the waste rock is not PAG and would not generate ARD or ML conditions.

In the event mining encounters a significant volume of a waste rock type that has not been characterized and has unknown ARD or ML characteristics, ABA and MWMP tests would be performed. If the results of these tests indicate the rock may produce ARD or ML, the rock would be placed in a designated cell in WRSA 5 and encapsulated with inert waste rocks following the protocol in the Adaptive Waste Rock Management Plan described in Section 2.1.3.2.

Other mine process components including the new heap leach facility and associated process ponds would be designed, operated, decommissioned, and reclaimed to contain mine process solution as presented in Section 2.1.3.3 and 2.1.11.6. The heap leach facility is surrounded by an existing upgradient diversion ditch that prevents run-on from entering the heap leach and process facilities. Storm water runoff from the heap is maintained within containment and channeled to the lined process ponds.

As described in Section 2.1, surface water management consists of runoff diversion and run-on control constructed and operated in accordance with Gold Acquisition Corp.'s WPCP NEV2007105 administered by NDEP. BMPs including silt fences, water bars, ditches, and sediment ponds are utilized to control surface erosion and sediment from disturbed areas.

Active monitoring of ground water, mine water supply wells, monitoring wells, process solutions, and leak detection systems are conducted in accordance with Gold Acquisition Corp.'s WPCP NEV2007105.

The current water table level, in the compartmentalized bedrock aquifer, where the pits are located is below the pit bottom elevation in the North and South Pits at approximately 5,120 feet amsl primarily due to previous and current pumping of the production wells and to a lesser extent from drought conditions. Pumping the production wells for process water would further depress the water table below the pit area during mining and processing operations. Consequently, the Proposed Action would not require dewatering to maintain dry pit conditions or disposal of dewatering water because all water pumped would be used in the process. Backfilling of a portion

of the pit is planned because modeling indicates the water level could recover to its pre-mining level of approximately 5,130 feet amsl during average precipitation conditions and to roughly 5,143 feet amsl during periods of above average precipitation. Partial backfilling to an elevation of 5,163 feet amsl would preclude the formation of a pit lake and provide a 20-foot buffer zone of dry backfill above the highest modeled elevation of the recovered water table following mining and cessation of pumping. The submerged portion of the backfill would be comprised of inert waste rock that is non-PAG and non-ML and would not impact ground water quality.

Due to compartmentalization of the bedrock aquifer beneath the pits, direct or indirect impacts to the regional alluvial aquifer are not anticipated from pumping the current on-site production wells, which produce from the bedrock aquifer in the immediate vicinity of the pits. If the production wells are mined out, replacement wells would be drilled and constructed in the same Cane Springs Formation as the current wells PW-1 and PW-2. Implementation of water resource management plans included in the WPCP NEV2007105 would result in mine contact water being managed and contained on site.

4.7.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, and mining and heap leaching activities could continue on previously authorized surface disturbance. Following the completion of these activities, the closure and reclamation of the Relief Canyon exploration, mine, and heap leach facilities would take place. Impacts associated with the No Action Alternative would be similar to but less than the Proposed Action.

4.8 Geology and Minerals

4.8.1 Proposed Action

4.8.1.1 Mineral Resources

Under the Proposed Action, approximately 10.4 million tons of ore would be mined and processed using heap leach extraction methods; approximately 28.2 million tons of waste rock would be generated over the life of the Project. The production of these minerals from public lands is consistent with the Mining Law, FLPMA, and federal regulations on the use of the public lands.

Implementation of surface disturbing activities associated with the open pit, waste rock storage facility, exploration drilling outside of the existing pit area, and construction of ancillary facilities would affect approximately 211 acres within the Project Area. Impacts to geology and mineral resources would include the potential loss of access to future mineral resources as a result of the permanent placement of the proposed waste rock storage facility on private land and the partial pit backfill. It is anticipated that these surface disturbances would have a minor effect on potential future access to remaining ore. No monitoring or mitigation measures would be required.

4.8.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, and mining and heap leaching activities could continue on previously authorized surface disturbance. Following the completion of these activities, the closure and reclamation of the Relief Canyon exploration disturbance, mine, and heap leach facilities would take place. There would be reduced impacts to mineral resources from the No Action Alternative because less material would be mined.

4.9 Public Safety, Transportation, and Access

4.9.1 Proposed Action

Under the Proposed Action, traffic would increase on Coal Canyon Road and Packard Flat road. These roads are well maintained by Pershing County and Coal Canyon Road has an enforceable speed limit. In general, the speed limit on improved dirt roads is 45 miles per hour and on unimproved dirt roads, 15 miles per hour. These speed limits would be observed by Project personnel traveling the roads. As outlined in the EPMs, public safety would be maintained throughout the life of the Project by excluding unauthorized access to the mining areas through fencing, security, and traffic-control measures. In addition, speed limits would be posted and enforced within the Project Area. The BLM has already approved mining at the Relief Canyon Mine. The volume of traffic would not likely change from the previous analysis; however, the duration of any impacts associated with traffic would increase but remain minimal. To provide for public safety, the pit access roads would be blocked with rock or earthen berms during reclamation. Reclaimed roads that could experience continued unauthorized use after reclamation would be blocked with earthen or rock berms to eliminate vehicle access as a public safety measure. The Proposed Action would have little potential to impact public safety. No monitoring or mitigation measures would be required.

4.9.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, mining and heap leaching activities could continue on previously authorized surface disturbance. Following the completion of these activities, the closure and reclamation of the Relief Canyon exploration, mine, and heap leach facilities would take place. The No Action Alternative would have similar but fewer potential impacts than the Proposed Action because the Project would have a shorter duration and there would be less traffic.

4.10 Socioeconomics

4.10.1 Proposed Action

It is anticipated there would be approximately 50 employees on site during construction activities increasing to approximately 80 employees during the operations phase of the Project. Following the cessation of mining, leaching would continue, and reclamation would be ongoing with a reduced workforce of up to 18 people. During closure and reclamation, up to ten people would be

on site. It is likely that many of the future employees already reside in the assessment area (i.e., Humboldt, Pershing, Lyon, and Churchill Counties), resulting in little effect to housing and public services.

A temporary positive effect on mine-related employment and income would occur over the ten-year timeframe for both current and additional employees, including both direct and indirect (and induced) effects on employment and expenditures in the mining industry. This positive impact could potentially be noticeable to the community given recent job losses in the mining industry within the study area. The Project would not be expected to stress public infrastructure because any new jobs created would be offsetting jobs that have been lost at other mines in the area. After the approximate ten-year life of the mine, all of the workers would be laid off as mining operations ceased and reclamation was completed.

For purposes of this analysis, an estimated range of employment and income effects was developed for consideration based on two studies:

- An input-output (IMPLAN) model cited by Ciciliano et al. (2008) for the hard rock mining sector in the Elko Micropolitan Statistical Area. This study used an employment multiplier of approximately 1.86; creating an additional 0.86 jobs for every direct hard rock mining job, and an income multiplier of 1.37; a value of $0.37 earned by those jobs for every $1.00 earned by mine workers; and

- A more recent IMPLAN modeling effort conducted on behalf of the Nevada Mining Association (Applied Analysis), which estimated the 2011 Nevada mining industry had an employment multiplier of 2.33; creating an additional 1.33 jobs for every direct hard rock mining job and a wage and salary multiplier of 1.62; translating into a value of $0.62 earned by those jobs for every $1.00 earned by mine workers.

Direct impacts resulting from additional employment attributable to the Project (approximately 80 additional jobs) over a ten-year Project life for the Proposed Action would translate into additional labor income of approximately $5.8 million annually, based on 2014 average wages for metal mining workers in Pershing County (NDETR 2014a). Indirect and induced impacts from secondary (using an employment multiplier range of 1.86 to 2.33) would support approximately 69 to 106 additional jobs in the study area, generating a range of approximately $2.2 to $3.6 million in average annual income from those secondary jobs over the ten-year Project life (based on a range of income multipliers of 1.37 to 1.62). Net mineral proceeds, property and sales and use taxes would also increase based on additional production over this ten-year timeframe.

No recommended mitigation measures have been identified for economics and social values.

4.10.2 No Action Alternative

Under the No Action Alternative, impacts associated with the existing work force (15 full-time and seven temporary jobs) at the mine would continue, but would not extend beyond the existing mine life. Direct impacts and indirect and induced impacts from secondary employment, as a result of the 80 additional jobs associated with the Proposed Action would not occur, and would not create any additional impacts over the impacts created by the current work force. Therefore, impacts

under the No Action Alternative would be similar, but substantially less than the impacts under the Proposed Action.

4.11 Rangeland Management

4.11.1 Proposed Action

Under the Proposed Action approximately 183 acres of new disturbance would occur within the South Rochester Allotment. No new rangeland or other exclusion fences would be constructed as part of the Proposed Action. There are 170,807 BLM-administered acres within the South Rochester Allotment and 1,386 active AUMs. Approximately 0.1 percent of the total BLM-administered acres within the South Rochester Allotment would be affected by the Proposed Action, or approximately one AUM. This small decrease in total AUMs supported by the South Rochester Allotment is not anticipated to generate adverse impacts to rangeland management in the Project Area.

4.11.2 No Action Alternative

Under the No Action Alternative, no new rangeland improvements (i.e., fence) would be constructed. BLM- and NDOW-approved barbed wire fencing is in place to minimize the intrusion of livestock, wild horses, and other wildlife into the heap leach processing area. Eight-foot high chain-link fences are in place around the lined ponds. Fencing and/or cattle guards are in appropriate locations as shown on Figure 2.1.1.

