

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

Environmental Assessment DOI-BLM-NV-B010-2015-055-EA
DATE: July 2015

Environmental Assessment

Barrick Cortez Inc. (NVN-067575 [14-1A]) Amendment 3 to Plan of Operations
and Reclamation Permit Application

File Number: NVN-067575



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BLM Mission Statement

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times.

Management is based upon the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation, rangelands, timber, minerals, watershed, fish and wildlife, wilderness, air and scenic, scientific, and cultural values.

Abbreviations and Acronyms

°F	degrees Fahrenheit
µg/m ³	micrograms per cubic meter
AAQS	Ambient Air Quality Standards
AMEC	AMEC Environment & Infrastructure, Inc.
amsl	above mean sea level
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
APO3	Amendment 3 to Plan of Operations and Reclamation Permit Application
AUM	Animal Unit Month
BCI	Barrick Cortez, Inc.
BLM	Bureau of Land Management
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGM	Cortez Gold Mines
CO	carbon monoxide
CO ₂ e	carbon dioxide equivalent
CR	County Road
dBA	decibels, A-weighted
E	east
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
ESA	Endangered Species Act
ET	evapotranspiration
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act of 1976
GBE	Great Basin Ecology, Inc.
GHG	greenhouse gas
H:V	horizontal:vertical
HAP	hazardous air pollutants
HC/CUEP	Horse Canyon/Cortez Unified Exploration Project
HDPE	high density polyethylene
I-80	Interstate 80
IM	Instructional Memorandum
IMP	Integrated Monitoring Plan
JBR	JBR Environmental Consultants, Inc.
KOP	key observation point
LOS	level of service
MBTA	Migratory Bird Treaty Act
N	North

NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NAGPRA	Native American Graves Protection and Repatriation Act
NDEP	Nevada Division of Environmental Protection
NDETR	Nevada Department of Employment, Training, and Rehabilitation
NDOA	Nevada Department of Agriculture
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NO ₂	nitrogen dioxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
PA	Programmatic Agreement
PFYC	Potential Fossil Yield Classification
PGH	preliminary general habitat
PLS	pure-live-seed
PM ₁₀	particulate matter with an aerodynamic diameter of 10 microns or less
PM _{2.5}	particulate matter with an aerodynamic diameter of 2.5 microns or less
PoO	Plan of Operations
PPH	preliminary priority habitat
R	Range
RFD	Range Front Declines
RFFA	reasonably foreseeable future action
ROD	Record of Decision
ROW	right-of-way
SEIS	supplemental environmental impact statement
SHPO	State Historic Preservation Office(r)
SO ₂	sulfur dioxide
SR	State Route
SRK	SRK Consulting, Inc.
T	Township
tpd	tons per day
tpy	tons per year
U.S.	United States
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
vpd	vehicles per day
VRM	Visual Resources Management

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1.0 Introduction

1.1 Background

Barrick Cortez Inc. (BCI), as manager of the Cortez Joint Venture, currently operates gold mining and processing operations within the Cortez Gold Mines (CGM) Operations Area, which is located approximately 24 miles south of Beowawe in Lander and Eureka counties, Nevada (**Figure 1-1**). On August 20, 2014, BCI submitted the Barrick Cortez Inc. (NVN-067575 [14-1A]) Amendment 3 to Plan of Operations and Reclamation Permit Application (APO3) to the Bureau of Land Management (BLM) Mount Lewis Field Office, proposing modifications to existing operations. The APO3 submittal was revised and resubmitted on October 22, 2014 (BCI 2014a). APO3 proposes modifications to facilities in two of the mining complexes in the CGM Operations Area and modifications to overall operations as summarized below (the Proposed Action):

Pipeline Complex:

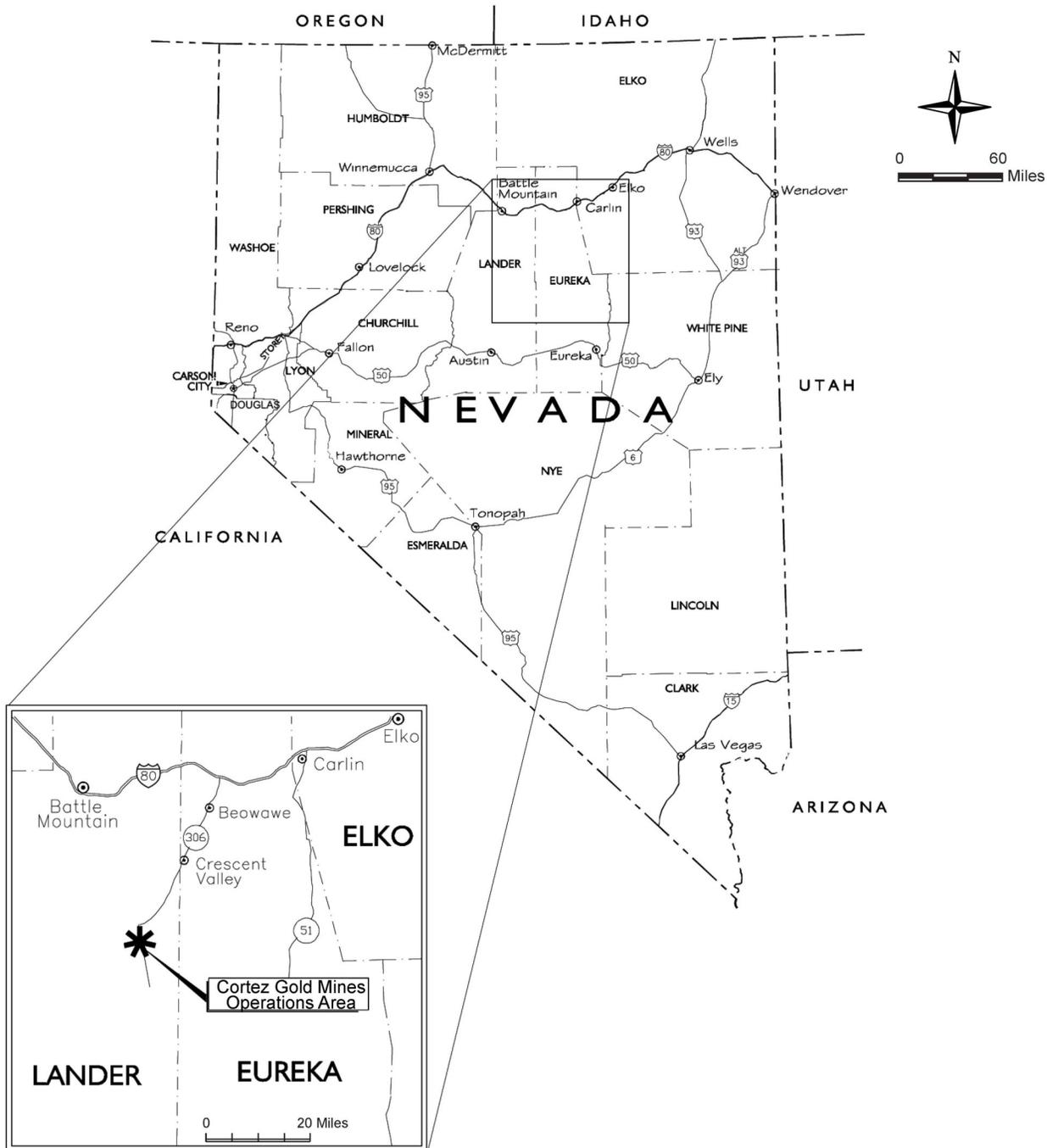
- Deepen the existing Gap Pit (west portion of the existing Pipeline Pit complex)
- Expand the existing Area 30 (Pipeline South Area) Heap Leach Facility and Gap Waste Rock Facility and construct associated storm water diversions
- Reconfigure and increase the height of the existing Pipeline/South Pipeline Waste Rock Facility
- Construct a new water treatment plant and associated facilities
- Construct additional mine infrastructure (e.g., administration building, maintenance shop, etc.) and reconfigure the life-of-mine power line
- Expand the capacity of the refractory ore stockpile on top of the Pipeline/South Pipeline Waste Rock Facility

Cortez Hills Complex:

- Reconfigure and increase the height of the existing Canyon Waste Rock Facility
- Construct new Range Front Declines (RFDs) and associated surface facilities
- Construct additional surface facilities to support currently authorized underground operations
- Relocate and expand the capacity of the refractory ore stockpiles, and develop an oxide ore stockpile, on top of the Canyon Waste Rock Facility