4.12 Soils

4.12.1 Proposed Action

There are 347 acres of existing disturbed soils within the Project Area. The 211.8 acres of repurposed surface disturbance in the Project Area is shown on Figure 2.1.1. The Proposed Action would re-disturb 14.9 acres (0.4 percent) of the existing 347 acres of disturbed area of outcrop and disturbed soil. New disturbance would impact 0.1 acre (zero percent) of the Bubus very fine sandy loam, 146.9 acres (four percent) of the Oxcorel-Beoska association, 18.9 acres (one percent) of the Puffer, very steep – Atlow-Puffer association, 16.5 acres (one percent) of the Puffer-Mulhop-Rock outcrop association, and 0.1 acre (zero percent) of the Snapp-Oxcorel association within the Project Area. No impacts would occur to the Eastwell-Shabliss-Blackhawk association. Erosional potential for the five soil types/map unit is between low and moderate to high.

Direct impacts from surface disturbing activities would primarily include potential increases in soil erosion due to wind and storm water runoff. BMPs as outlined in the Handbook of Best Management Practices (NDEP and Nevada Division of Conservation 1994) would be used to limit erosion and reduce sediment in precipitation runoff from the proposed Project facilities and disturbed areas during construction, operations, and initial stages of reclamation. Silt fences, sediment traps, or other BMPs would be used to prevent migration of eroded material until reclaimed slopes and exposed surfaces have demonstrated erosional stability. In addition, surface grading, engineered surface water diversion channels, and temporary sediment control facilities would be used to reduce erosion and sedimentation.

BMPs would include the use of one or all of the following: sediment control structures including surface water diversion channels and ditches and sediment basins; and runoff control structures including silt traps and fences constructed of certified weed-free straw bales or geotextile fabrics. In addition, crushed rock would be applied to constructed roads, as necessary, to help reduce erosion and soil compaction. The material used would be inert limestone waste rock and would be approved by NDEP.

In order to minimize erosion and soil loss, the EPMs described in Section 2.1.12 would be implemented. Reseeding of disturbance areas would be conducted as soon as practicable with a BLM-approved seed mix to reduce the potential for wind and water erosion, minimize impacts to soils and vegetation, and help prevent the spread of invasive and non-native species in disturbance areas. Concurrent reclamation would be conducted to the extent practical to accelerate revegetation of disturbed areas. Sediment and erosion control measures and revegetated areas would be inspected periodically to ensure long-term erosion control and successful reclamation. Once reestablished, the vegetation would hold surface soil intact and would decrease the likelihood of erosion.

4.12.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, mining and heap leaching activities could continue on previously authorized surface disturbance. Following the completion of these activities, the closure and reclamation of the Relief Canyon exploration disturbance, mine, and heap leach facilities would take place. The No Action Alternative would have similar but fewer potential impacts than the Proposed Action because there would be less disturbance.

4.13 Special Status Species

4.13.1 Proposed Action

Plants

The Proposed Action would result in the loss of habitat and individuals of two species of BLM Sensitive plants present in the Project Area - the sand cholla and Lahontan beardtongue.

Eighty-one sand cholla individuals are present in the Project Area, and the Proposed Action would remove eight of them. Based on historic data from NNHP's 2001 estimated range calculations, the sand cholla's Nevada range extends across more than 129,000 acres (Morefield 2001). This range calculation was based on 14 occurrences in nine counties. Based on more recent NNHP data, the sand cholla is now known to occur in 37 locations in 13 counties of Nevada (NNHP 2002) so it is likely that the range is larger than currently mapped. The Proposed Action (211 acres) would constitute a small fraction of this overall range. It is likely that the removal of the eight sites would have a negligible effect on the overall occurrence of sand cholla within the state of Nevada. The Proposed Action includes an avoidance and salvage EPM (Section 2.1.12) in order to minimize impacts to sand cholla.

Twenty-seven occurrences of Lahontan beardtongue were identified within the Project Area. The Proposed Action would potentially impact three or more occurrences in the vicinity of the exploration roads. Based on 2001 NNHP range map data, the Lahontan beardtongue's Nevada range extends across more than 24,000 acres Morefield 2001). This range calculation was based on four occurrences within three counties. It is likely that the removal of the three or more sites would have a negligible effect on the overall occurrence of Lahontan beardtongue within the state of Nevada. The Proposed Action includes an avoidance EPM (Section 2.1.12) in order to minimize impacts to Lahontan beardtongue.

Wildlife

Sensitive species documented in the Project Area that would likely be affected by removal of habitat or displacement include the golden eagle, Western burrowing owl, Preble's shrew, dark kangaroo mouse, and pale kangaroo mouse.

The western burrowing owl species was identified as present in the Project Area in June 2014, and no further surveys were conducted after the siting. For the purposes of this analysis it is assumed burrowing owls are present within the area of the Proposed Action. The Proposed Action would remove approximately 118 acres of Inter-Mountain Basins Mixed Salt Desert Scrub, which is suitable Western burrowing owl habitat. If individuals of these species are present in disturbed habitats, it is likely that they would be killed by construction activities. Mining activities may also disrupt active burrows during the nesting season (March 1 through August 31). An EPM for burrowing owls has been incorporated into the Proposed Action (Section 2.2). The protection measure would reduce the potential for direct loss of nests (e.g., crushing) or indirect effects (e.g., abandonment) from increased noise due to surface clearing activities during breeding season. After the implementation of the EPMs, potential impacts to burrowing owls that would be expected to occur include foraging and nesting habitat loss, mortality from surface disturbing activities due to burrowing owls being year round resident birds, and disturbance to burrowing owl behavior from increased human presence and noise due to mining activities.

Although not documented by a survey in the Project Area, suitable habitat is present for the dark kangaroo mouse, pale kangaroo mouse, and Preble's shrew. The Proposed Action would remove approximately 22 acres of sagebrush/Utah juniper habitat, which is suitable habitat for these species. Direct and indirect impacts to these small mammals may include mortality from heavy equipment during construction and operations, loss of habitat, reduced forage, reduced cover, increased predation and displacement from mining activity noise. Population status and distribution of these small mammals is not well known; however, the types of habitat that would be destroyed with the Proposed Action are widespread in Nevada and the Great Basin as a whole. It is likely that the incremental loss of habitat and potential for mortality from the Proposed Action would have a negligible effect on the populations of these small mammals regionally and over their range of occurrence.

The greater sage-grouse has not been detected in the Project Area and habitat for this sagebrush-obligate species is marginal. The nearest lek is nine miles away and classified as inactive. Other closest leks are 41, 52, 56, and 80 miles distant (Enviroscientists 2015). The Proposed Action

would remove approximately 22 acres of sagebrush/Utah juniper habitat. The loss of this relatively small amount of low value/transitional habitat would not likely affect greater sage-grouse.

Based on the greater sage-grouse baseline studies performed in the Project Area, it appears highly unlikely that greater sage-grouse would utilize the OHMA area within the Project Area because the area lacks the following key habitat features: water sources (SWS 2014), riparian and wet meadows; sagebrush cover greater than 65 percent within the landscape for seasonal habitat use; and cover by shrub species other than big sagebrush (*Artemisia tridentata*).

4.13.2 No Action Alternative

The No Action Alternative would be similar to the Proposed Action.

4.14 Vegetation

4.14.1 Proposed Action

Direct and indirect impacts to vegetation would occur from construction of the proposed expansion of mine facilities. The amount of vegetation removed by community type is summarized in Table 4.4-1. The majority of vegetation would be removed from the Inter-Mountain Basins Mixed Salt Desert Scrub community.

Dust from roads and mining activities could coat vegetation in areas adjacent to or downwind from dust sources. Dust on vegetation would weaken some species and predispose them to insect infestation. Control of fugitive dust on the haul and access roads through the use of water and chemical binders would reduce the amount of dust that would settle on vegetation.

Reclamation and revegetation activities would be in conformance with the BLM and State of Nevada Reclamation regulations. Reclamation and revegetation would minimize the direct impacts to the vegetation communities within the Project Area. Following mining, proposed disturbances including roads, heap leach and waste rock disposal facilities would be reclaimed to attain the desired plant community to support wildlife. Growth media and seeding would not occur within the pit, which would remain unvegetated. Concurrent reclamation during and after mining would likely reestablish permanent and stable vegetation cover within five to ten years; assuming that livestock use of the area is deferred and noxious weeds are controlled. It is unlikely that sagebrush would be reestablished on reclaimed areas and communities of big sagebrush have proven difficult to reestablish on reclaimed land (Vicklund et al. 2004). Reclaimed plant communities would likely differ in species composition from native pre-mining communities. Grasses with low densities of forbs and shrubs would dominate the reclaimed areas.

4.14.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, mining and heap leaching activities could continue on previously authorized surface disturbance. The No Action Alternative would not affect undisturbed vegetation within the area of the Proposed Action. Implementation of the current approved reclamation plan for the Relief Canyon Mine would result

in establishment of vegetation on those areas to be seeded. Weather, especially drought, livestock grazing, and wildfire would continue to modify plant communities in terms of canopy structure and species diversity. The No Action Alternative would have similar but fewer potential impacts than the Proposed Action because there would be less disturbance.

4.15 Wildlife

4.15.1 Proposed Action

Potential direct and indirect impacts to wildlife would result from removal of 182.3 acres of habitat, which represents the amount of habitat within the area of the Proposed Action that is undisturbed. Loss of habitat would reduce local availability of forage, security, and breeding cover for wildlife inhabiting the area. Species dependent on these disturbed sites would be killed or displaced. Displaced animals may be incorporated into adjacent populations, depending on variables such as species behavior, density, and habitat quality. Adjacent populations may experience increased mortality, decreased reproductive rates, or other responses resulting from competition with displaced individuals. The extent of habitat loss due to displacement would vary among species and individuals. Although a common wildlife response to noise and human presence is displacement, some animals become acclimated to noise, traffic, and other human activities and occupy habitat affected by mine-related disturbance.

Species such as mule deer, pronghorn antelope, bighorn sheep, and coyote have relatively large home ranges. The Project Area represents a relatively small part of the ranges of these species. Specifically, it encompasses less than ten percent of the mule deer distribution within the four-mile buffer area. Occupied pronghorn antelope distribution exists throughout the entire Project Area and the four-mile buffer area. No known occupied bighorn sheep or elk distributions exist in the vicinity of the Project Area (Enviroscientists 2015, Appendix F). The loss of 182.3 acres of habitat would not affect local and regional populations.

Small mammals, lizards, snakes, and insects would be killed by construction activities and vehicle traffic. Often lizards, snakes, and small mammals seek cover underground and removal of soil and rock would result in direct mortality. Small mammals can rapidly colonize reclaimed land, often within one to two years (Hingten and Clark 1984); however, the potential for small mammals to colonize reclaimed areas depends on the diversity and cover of vegetation and proximity to undisturbed habitats that would provide a source for populations of small mammals (Larken et al. 2008).

Approximately 70 acres of habitat would remain as open pit as a result of pit expansion, resulting in a long-term loss of potential habitat for wildlife species that rely on diverse plant communities for food and cover. Raptor species may use the pit wall for nesting or roosting habitat.

4.15.2 No Action Alternative

Under the No Action Alternative, the exploration drilling program would continue, mining and heap leaching activities could continue on previously authorized surface disturbance. The No Action Alternative would not affect populations of wildlife in the Project Area beyond the indirect

effects created by existing mining operations. Closure and reclamation of the Relief Canyon Mine in accordance with approved plans would restore habitat for wildlife. Existing conditions such as weather, habitat, and predation would continue to influence population density in the Project Area.

5 CUMULATIVE EFFECTS

5.1 Introduction

This section describes the cumulative effects that could result from potential impacts of the Proposed Action and the No Action Alternative, when combined with past, present, and reasonably foreseeable future actions (RFFA) in the vicinity of the Project Area.

The CEQ defines cumulative impact as "*…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions 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 (1508.7).*"

5.1.1 Cumulative Analysis Methodology

Assumptions for Cumulative Effects Analysis

Based on the environmental consequences analysis presented in Chapter 4, no direct or indirect impacts on the environment have been identified for the following resources or resource uses:

- Supplemental Authority Elements
  - Areas of Critical Environmental Concern
  - Cultural Resources
  - Environmental Justice
  - Farmlands (Prime or Unique)
  - Fish Habitat
  - Floodplains
  - Forests and Rangelands
  - Human Health and Safety
  - Invasive, Non-native Species
  - Native American Religious Concerns
  - Threatened or Endangered Species
  - Wastes, Hazardous/Solid
  - Water Quality
  - Wetlands and Riparian Zones
  - Wild and Scenic Rivers
  - Wilderness
- Additional Resources
  - Fire Management
  - Forestry and Woodland Resources
  - Lands and Realty
  - Lands with Wilderness Characteristics
  - Noise
  - Paleontological Resources
  - Public Safety

- Recreation
- Special Status Plant Species
- Transportation/Traffic
- Visual Resources
- Wild Horses and Burros

Consequently, no cumulative effects from implementation of the Proposed Action have been identified for these resources and they are not discussed further in this chapter.

The cumulative effects analysis included in this section is based on implementation of the Proposed Action, which has a time frame of approximately ten years for construction, operation, closure, and reclamation (see Section 2.1.1). Conservatively, cumulative or additive impacts (through reclamation) are described for RFFAs for ten years (i.e., through year 2026).

5.1.2 Description of Cumulative Effects Study Area Boundaries

The extent of the cumulative effects study area (CESA) varies for each resource, based on the geographic area of each resource expected to contribute an additive effect when combined with the potential effects of the Proposed Action. As a result, the list of projects or actions considered under the cumulative analysis may vary according to the resource being considered. The CESAs are shown on Figures 5.1.1 and 5.1.2 and described in Table 5.1-1.

Table 5.1-1: Cumulative Effects Study Areas

Resource	CESA Name	CESA size (acres)
Migratory Birds, Soils, Special Status Wildlife Species, Vegetation, Wildlife (General)	Wildlife	174,781
Rangeland Management	Range	254,864
Water Resources	Water Resources	140,294
Air Quality	Air Quality	2,112,456
Geology and Minerals	Geology	2,974
Socioeconomics	Socioeconomics	14,563,564

The Wildlife CESA (174,781 acres/273 square miles [mi^2]) is identified as portions of NDOW hunt units 043 and 182 with a northern border of Limerick Canyon and a southern border of Muttlebury Canyon and a township and range line (Figure 5.1.1). The Wildlife CESA was developed to address potential cumulative impacts to soils, vegetation, migratory birds, special status wildlife species, and other wildlife species. This CESA represents the likely maximum extent Project activities could have on these resources.

The Range CESA (254,864 acres/398 mi^2) is identified as the South Rochester Allotment (Figure 5.1.1). This CESA was developed to address potential cumulative impacts to rangeland management. This CESA was chosen for rangeland management because the activities associated with the Proposed Action are located within this allotment.

The Water Resources CESA (140,294 acres/219 mi^2) is identified as the USGS HUC 5 Packard Wash watershed and the Coeur Rochester ground water model boundary (Figure 5.1.1). This CESA was developed to address potential cumulative impacts to ground water quantity. This CESA was chosen because it represents the Project's hydrologic assessment area.

In addition, a generalized discussion of cumulative effects is presented for air quality, geology, and socioeconomics based on the following geographic areas:

Consistent with the analysis of direct and indirect impacts, the Air Quality CESA is a 50-kilometer (km) buffer around the Project Area, consistent with the USEPA's Guideline on Air Quality Models (Appendix W to 40 CFR Part 51) (CFR, Title 40, Sec 51, Appendix W 2016). This general area is bisected by I-80 and includes the Florida Canyon Mine on the northern end and a portion of the Carson Sink on the southern end (Figure 5.1.2).

The Geology CESA (2,974 acres/five mi^2) is identified as the Project Area (Figure 5.1.1). This CESA was developed to address potential cumulative impacts to geology and mineral resources. This CESA represents the most likely maximum extent Project activities could have on geology and mineral resources in the region.

Consistent with the analysis of direct and indirect impacts, the Socioeconomics CESA includes Pershing County, Humboldt County, Lyon County, and Churchill County (Figure 3.10.1). The CESA is based on the location of the Relief Canyon Mine in Pershing County and the potential residence locations of future mine employees in Pershing County, Humboldt County, Lyon County, and Churchill County. Employment, income, and taxes paid to local governments would be most affected in these respective counties.

5.1.3 Past, Present, and Reasonably Foreseeable Future Actions

5.1.3.1 Past and Present Actions

General past and present actions in the Wildlife, Range, and Water Resources CESAs, include mining and exploration, energy production and distribution, wildfire, fuels treatment, livestock grazing and rangeland improvements, ROW construction, and recreation.

Mining and Mineral Development

A range of locatable mineral projects have been developed and mined in BLM's Winnemucca District dating back to the 1860s. Locatable minerals include gold, silver, mercury, tungsten, manganese, molybdenum, copper, barite, sulfur, gypsum, limestone, iron, diatomite, and clay, as well as precious and semiprecious gemstones (BLM 2013a).

A range of past and present surface management plans associated with past and present mineral development are located within the Wildlife, Range, and Water Resources CESAs. Table 5.1-2 provides general statistics as accessed from BLM's Land & Mineral Legacy Rehost 2000 (LR2000) system (BLM 2016a) regarding the acreage of potential disturbance associated with past (expired) and current (authorized) surface management plans and mineral material disposal sites in the Wildlife CESA.

For purposes of cumulative effects analysis, the total number of acres for each case recordation file is assumed to represent the total number of disturbed acres. While some of these acres may have been totally or partially reclaimed or never disturbed at all, these estimates provide a conservative assessment of total past or present disturbance related to mineral development within the CESA. In total, these mineral actions represent approximately 1.8 percent of the total land area within the Wildlife CESA.

Table 5.1-2: Summary of Past and Present Mineral Actions in Wildlife CESA

Case Type	Disposition	Number of Cases (by Individual Serial Numbers)	Range of Size	Total Potential Disturbed Acreage
Surface Management Plan/Notice	Authorized	19	0.12 to 1,741.50 acres	2,611
Surface Management Plan/Notice	Expired	7	0.99 to 4.92 acres	18
Mineral Material Disposal Sites	Authorized	7	4.96 to 200 acres	529
Total	**-**	**33**	**-**	**3,158**
Percentage of Wildlife CESA (174,781 acres)				**1.8**

Source: BLM 2016a

All of the expired cases in the Wildlife CESA are less than five acres each. A vast majority of the authorized cases are small, with only four cases exceeding 50 acres. The four larger cases are associated with the Rochester Mine, the existing operations at the Relief Canyon Mine, the Colado Plant, and the Spring Valley exploration project. Another small mine in the area is Nevada Cement Company's limestone mine. This mine is located on private land so it was not listed in the BLM's LR2000 database.

Table 5.1-3 provides general statistics regarding the acreage of potential disturbance associated with past (expired) and current (authorized) surface management plans in the Range CESA. The Rochester Mine, the Colado Plant, and existing operations at the Relief Canyon Mine make up the majority of the total expired and authorized surface management case acres within the entire CESA and in total, these mineral actions represent one percent of the total Range CESA.

Table 5.1-3: Summary of Past and Present Mineral Actions in Range CESA

Case Type	Disposition	Number of Cases (by Individual Serial Numbers)	Range of Size	Total Potential Disturbed Acreage
Surface Management Plan/Notice	Authorized	6	1.4 to 1,741.5 acres	2,543
Surface Management Plan/Notice	Expired	4	1 to 4.99 acres	15
Mineral Material Disposal Sites	Authorized	7	4.96 to 480 acres	970
Total	**-**	**17**	**-**	**3,528**
Percentage of Range CESA (254,864 acres)				**0.1**

Source: BLM 2016a

Table 5.1-4 provides general statistics regarding the acreage of potential disturbance associated with past (expired) and current (authorized) surface management plans in the Water Resources CESA. The Rochester Mine, the Spring Valley Exploration Project, and existing operations at the Relief Canyon Mine make up the majority of the total expired and authorized surface management case acres within the entire CESA and in total, these mineral actions represent 1.6 percent of the total Water Resources CESA.