Overall Operations:

- Modify the mining rate between the Pipeline and Cortez Hills complexes to provide operational flexibility
- Retain currently authorized off site refractory ore shipping rate of 1.2 million tons per year (tpy) to the existing Goldstrike Mill for processing, but eliminate the on site location restrictions to provide for operational flexibility
- Backhaul up to 600,000 tpy of oxide (mill- and heap leach-grade) ore from the Arturo Mine through the Goldstrike Mine to the Pipeline Complex for processing



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**Amendment 3 to
 Plan of Operations EA**

Figure 1-1
 Project Vicinity

Operations within the CGM Operations Area are located on public lands administered by the BLM and private lands owned by BCI. The proposed modifications within the CGM Operations Area would be located on BLM-administered land in Lander County within Township 28 North (T28N), Range 47 East (R47E), Sections 28, 29, 30, 31, and 33; T27N, R46E, Sections 1, 12, and 13; T27N, R47E, Sections 4, 6, 7, 9, 10, 14, 16, 17, 18, 23, 24, 25, 26, 35, and 36; T27N, R48E, Sections 30 and 31; and T26N, R47E, Sections 1 and 2.

The proposed facilities modifications at the Pipeline and Cortez Hills complexes would result in 581 acres of new surface disturbance and the reallocation of currently authorized disturbance. No modifications are proposed at the Cortez or Gold Acres complexes within the CGM Operations Area. With BLM approval of APO3, the total approved disturbance area for operations within the CGM Operations Area would increase to 16,700 acres.

As required by the National Environmental Policy Act (NEPA), environmental impact statements (EISs) and environmental assessments (EAs) were prepared prior to the development of the Cortez Expansion Project (BLM 1993), Cortez Pipeline Project (BLM 1996), South Pipeline Project (Amendment for the South Pipeline Project [BLM 2000]), Pipeline/South Pipeline Pit Expansion (Supplemental EIS [SEIS] for Pipeline/South Pipeline Pit Expansion Project [BLM 2004]), Cortez Hills Expansion Project (Cortez Hills Expansion Project Final EIS and Final SEIS [BLM 2008a, 2011]), and subsequent modifications in the CGM Operations Area (EA for Barrick Cortez Inc. (NVN-67575 [11-3A]) 2011 Amendment to Plan of Operations (PoO) and Reclamation Permit Application Proposed North Waste Rock Facility Realignment/Rangeland Fence Addition/Stockpile Relocation/Ancillary Addition [BLM 2014a]). An EA also was prepared for the Amendment to the Cortez PoO for the Underground Exploration Project and Modification to the Reclamation Permit (0217) (Cortez Underground Exploration Project EA [BLM 2006]). Previous plans of operations and related amendments for mining operations in the CGM Operations Area are listed in Appendix 1 of APO3 (BCI 2014a).

Based on the proposed modifications in the CGM Operations Area as described in APO3 (BCI 2014a), the BLM has determined the need for an EA in compliance with NEPA. This EA was prepared in compliance with NEPA and other applicable laws and regulations. This EA tiers from the Cortez Hills Expansion Project Final EIS and Final SEIS (BLM 2008a, 2011), the EA for Barrick Cortez Inc. 2011 Amendment to PoO and Reclamation Permit Application (BLM 2014a), as well as the Amendment for the South Pipeline Project (BLM 2000) and SEIS for the Pipeline/South Pipeline Project (BLM 2004).

This EA describes the proposed modifications (Proposed Action) and the No Action Alternative. It also describes the affected environment and the environmental consequences of implementing the Proposed Action or the No Action Alternative.

1.2 Purpose of and Need for Action

The BLM's purpose is to respond to BCI's proposed modifications in the CGM Operations Area as described in APO3 (BCI 2014a) and summarized in this EA. The BLM's need for the action is established by the agency's responsibility under Section 302 of the Federal Land Policy and Management Act of 1976 (FLPMA) and the BLM Surface Management Regulations at 43 Code of Federal Regulations (CFR) 3809, to respond to an exploration or mining plan of operations and to take any action necessary to prevent unnecessary or undue degradation of public lands as a result of actions taken to prospect, explore, assess, develop, and process locatable mineral resources on public lands.