Table 5.1-4: Summary of Past and Present Mineral Actions in Water Resources CESA

Case Type	Disposition	Number of Cases (by Individual Serial Numbers)	Range of Size	Total Potential Disturbed Acreage
Surface Management Plan/Notice	Authorized	16	0.11 to 1,741.5 acres	2,262
Surface Management Plan/Notice	Expired	5	0.08 to 4.92 acres	8
Mineral Material Disposal Sites	Authorized	1	20 acres	20
Total	**-**	**22**	**-**	**2.290**
Percentage of Water Resources CESA (140,294 acres)				**1.6**

Source: BLM 2016a

The main mineral developments in the three CESAs are the Rochester Mine and the existing operations at the Relief Canyon Mine. The Colado Plant operations are also a main activity in the Wildlife and Range CESAs. The main permitted activities at the Rochester Mine include an open pit gold and silver mine and heap leach operation. BLM approved an amendment in August 2009 for the construction of an additional heap leach pad, and the extension of the mine life. EP Minerals' Colado Plant, located near Lovelock, Nevada, currently processes both diatomaceous earth and perlite. Details regarding the existing Relief Canyon Mine operations are discussed in Chapter 2 of this EA.

Energy Production and Distribution

The Nevada BLM Geographic Information Systems (GIS) data (BLM 2016b) contain four individual authorized geothermal leases within the Wildlife CESA, 19 leases within the Range CESA, and one lease within the Water Resources CESA. As shown in Table 5.1-5, two leases are common between the Wildlife and Range CESAs, and one lease is common between the Range and Water Resources CESAs.

Table 5.1-5: Geothermal Lease Summary

Lease Number	Township	Range	Section(s)	Lease Holder
Wildlife CESA				
NVN-079305	27 North	32 East	22, 24, 27, 28	Gradient Resources Inc.
NVN-079306	27 North	32 East	2, 10, 12, 14	Gradient Resources Inc.
NVN-079307	28 North	32 East	34, 36	Gradient Resources Inc.
NVN-079352	28 North	32 East	22, 26	Gradient Resources Inc.
Range CESA				
NVN-074854	26 North	35 East	35	TGP New York Canyon LLC

Lease Number	Township	Range	Section(s)	Lease Holder
NVN-076298	25 North	35 East	1, 2, 3	TGP New York Canyon LLC
NVN-076299	25 North	35 East	10, 11, 12	TGP New York Canyon LLC
NVN-076300	25 North	35 East	14, 15	TGP New York Canyon LLC
NVN-076301	25 North	36 East	6	TGP New York Canyon LLC
NVN-076302	26 North	35 East/36 East	25/29, 30	TGP New York Canyon LLC
NVN-077217	24 North	32 East	6	Ormat Nevada Inc.
NVN-079305	27 North	32 East	22, 24, 27, 28	Gradient Resources Inc.
NVN-079306	27 North	32 East	10, 14	Gradient Resources Inc.
NVN-086890	25 North	35 East	9, 16, 20, 21, 22, 28, 29	TGP New York Canyon LLC
NVN-086893	26 North	36 East	20, 21	TGP New York Canyon LLC
NVN-088404	25 North	31 East/32 East	24, 26/18	Venture Prospects LLC
NVN-088412	25 North	34 East/35 East	24, 25/19, 30	TGP New York Canyon LLC
NVN-088417	25 North	36 East	1, 2, 3, 10, 11, 12	TGP New York Canyon LLC
NVN-088418	25 North	36 East	4, 5	TGP New York Canyon LLC
NVN-088419	26 North	36 East	26, 27, 34, 35, 36	TGP New York Canyon LLC
NVN-088814	26 North	36 East	28, 33	TGP New York Canyon LLC
NVN-090742	26 North	35 East/36 East	13/8, 9, 10, 15, 16, 17, 18	TGP New York Canyon LLC
NVN-090743	26 North	35 East/36 East	22, 23, 24, 26, 27, 34/19	TGP New York Canyon LLC
Water Resources				
NVN-088412	24 North	35 East	6	TGP New York Canyon LLC

Source: BLM 2016b

No producing oil or gas wells have been located within the Winnemucca District. The potential for oil and gas development in the CESAs is considered low.

Wildfire

The BLM reports that throughout the Winnemucca District, a total of 1,127 fires burned a total of 1.8 million acres between 1990 and 2011. Habitat and surface use loss is due to the invasion of cheatgrass in burned areas. An accelerated fire return interval and frequency is observed in cheatgrass-infested areas below 6,500 feet amsl. BLM estimates that two percent of desert sink scrub, 12 percent of the salt desert scrub, 23 percent of sagebrush scrub, two percent of the riparian habitat, four percent of meadows, and six percent of the woodland has been impacted by fire over this time frame (BLM 2013a). Approximately 1.2 million acres burned between 2000 and 2015, throughout the Winnemucca District (BLM 2016b).

Table 5.1-6 presents a summary of fires, recent fire years, and associated acreages impacted within the Air Quality, Wildlife, Range, and Water Resources CESAs. Based on available GIS data, approximately 1,428 acres within the Wildlife CESA burned between 2000 and 2012 (approximately 0.8 percent), approximately 702 acres burned within the Range CESA (approximately 0.3 percent) between 2000 and 2011, and approximately 734 acres within the Water Resources CESA burned between 2006 and 2012 (approximately 0.5 percent). There were no documented wildland fires in the Wildlife CESA between 2013 and 2015, in the Range CESA between 2012 and 2015, or in the Water Resources CESA between 2013 and 2015 (BLM 2016a). Approximately 140,183 acres within the Air Quality CESA burned between 2000 and 2015 (BLM 2016a).

Table 5.1-6: Wildland Fire Acres in the CESAs

Fire Name	Fire Year	Wildlife CESA (acres)	Range CESA (acres)	Water Resources CESA (acres)	Air Quality CESA (acres)
Cottonwood	2000	-	5.5	-	6,121.6
Johnson	2000	-	-	-	36.4
M Pass	2000	-	-	-	37.8
Prince	2000	-	-	-	13,483.7
Star	2000	-	-	-	53.8
400	2001	-	-	-	324.0
Gooseberry	2001	-	-	-	16.1
Humboldt	2001	-	-	-	8.0
Limerick	2001	9.4	-	-	9.4
Peru	2001	-	-	-	1,481.7
Spaulding	2001	-	-	-	68,869.2
Standard	2001	-	-	-	1,280.3
TrinitySmt	2001	-	-	-	10.9
Victory	2001	-	-	-	0.7
Toulon	2002	-	-	-	1,160.7
93 Fire	2006	-	-	-	3.3
Florida	2006	-	-	-	14.7
Inskip Canyon	2006	-	-	-	743.5
LovelockHaystak	2006	-	-	-	0.6
Martin	2006	-	-	-	0.7
McCoy	2006	-	-	-	107.3
McCoy2	2006	-	-	-	50.4
Ragged Top	2006	-	-	-	1.3
Rochester	2006	-	-	2.5	2.5
Sage	2006	-	-	-	27,052.5
Unionville	2006	-	-	-	40.2
Upper Valley	2006	22.6	-	-	22.6
MM 116 Pershing	2007	0.3	-	-	0.3
MM93	2007	-	-	-	0.6
Pole Creek	2007	-	-	-	5.9
Rochester	2007	229.2	-	-	229.2
Sacramento	2007	-	-	-	3.8
Toulon	2007	-	-	-	0.2
7 Troughs	2010	-	-	-	1,667.3
Cottonwood	2010	-	-	-	1,571.4
Imlay 1	2010	-	-	-	0.5
Imlay 2	2010	-	-	-	3.9
Imlay 3	2010	-	-	-	3.1
MM 103 Assist	2010	-	-	-	7.9
Rochester	2010	3.9	-	3.9	3.9
Standard Mine	2010	-	-	-	0.1
John Brown	2011	-	-	-	1.0
Kennedy Summit	2011	-	-	-	36.7
Landfill	2011	-	-	-	1.0
Last Chance	2011	-	-	-	11,617.8
Leach	2011	-	-	-	185.7
Limerick	2011	0.1	-	-	0.1
MM 134	2011	-	-	-	35.3

Fire Name	Fire Year	Wildlife CESA (acres)	Range CESA (acres)	Water Resources CESA (acres)	Air Quality CESA (acres)
MM 142	2011	-	-	-	26.7
MM 146	2011	-	-	-	3.3
MM 91	2011	-	-	-	3.5
New York Canyon	2011	-	696.4	-	696.4
Rye Patch	2011	-	-	-	202.8
Spaulding Canyon	2011	-	-	-	1.0
Thunder Mountain	2011	-	-	-	0.1
Willow Canyon	2011	-	-	-	1,089.8
Willow Creek	2011	-	-	-	66.8
Mine	2012	1,003.7	-	727.7	1,003.7
MM 117	2012	-	-	-	2.4
MM 132	2012	-	-	-	4.9
Oreana	2012	155.1	-	-	155.1
Rocky Canyon	2012	-	-	-	370.5
Victory	2012	-	-	-	11.9
McGee	2013	-	-	-	1.2
Mud	2013	-	-	-	1.0
Rye Patch Canyon	2013	-	-	-	2.7
Coyote 1	2014	-	-	-	1.1
Coyote 2	2014	-	-	-	0.2
Imlay	2014	-	-	-	136.6
Star Creek	2015	-	-	-	181.8
	Total	**1,427.5**	**701.9**	**734.1**	**140,183.0**

Source: BLM 2016b

Effects on vegetation can include loss or partial removal of upland species, potential removal of below ground biomass, soil hydrophobicity, and potential for increasing spread of noxious weeds and invasive grasses. Following each wildfire event, the BLM evaluates and develops appropriate Burned Area Rehabilitation plans to address specific resource concerns. The extent to which a burned area is reseeded is governed by variables that are evaluated on a site-specific basis such as burn intensity, soil stability, and pre-burn conditions. Site evaluations following wildfire events have determined unseeded areas could rehabilitate naturally due to pre-fire vegetative conditions, elevation, precipitation zone, and site potentials.

The Winnemucca District uses an integrated vegetation management strategy to obtain hazardous fuels management objectives. These include assessing vegetation conditions, identifying goals and objectives and implementing management actions to achieve goals and objectives. Common management actions include treatments such as prescribed fire and non-fire hazardous fuel treatments (mechanical, chemical, and biological fuel breaks) to manipulate vegetation to achieve desired vegetation objectives. Treatments are strategically situated to protect human communities and resource values (BLM 2013a). Of the entire acreage within the Winnemucca District, the BLM treated 11,087 acres between 2003 and 2010 via 52 individual projects (BLM 2013a). Main projects included chemical treatments, mowing, seeding, disking, thinning, and prescribed fire.

Livestock Grazing

Grazing allotments administered by the BLM located within the CESAs are summarized in Table 5.1-7 and include the number of active AUMs within each allotment (as a whole). There are seasonal grazing permits for cattle and sheep. Available GIS data identified five allotments within the Wildlife CESA and eight allotments within the Water Resources CESA. One allotment makes up the Range CESA. Livestock grazing, depending on the intensity and duration, can affect the diversity and productivity of plant communities and wildlife habitats.

Table 5.1-7: Grazing Allotments within the CESAs

Allotment Name	Active AUMs	Wildlife CESA (acres)	Range CESA (acres)	Water Resources CESA (acres)
Boyer Ranch Cottonwood Valley	1,790	-	-	67
Coal Canyon-Poker	3,144	55,941	-	15,925
Copper Kettle	2,333	-	-	29,883
Dixie Valley	6,341	-	-	1
Humboldt Sink	1,582	1,438	-	42
Star Peak	3,075	2,009	-	4,271
Rawhide	2,740	41,410	-	4,305
South Rochester	3,186	72,495	254,864	85,800

Source: BLM 2012; BLM 2016b

Rights-of-Way

Rights-of-way (ROWs) within the CESAs include roads and highways, wind development facilities, railroads, power transmission lines, communication sites, telephone lines, and irrigation and other water facilities. Most of these ROWs are linear features crossing portions of the landscape. Permanent disturbances associated with ROWs are typically limited. Approximately 50 individual authorized ROWs are located within the Wildlife CESA with a total of approximately 7,216 acres. Approximately 51 individual authorized ROWs are located within the Range CESA with a total of approximately 4,573 acres. Approximately 24 individual ROWs are located within the Water Resources CESA for a total of approximately 3,830 acres (BLM 2016a).

Recreation

Dispersed recreation occurs throughout the CESAs; however, no specific data are available on the level of uses in the CESAs. The five most popular dispersed recreational activities within the Winnemucca District include OHV use, hunting, pleasure driving and sight-seeing, fishing, and camping (BLM 2013a). The nearest developed recreational facilities to the CESAs include the state-managed Rye Patch Reservoir and Humboldt Wildlife Management Area which includes Toulon Lake and Upper Humboldt Lake. These facilities are located northwest and southwest of the CESAs and offer recreational activities such as boating, hunting, fishing, and camping.

5.1.3.2 Reasonably Foreseeable Future Actions

RFFAs are those actions that are known or could reasonably be anticipated to occur within the CESAs and within a time frame appropriate to the expected impacts from the Proposed Action. For this Project, the time frame for potential future actions is assumed to be the life-of-mine duration (including reclamation), or approximately ten years.

Based upon a review of LR2000 data (BLM 2016a), ten pending mineral surface management cases and two mineral material disposal site cases are currently on file in the Air Quality CESA, with a total acreage of approximately 511 acres (Table 5.1-8). There are 15 pending ROWs on file in the Air Quality CESA.

Table 5.1-8: RFFAs in the Air Quality CESA

Case Type	Serial Number	Applicant	Action Details	Total Potential Disturbed Acreage
MINERAL SURFACE MANAGEMENT (PLAN/NOTICE) AND DISPOSAL SITES				
380910	NVN-082694	Imperial Milling Inc.	Open pit mining	8
380910	NVN-093830	Rye Patch Gold US Inc.	Gold exploration	200
380910	NVN-093831	Rye Patch Gold US Inc.	Gold exploration	200
380913	NVN-092996	Nevada Iron LLC	Iron exploration	0.11
380913	NVN-092998	American Innovative Minerals LLC	Tungsten exploration	1.3
380913	NVN-093025	American Innovative Minerals LLC	Tungsten exploration	0.51
380913	NVN-093341	Discovery Harbour Resources Corporation	Gold exploration	2.7
380913	NVN-094248	Lode Inc.	Sampling	0.001
380913	NVN-094372	Murfield Nevada Inc.	Exploration drilling	2.06
380913	NVN-094495	Dan R. Turner	Exploration trenching	1.5
360413	NVN-087644	BLM	Big Meadows community sand and gravel pit	56
360413	NVN-089573	BLM	Coal Canyon community sand and gravel pit	38.98
RIGHTS-OF-WAY				
281001	NVN-077697	Nevada Cement Co.	Limestone conveyor and road from mine to mill site	53.719
281001	NVN-089325	Pershing County	Rye Patch	10.91

Case Type	Serial Number	Applicant	Action Details	Total Potential Disturbed Acreage
281001	NVN-089327	Pershing County	Spring Valley Road	94.55
281001	NVN-089386	Pershing County	Limerick Canyon Road	64
281001	NVN-091649	Pershing County	Packard Flat Road	10
281001	NVN-092476	Pershing County	American Canyon Road	40
281001	NVN-094492	Not available	Klondike Canyon Road	2.033
285002	NVN-092892	Sierra Pacific Power Co.	Powerline to Western Union radio relay station northwest of Imlay	7.15
285002	NVN-093931	NV Energy	13.2-kV transmission line	115.755
285003	NVN-090074	Nevada Iron LLC	Single-pole electrical transmission line	13
285003	NVN-091829	Sierra Pacific Power Co.	Woosley power transmission line	6.2
285003	NVN-091976	Sierra Pacific Power Co.	Not available	0.86
285003	NVN-094332	NV Energy	120-kV transmission line	28
289001	NVN-086168	Nevada Specialty Minerals LLC	Split estate	207.346
289001	NVN-092181	Nevada Bureau of Mines and Geology	41 geodetic benchmarks	0.1

Source: BLM 2016a

Based upon a review of LR2000 data (BLM 2016a), five pending mineral surface management cases and one mineral material disposal site case are presently on file in the Wildlife CESA, with a total acreage of approximately 2,613 acres (Table 5.1-9). The largest pending ROW consists of a 13.2-kilovolt (kV) power transmission line proposed to provide power from the Rochester substation to the airway beacon in Pershing County (116 acres).

Table 5.1-9: RFFAs in the Wildlife CESA

Case Type	Serial Number	Applicant	Action Details	Total Potential Disturbed Acreage
MINERAL SURFACE MANAGEMENT (PLAN/NOTICE) AND DISPOSAL SITES				
380910	NVN-064629	Coeur Rochester, Inc.	Gold and silver mining and closure	2,170
380910	NVN-093830	Rye Patch Gold US Inc.	Gold exploration	200
380910	NVN-093831	Rye Patch Gold US Inc.	Gold exploration	200
380913	NVN-094372	Murfield Nevada Inc.	Exploration drilling	2
380913	NVN-094495	Dan R. Turner	Exploration trenching	1.5
360413	NVN-089573	BLM	Coal Canyon community sand and gravel pit	39
RIGHTS-OF-WAY				
281001	NVN-089327	Pershing County	Spring Valley Road	95
281001	NVN-089386	Pershing County	Limerick Canyon Road	64
281001	NVN-091649	Pershing County	Packard Flat Road	10
281001	NVN-092476	Pershing County	American Canyon Road	40
285002	NVN-093931	NV Energy	13.2-kV transmission line	116
285003	NVN-090074	Nevada Iron LLC	Single-pole electrical transmission line	13
285003	NVN-091829	Sierra Pacific Power Co.	Woosley power transmission line	6
285003	NVN-094332	NV Energy	120-kV transmission line	28
289001	NVN-092181	Nevada Bureau of Mines and Geology	41 geodetic benchmarks	0.1

Source: BLM 2016a

Based upon a review of LR2000 data (BLM 2016a), two pending mineral surface management cases and one disposal site case are presently on file in the Range CESA, with a total acreage of approximately 41 acres (Table 5.1-10). A total of five pending ROW cases are recorded in the Range CESA, with a total acreage of approximately 167 acres. The largest pending ROW consists of a 13.2-kV power transmission line proposed to provide power from the Rochester substation to the airway beacon in Pershing County (116 acres).

Table 5.1-10: RFFAs in the Range CESA

Case Type	Serial Number	Applicant	Action Details	Total Potential Disturbed Acreage
MINERAL SURFACE MANAGEMENT (PLAN/NOTICE) AND DISPOSAL SITES				
380913	NVN-092996	Nevada Iron LLC	Iron exploration	0.1
380913	NVN-094372	Murfield Nevada Inc.	Exploration drilling	2
360413	NVN-089573	BLM	Coal Canyon community sand and gravel pit	39
RIGHTS-OF-WAY				
281001	NVN-091649	Pershing County	Packard Flat Road	10
285002	NVN-093931	NV Energy	13.2-kV transmission line	116
285003	NVN-090074	Nevada Iron LLC	Single-pole electrical transmission line	13
285003	NVN-094332	NV Energy	120-kV transmission line	28
289001	NVN-092181	Nevada Bureau of Mines and Geology	41 geodetic benchmarks	0.1

Source: BLM 2016a

Based upon a review of LR2000 data (BLM 2016a), two pending mineral surface management cases and one disposal site case are presently on file in the Water Resources CESA, with a total acreage of approximately 241 acres (Table 5.1-11). A total of eight pending ROW cases are recorded in the Water Resources CESA, with a total acreage of approximately 365 acres. The largest pending ROW consists of a 13.2-kV power transmission line proposed to provide power from the Rochester substation to the airway beacon in Pershing County (116 acres).

Table 5.1-11: RFFAs in the Water Resources CESA

Case Type	Serial Number	Applicant	Action Details	Total Potential Disturbed Acreage
MINERAL SURFACE MANAGEMENT (PLAN/NOTICE) AND DISPOSAL SITES				
380913	NVN-093830	Rye Patch Gold US Inc.	Gold exploration	200
380913	NVN-094372	Murfield Nevada Inc.	Exploration drilling	2
360413	NVN-089573	BLM	Coal Canyon community sand and gravel pit	39
RIGHTS-OF-WAY				
281001	NVN-089327	Pershing County	Spring Valley Road	95
281001	NVN-089386	Pershing County	Limerick Canyon Road	64

Case Type	Serial Number	Applicant	Action Details	Total Potential Disturbed Acreage
281001	NVN-091649	Pershing County	Packard Flat Road	10
285002	NVN-093931	NV Energy	13.2-kV transmission line	116
285003	NVN-090074	Nevada Iron LLC	Single-pole electrical transmission line	13
285003	NVN-094332	NV Energy	120-kV transmission line	28
289001	NVN-092181	Nevada Bureau of Mines and Geology	41 geodetic benchmarks	0.1

Source: BLM 2016a

5.1.3.3 Continuation of Past and Present Actions

Past and present activities/events expected to continue throughout the CESAs include livestock grazing, wildlife habitat management, wildland fires, grazing permit renewals, mining, mineral exploration, and ROW construction. Dispersed recreation would likely increase over time consistent with recent visit and visitor use trends reported by the BLM (BLM 2013a).

5.2 Cumulative Impact Analysis

5.2.1 Air Quality

The Air Quality CESA includes a 50-km radius around the Project Area and consists of approximately 2,112,456 acres (Figure 5.1.2).

5.2.1.1 Impacts from Past and Present Actions

Prior to the implementation of the FCAA, few if any measures to control or minimize impacts to air quality were required. Most mining operations were of smaller scale and consisted of underground operations with small disturbance footprints. Most air quality impacts from these operations consisted of fugitive dust generated during exploration road building, trenching, and mining operations, as well as reclamation operations and travel on dirt roads. Present actions within the Air Quality CESA likely to be contributing to air quality impacts include wildland fire, dispersed recreation, ROW construction, mineral exploration and mining, industrial operations (i.e., construction facilities, power generation facilities, generators, and processing), and transportation networks. These activities are principally contributing point source particulate matter emissions and fugitive dust to the air quality; however, combustion sources also contribute emissions. Table 5.2-1 provides a summary of the emissions from major sources within the Air Quality CESA. These emissions include those sources that have air quality operating permits from the BAPC, vehicle travel on I-80 and other roads, railroads, and the Dixie Valley Geothermal Power Plant.

Historic wildland fires (2000-2015) have burned approximately 140,183 acres within the Air Quality CESA, which is approximately seven percent of the CESA. Authorized and expired mineral exploration and mining notices and plans of operations, as well as mineral material disposal sites, total approximately 17,156 acres of surface disturbance, which is approximately 0.7 percent of the Air Quality CESA. Authorized ROWs, covering approximately 22,716 acres (approximately one percent of the CESA), issued within the Air Quality CESA were issued for facilities that have the potential to create surface disturbance or impact air quality. Impacts to air quality from dispersed recreation are not quantifiable.

Table 5.2-1: Air Quality Emissions within the Air Quality CESA, Tons per Year

Emission Sources	PM	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC
Facilities	1,843.7	606.1	283.6	761.0	186.5	603.3	102.0
Roads/Vehicles	131.5	131.5	120.8	5,488.2	18.5	5,180.7	272.0
Project Total	305.71	124.5	16.9	288.6	7.7	418.6	11.1
Total	2,280.9	862.0	421.6	6,538.0	212.8	6,202.6	385.0
Percent Cumulative Contribution	13.4	14.4	4.0	4.4	3.6	6.8	2.9

Source: Enviroscientists 2015

5.2.1.2 Impacts from RFFAs

RFFAs within the Air Quality CESA, which may contribute to impacts to air quality, include wildland fire, dispersed recreation, ROW construction (approximately 1,216 acres or approximately 0.06 percent of the CESA), mineral exploration and mining including mineral material disposal sites (approximately 511 acres or approximately 0.02 percent of the CESA), industrial operations (i.e., construction facilities, power generation facilities, generators), and transportation networks. Air quality impacts from RFFAs could include generation of fugitive dust during hard rock mining and exploration. Emissions may also be generated from processing facilities, burning of fossil fuels by heavy equipment and other vehicles, vehicle travel on paved and unpaved roads, and fugitive dust from travel on unpaved roads. Some of these emissions would be localized and subject to BAPC air quality permits and compliance, development of mitigation measures, and implementation of operational performance standards. Others would be more long term and basin wide.

5.2.1.3 Cumulative Impacts

Proposed Action

Each of the identified individual projects within the CESA, including existing and proposed mining operations, emit air pollutants. With the possible exception of motor vehicle emissions, the existing and proposed mining operations are major sources of criteria pollutants within the CESA. The modeling for the Proposed Action shows the levels of these pollutants are below the applicable NAAQS and Nevada AAQS. The Proposed Action contributions to the cumulative air quality environment would not result in cumulative impacts that would exceed the NAAQS and Nevada AAQS. The RFFAs would result in additional emissions similar to those currently emitted

by existing operations within the CESA. In addition, the major sources of pollutants (except for motor vehicle emissions) within the CESA would operate under permitted conditions established by the BAPC.

No Action Alternative

Under the No Action Alternative, incremental cumulative impacts to air quality within the CESA would result from past and present actions and RFFAs; however, the incremental contribution of this alternative would be less than the Proposed Action because there would be fewer mining activities. The cumulative emissions are generally dispersed and the stationary sources would be regulated by the BAPC to ensure impacts would be less than the levels consistent with the ambient air quality standards.

5.2.2 Migratory Birds, Special Status Species, and Wildlife

The CESA for migratory birds, special status species, and other wildlife is the Wildlife CESA. This CESA encompasses approximately 174,781 acres and is shown on Figure 5.1.1.

5.2.2.1 Impacts from Past and Present Actions

Past and present actions that could impact migratory birds, special status species, general wildlife and their habitat include exploration and mining, energy production and distribution, ROW construction and maintenance, livestock grazing, dispersed recreation and wildfires. Impacts to migratory birds, special status species, and other wildlife and their habitat have resulted from the following: 1) indirect impacts from the destruction of habitat associated with building roads and clearing vegetation; 2) indirect impacts from the disruption from human presence or noise; and 3) direct impacts or harm to avian species that result if trees and shrubs containing viable nests were cut down or ground nests destroyed by construction or ranching equipment. Past and present actions associated with mineral development have affected or would affect 3,158 acres, approximately 1.8 percent of the Wildlife CESA. Four geothermal leases have been issued across 12 sections in the CESA; however, there has been little surface disturbance associated with these leases to date.

A total of 1,428 acres (approximately 0.8 percent) have been burned in the Wildlife CESA by wildfire from 2000 through 2012. Fires have increased the cover and density of cheatgrass, which has accelerated the fire return interval in cheatgrass-infested areas. Since many shrubs do not re-sprout after fire, shrub-dominated plant communities (e.g., salt-desert shrub and sagebrush) have been reduced by 12 to 23 percent in Nevada (BLM2013a).

Livestock grazing, depending on the intensity and duration, can affect the diversity and productivity of wildlife habitats. There are approximately 173,293 acres of grazing allotments on BLM-administered land, representing approximately 99 percent of the CESA.

ROWs (defined by BLM case acres) within the CESA occupy 7,216 acres (four percent). Typically, placement of facilities in ROWs remove the habitat permanently (e.g., highways and roads) or alter habitat by soil disturbance (e.g., pipelines and power lines).

Dispersed recreational use in the CESA primarily includes off-highway vehicles (OHV) use, hunting, pleasure driving and camping. These activities can affect biological resources directly through animal mortality and risk of fire, which can kill animals and degrade arid land habitats. Past and present actions in the CESA have resulted in the increased density and distribution of annual grasses that proliferate after fire and grazing and trampling by livestock and wild horse and burros, and other disturbances that reduce the cover of native vegetation.

5.2.2.2 Impacts from RFFAs

Potential impacts to migratory birds, special status species, other wildlife and their habitat from livestock grazing, recreation, ROW construction, mineral exploration, mining, or loss of native vegetation associated with potential wildland fires could occur. Specific impacts from RFFAs would be similar to the specific impacts associated with the past and present actions. There are no specific data to quantify impacts to migratory birds, special status species, and other wildlife or their habitat within the CESA as a result of livestock grazing, recreation, or potential wildland fires. There are approximately 2,613 acres of pending minerals projects identified in the CESA, and approximately 372 acres of pending ROW projects.

5.2.2.3 Cumulative Impacts

Proposed Action

The Proposed Action (approximately 211 acres of temporary habitat removal) would impact approximately 0.1 percent of the CESA. Quantifiable past and present actions and RFFA disturbance in the Wildlife CESA total approximately 14,787 acres, which results in an incremental impact from the Proposed Action of approximately 0.1 percent. Since there are limited quantifiable data for all activities in the CESA, this calculation is a conservative analysis of the potential incremental impact of the Proposed Action. Project-related impacts would be localized and minimized due to implementation of the EPMs outlined in Section 2.1.12 and reclamation. Therefore, based on the above analysis and findings, incremental impacts to migratory birds, special status species, and other wildlife and their habitat as a result of the Proposed Action, when combined with the impacts from the past and present actions and RFFAs, are expected to be minimal.

No Action Alternative

The past and present actions and RFFAs used in this analysis for the Proposed Action would have a similar incremental cumulative impact as the No Action Alternative; however, the No Action Alternative would not result in any additional incremental cumulative impacts beyond the impacts associated with the Proposed Action.

5.2.3 Water Resources

The CESA for water resources is the Water Resources CESA. This CESA encompasses approximately 140,294 acres and is shown on Figure 5.1.1.

5.2.3.1 Impacts from Past and Present Actions

Past and present actions that could impact water quantity include exploration and mining, energy production and distribution, ROW construction and maintenance, livestock grazing, dispersed recreation and wildfires. Past and present actions associated with mineral development have or would affect 2,290 acres, approximately 1.6 percent of the Water Resources CESA. One geothermal lease has been issued across one section in the CESA; however, there has been little surface disturbance associated with this lease.
From 2000 through 2012, 734 acres (approximately 0.5 percent) have been burned in the Water Resources CESA by wildfire. There were no documented wildfires in the Water Resources CESA between 2013 and 2015 (BLM 2016b). Fires have decreased the cover around springs, which may result in an increase to the pumpage of ground water.

Livestock and wild horse and burro grazing, depending on the intensity and duration, can affect the water quantity. Ground water may be pumped to provide emergency water supplies when springs dry up or are affected by too many grazing animals. There are approximately 140,294 acres of grazing allotments on BLM-administered land, representing approximately 100 percent of the CESA.

ROWs (defined by BLM case acres) within the CESA occupy 3,830 acres (2.7 percent). Typically, placement of facilities in ROWs do not affect water quantity. Dispersed recreational use in the CESA primarily includes OHV use, hunting, pleasure driving and camping. These activities generally do not affect water quantity.

5.2.3.2 Impacts from RFFAs

Future land uses and practices that could result in potential impacts to water quantity include agriculture, municipal and rural development, livestock grazing, fuels treatments, wildland fire, ROW construction, minerals exploration, mining, and recreation. Specific impacts from RFFAs would be similar to the specific impacts associated with the past and present actions. There are no specific available data to quantify future water quantity impacts. There are approximately 241 acres of pending minerals projects identified in the CESA, and approximately 365 acres of pending ROW projects that could have impacts to water quantity.

5.2.3.3 Cumulative Impacts

Proposed Action

The Proposed Action (approximately 211 acres) would impact approximately 0.2 percent of the CESA. Quantifiable past and present actions and RFFA disturbance in the Water Resources CESA is approximately 7,460 acres, which results in an incremental impact from the Proposed Action of approximately three percent. Since there are limited quantifiable data for all activities within the CESA, this calculation is a conservative analysis of the potential incremental impact of the Proposed Action. Project-related impacts would be minimized due to implementation of the EPMs outlined in Section 2.1.12 and reclamation of the mine facilities. Based on the above analysis and

findings, incremental impacts to water quantity as a result of the Proposed Action, when combined with the impacts from the past and present actions and RFFAs, would be minimal.

No Action Alternative

The past and present actions and RFFAs used in this analysis for the Proposed Action would have a similar incremental cumulative impact as the No Action Alternative; however, the No Action Alternative would not result in any additional incremental cumulative impacts beyond the impacts associated with the Proposed Action.

5.2.4 Geology and Minerals

The CESA for geology and minerals is the Geology CESA or the Project Area and is shown on Figure 5.1.1.

5.2.4.1 Impacts from Past and Present Actions

Past and present actions that may have impacted or are currently impacting geology and minerals within the CESA include primarily mineral exploration and mining-related actions. Most past and present minerals operations within the CESA consist of mineral exploration, open pit mining, and heap leaching operations associated with the existing activities at the Relief Canyon Mine.

5.2.4.2 Impacts from RFFAs

With the exception of the Proposed Action, there are no known RFFAs that would be expected to occur within the Geology CESA.

5.2.4.3 Cumulative Impacts

Proposed Action

Under the Proposed Action, approximately 10.3 million tons of ore would be mined and processed using heap leach extraction methods; approximately 28.2 million tons of waste rock would be generated over the life of the Project. Implementation of surface disturbing activities associated with the open pit, waste rock storage facility, exploration drilling outside of the existing pit area, and construction of ancillary facilities would affect approximately 211 acres within the Project Area. Impacts to geology and mineral resources would include the potential loss of access to future mineral resources as a result of the permanent placement of the proposed 95.7-acre waste rock storage facility on private land and the partial pit backfill. It is anticipated these surface disturbances would have a minor effect on potential future access to remaining ore and would therefore result in a minor incremental cumulative impact to geology and mineral resources.

No Action Alternative

Less ore would be mined under the No Action Alternative; therefore, no additional cumulative impacts would result from the No Action Alternative beyond those analyzed for the Proposed Action.

5.2.5 Socioeconomics

The CESA for socioeconomics includes Pershing County, Humboldt County, Lyon County, and Churchill County (Figure 3.10.1). The rationale for the CESA formation is based on the location of the Relief Canyon Mine in Pershing County and the potential residence locations of future mine employees in Pershing County, Humboldt County, Lyon County, and Churchill County. Employment, income, and taxes paid to local governments would be most affected in these respective counties.

5.2.5.1 Impacts from Past and Present Actions

Past and present actions within the CESA include a similar range of general land uses as discussed for the Wildlife, Water Quality, and Range CESAs including activities associated with minerals exploration and mining, energy production and distribution, wildfire suppression, fuels treatment, livestock grazing and rangeland improvements, ROW construction, and recreation.

Specific to mining development in the CESA, based on 2013 data from the Nevada Bureau of Mines and Geology (NBMG) (NBMG 2015) four major metal mines are located within Pershing County, including the Relief Canyon Mine, Coeur Rochester Mine, Florida Canyon Mine, and Sunrise Gold Placer Mine, as well as four mines producing industrial minerals including the Colado Mine, Nassau Mine, Nevada Cement Limestone Mine, and Sexton Diatomite Mine. Seven major mines are located in Humboldt County including six gold/silver mines (Hycroft Mine, Lone Tree Complex, Marigold Mine, Pinson Mine, Turquoise Ridge Joint Venture, and Twin Creeks Mine), and one industrial mineral mine (MIN-AD Dolomite Mine). The only major mine in Lyon County is the NCC Fernley Limestone Operations. There are five industrial minerals mines in Churchill County including the Churchill Limestone Mine, Fernley Diatomite Operations, Hazen Diatomite Mine, Huck Salt Mine, and Nightingale Diatomite Mine (NBMG 2015).

Activities such as mining and energy production are part of the existing social and economic climate within the CESA and represent activities that support the existing population, provide continued employment opportunities and income generation, create a demand for public services, and help maintain revenues and defray expenditures for communities/counties within the socioeconomics CESA.

5.2.5.2 Impacts from RFFAs

The RFFAs that are known or could reasonably be anticipated to occur within the CESA over the approximately ten years of the Project life associated with the Proposed Action consist of the same range of activities discussed above, thus supporting continued long-term employment opportunities and economic development.

In addition to the Proposed Action, the BLM is reviewing a proposed mine expansion at the Coeur Rochester Mine, which would primarily expand the existing surface disturbance and project boundary by expanding the Stage IV heap leach pad, extend the mine life at that facility, and provide for closure activities at the mine (BLM 2015). The BLM is also reviewing a proposed mine

expansion at the Hycroft Mine, which would primarily expand the project boundary, increase surface disturbance, and extend the mine life (BLM 2014).

5.2.5.3 Cumulative Impacts

Proposed Action

Past and present actions within the socioeconomics CESA, as well as RFFAs including the Proposed Action, the Coeur Rochester Mine and Hycroft Mine expansions would collectively extend and enhance existing employment opportunities and economic growth in the area by extending operations and offering continued and some additional employment. Cumulative impacts, as a result of the Proposed Action when added to past and present actions and RFFAs, are expected to be generally positive with extended employment, income, and tax benefits over the ten-year life-of-mine.

On a temporary basis, the Proposed Action, the Coeur Rochester Mine expansion, and Hycroft Mine expansion would provide short-term employment to workers to support construction activities; some overlap with regard to construction timing between the three projects is possible. Many construction workers would likely already reside in the CESA. Based on the proposed maximum employment of 80 workers for the Proposed Action over an approximate ten-year period, it is unlikely the proposed Project would result in measurable changes to the demand for housing, public facilities and services, emergency and health care services, or public education. Anticipated schedules for increases or decreases in employment for RFFAs in the CESA are not known. However, the anticipated use of existing local workers or individuals seeking employment for the additional employment needed for the Proposed Action indicates a modest positive contribution to economic effects and cumulative employment, and minimal to no measurable additional demand for housing or public facilities and services and associated impacts.

Some specialty out-of-state contractors may be required for the three projects over a period of several months (e.g., to install leach pad liners), meaning there would be short-term cumulative effects on temporary housing (hotels), restaurants and other service sectors, as well as community services. Such impacts would be short term and existing facilities within the CESA would likely be adequate to support any short-term influx of construction workers.

No Action Alternative

Under the No Action Alternative, the proposed expansion activities associated with the Relief Canyon Mine would not be approved and, therefore, not have the beneficial impacts in the CESA associated with the Proposed Action. Therefore, the No Action Alternative's incremental cumulative impact when added to past and present actions and RFFAs, is expected to be minimal.

5.2.6 Rangeland Management

The CESA for rangeland management is the Range CESA. This CESA encompasses approximately 254,864 acres and is shown on Figure 5.1.1.

5.2.6.1 Impacts from Past and Present Actions

Past actions likely to have collectively impacted rangeland management include agriculture, municipal and rural development, ROW construction and maintenance, fuels treatments, wildland fire, transportation networks, minerals exploration, mining, and recreation. Building of sumps, fences or other linear features associated with these actions, or off-road travel could have destroyed forage or disrupted the movement of grazing animals. Approximately 3,528 acres of quantifiable past and present mineral actions, 702 acres of wildland fires, and 4,573 acres of ROWs have occurred within the CESA that could have impacted rangeland management.

5.2.6.2 Impacts from RFFAs

Future land uses and practices that could result in potential impacts to rangeland management include agriculture, municipal and rural development, ROW construction and maintenance, fuels treatments, wildland fire, transportation networks, minerals exploration, mining, and recreation. Specific impacts from RFFAs would be similar to the specific impacts associated with the past and present actions. There are approximately 41 acres of quantifiable RFFAs due to minerals activities and 167 acres of ROWs that could impact rangeland management.

5.2.6.3 Cumulative Impacts

Proposed Action

The Proposed Action (approximately 211 acres of temporary forage removal) would impact approximately 0.1 percent of the CESA. Quantifiable past and present actions and RFFA disturbance in the Range CESA total approximately 9,011 acres, which results in an incremental impact from the Proposed Action of approximately two percent. Since there are limited quantifiable data for all activities in the CESA, this calculation is a conservative analysis of the potential incremental impact of the Proposed Action. Project-related impacts would be minimized due to the reclamation of the mining facilities and successful revegetation. Therefore, based on the above analysis and findings, incremental impacts to rangeland management as a result of the Proposed Action, when combined with the impacts from the past and present actions and RFFAs, are expected to be minimal.

No Action Alternative

The past and present actions and RFFAs used in this analysis for the Proposed Action would have a similar incremental cumulative impact as the No Action Alternative; however, the No Action Alternative would not result in any additional incremental cumulative impacts beyond the impacts associated with the Proposed Action.

5.2.7 Soils

The CESA for soils is the Wildlife CESA. This CESA encompasses approximately 174,781 acres and is shown on Figure 5.1.1.

5.2.7.1 Impacts from Past and Present Actions

Past actions likely to have collectively impacted soils include agriculture, municipal and rural development, livestock grazing, rangeland improvements, ROW construction, fuels treatments, wildland fire, transportation networks, minerals exploration, mining, and recreation that disturbed or impacted soils, or that increased erosion or sedimentation. Impacts from these activities include loss of soils productivity due to changes in soil physical properties, soil fertility, soil movement in response to water and wind erosion, and loss of soil structure due to compaction. Approximately 3,158 acres of quantifiable past and present mineral actions, 1,428 acres of wildland fires, and 7,216 of ROWs have occurred within the CESA that could have impacted soils.

5.2.7.2 Impacts from RFFAs

Future land uses and practices that could result in potential impacts to soil erosion include agriculture, municipal and rural development, livestock grazing, rangeland improvements, ROW construction, fuels treatments, wildland fire, transportation networks, minerals exploration, mining, and recreation. Specific impacts from RFFAs would be similar to the specific impacts associated with the past and present actions. There are no specific available data to quantify future soil erosion. There are approximately 2,613 acres of pending minerals projects identified in the CESA, and approximately 372 acres of pending ROW projects that could have impacts to soils.

5.2.7.3 Cumulative Impacts

Proposed Action

The Proposed Action (approximately 211 acres) would impact approximately 0.1 percent of the CESA. Quantifiable past and present actions and RFFA disturbance in the Wildlife CESA is approximately 14,787 acres, which results in an incremental impact from the Proposed Action of approximately one percent. Since there are limited quantifiable data for all activities within the CESA, this calculation is a conservative analysis of the potential incremental impact of the Proposed Action. Project-related impacts would be minimized due to implementation of the EPMs outlined in Section 2.1.12 and reclamation. Therefore, based on the above analysis and findings, incremental impacts to soils as a result of the Proposed Action, when combined with the impacts from the past and present actions and RFFAs, would be minimal.

No Action Alternative

The past and present actions and RFFAs used in this analysis for the Proposed Action would have a similar incremental cumulative impact as the No Action Alternative; however, the No Action Alternative would not result in any additional incremental cumulative impacts beyond the impacts associated with the Proposed Action.

5.2.8 Vegetation

The CESA for vegetation is the Wildlife CESA. This CESA encompasses approximately 174,781 acres and is shown on Figure 5.1.1.

5.2.8.1 Impacts from Past and Present Actions

Past and present actions that could impact vegetation include exploration and mining, energy production and distribution, ROW construction and maintenance, livestock grazing, dispersed recreation and natural phenomena such as wildfires. Past and present actions associated with mineral development have or would affect 3,158 acres, approximately 1.8 percent of the Wildlife CESA. Four geothermal leases have been issued across 12 sections in the CESA; however, there has been little surface disturbance associated with these leases.

From 2000 through 2012, 1,428 acres (approximately 0.8 percent) have been burned in the Wildlife CESA by wildfire. There were no documented wildfires in the Wildlife CESA between 2012 and 2015 (BLM 2016b). Fires have increased the cover and density of cheatgrass, which has accelerated the fire return interval in cheatgrass-infested areas. Since many shrubs do not re-sprout after fire, shrub-dominated plant communities (e.g., salt-desert shrub and sagebrush) have been reduced by 12 to 23 percent in Nevada (BLM2013a).

Livestock and wild horse and burro grazing, depending on the intensity and duration, can affect the diversity and productivity of plant communities and wildlife habitats. There are approximately 173,293 acres of grazing allotments on BLM-administered land, representing approximately 99 percent of the CESA.

ROWs (defined by BLM case acres) within the CESA occupy 7,216 acres (four percent). Typically, placement of facilities in ROWs remove the vegetation permanently (e.g., highways and roads) or alter vegetation by soil disturbance (e.g., pipelines and power lines).

Dispersed recreational use in the CESA primarily includes OHV use, hunting, pleasure driving and camping. These activities can affect biological resources directly through game animal mortality and risk of fire, which can kill animals and degrade arid land habitats, and trampling of vegetation due to off-road vehicle travel. Past and present actions in the CESA have resulted in the increased density and distribution of annual grasses, which proliferate after fire and intense grazing and trampling by vehicles, and other disturbances that reduce the cover of native vegetation.

5.2.8.2 Impacts from RFFAs

RFFAs would have the same potential as past and present activities, such as mining operations, dispersed recreation and natural phenomena to impact vegetation. These actions would likely contribute to habitat fragmentation, displacement of native species, soil loss, and conversion of native vegetation communities with invasive, non-native species. There are approximately 2,613 acres of pending minerals projects identified in the CESA, and approximately 372 acres of pending ROW projects that could have impacts to vegetation.

5.2.8.3 Cumulative Impacts

Proposed Action

The Proposed Action (approximately 211 acres) would impact approximately 0.1 percent of the CESA. Quantifiable past and present actions and RFFA disturbance in the Wildlife CESA is approximately 14,787 acres, which results in an incremental impact from the Proposed Action of approximately one percent. Since there are limited quantifiable data for all activities within the CESA, this calculation is a conservative analysis of the potential incremental impact of the Proposed Action. Project-related impacts would be minimized due to implementation of the EPMs outlined in Section 2.1.12 and reclamation of the mine facilities (including revegetation). Based on the above analysis and findings, incremental impacts to vegetation as a result of the Proposed Action, when combined with the impacts from the past and present actions and RFFAs, would be minimal.

No Action Alternative

The past and present actions and RFFAs used in this analysis for the Proposed Action would have a similar incremental cumulative impact as the No Action Alternative; however, the No Action Alternative would not result in any additional incremental cumulative impacts beyond the impacts associated with the Proposed Action.

6 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

6.1 Native American Consultation

The following Tribes were consulted as part of government-to-government consultation: Battle Mountain Band, Fallon Paiute and Shoshone Tribe, Lovelock Paiute Tribe, Pyramid Lake Paiute Tribe and Winnemucca Indian Colony. Letters were sent to several tribes. The Battle Mountain Band, Fallon Paiute Shoshone Tribe, and the Pyramid Lake Paiute Tribe received their letters on August 17, 2015; Lovelock Paiute Tribe received their letter on August 24, 2015; and the Winnemucca Indian Colony received their letter on September 24, 2015. All five groups were provided copies of the Preliminary EA on June 9, 2016.

6.2 Coordination and/or Consultation (Agencies)

The USFWS, NNHP, and NDOW were contacted to obtain information on sensitive species that have the potential to occur within the Project Area. The SETT was contacted for information on greater sage-grouse and their habitat.

6.3 Individuals and/or Organizations Consulted

No additional individuals or organizations were consulted for the preparation of this EA.

6.4 Public Outreach/Involvement

A letter and map were sent to a mailing list of potentially interested members of the public on August 14, 2015. Four comment letters were received from private individuals, state agencies, county governments, and interested parties. In addition, two letters of support of the Project were received from Humboldt and Pershing Counties. Concerns identified both internally from BLM and externally from the public centered on ground water, air quality, wildlife, economic and social values, dark skies initiative, rangeland improvements, and invasive/ nonnative plant species. This assisted the BLM in refining issues and in identifying new issues, coordination needs and possible alternatives.

7 LIST OF PREPARERS

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7.2 Bureau of Land Management Contractor

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7.3 Third Party Consultants

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9 FIGURES