1.3 Decision to be Made

The BLM's decision relative to this EA will consider the following: 1) approval of APO3 to authorize the proposed activities without modifications or additional mitigation measures; 2) approval of APO3 with

additional mitigation measures that the BLM deems necessary; or 3) denial of proposed APO3 and associated activities if the BLM determines that the proposal does not comply with the 3809 regulations.

1.4 BLM Responsibilities and Relationship to BLM and Non-BLM Policies, Plans, and Programs and Land Use Plan Conformance

The BLM is responsible for the content of this EA, which was prepared in conformance with the policy guidance provided in the updated BLM NEPA Handbook H-1790-1 (BLM 2008b), the Council on Environmental Quality (CEQ) regulations (40 CFR 1500), and agency guidance on the analysis of cumulative impacts.

The Cortez Hills Expansion Project Final EIS (BLM 2008a) identified the policies, plans, and programs applicable to the CGM Operations Area, which also apply to the proposed modifications in APO3 (BCI 2014a). The Proposed Action would be in conformance with these policies, plans, and programs, including the Shoshone-Eureka Resource Management Plan (BLM 1986c), the Lander County Policy Plan for Federally Administered Lands (Lander County 2005), and the Eureka County Master Plan (Eureka County 2010).

1.5 Issues

Internal scoping for the proposed project by the BLM interdisciplinary team occurred at a meeting held on May 8, 2014, at the BLM Mount Lewis Field Office in Battle Mountain, Nevada. During this meeting, BLM personnel identified the elements associated with supplemental authorities and other resources and uses to be addressed in Chapter 3.0 of this EA. Issues associated with the following resources were identified:

- Geology and Minerals
- Water Resources, including Geochemistry
- Soils and Reclamation
- Vegetation
- Wildlife (including migratory birds) and Fisheries Resources
- Range Resources
- Paleontological Resources
- Cultural Resources
- Native American Cultural Concerns
- Air Quality
- Land Use and Access
- Recreation
- Social and Economic Values
- Environmental Justice
- Visual Resources
- Noise
- Hazardous Materials and Solid Waste

2.0 Alternatives Including the Proposed Action

2.1 Introduction

This chapter describes the proposed modifications to existing operations in the CGM Operations Area (Proposed Action) as described by BCI in APO3 (BCI 2014a), inclusive of supporting documents, and supplemental information provided by BCI (2015a, 2014b) (see Section 2.2). The description of the No Action Alternative is presented in Section 2.3. Information on alternatives considered but eliminated from detailed analysis is presented in Section 2.4. A summary of the past, present, and reasonably foreseeable future actions (RFFAs) considered in the cumulative impact assessment is included in Section 2.5.

2.2 Proposed Action

Under the Proposed Action, the facilities modifications and overall operations modifications as summarized in Section 1.1 and described below would be made to existing operations at the CGM Operations Area. All other operations within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. Currently authorized facilities within the CGM Operations Area are presented in **Figure 2-1**; proposed modifications are presented in **Figure 2-2**.

The proposed modifications would result in a total of 581 acres of new surface disturbance and the reallocation of use of currently authorized disturbance at the Pipeline and Cortez Hills complexes as shown in **Table 2-1**. The proposed modifications would occur on BLM-administered lands located within the currently authorized PoO boundary (NVN-067575 [11-3A]). Under the Proposed Action, the total disturbance area for operations within the CGM Operations Area would increase from 16,119 acres, as currently authorized (BLM 2014b), to 16,700 acres.

Table 2-1 Currently Authorized and Proposed Surface Disturbance

Facility	No Action Alternative Total Authorized Disturbance by Facility (acres)	Proposed Action		
		Proposed Total Disturbance by Facility (acres)	Proposed Reallocation of Use of Currently Authorized Disturbance ¹ (sum total acres)	Proposed New Surface Disturbance ¹ (acres)
Pipeline Complex				
Gap Pit portion of Pipeline Pit Complex ²	1,543 ³	1,619 ³	58 ⁴	18 ⁴
Pipeline South Area Heap Leach	758	1,034	62	214
Gap Waste Rock Facility	125	347	220	2
Pipeline/South Pipeline Waste Rock Facility ⁵	2,714	2,549	-185	20
Storm Water Diversion Channels for Gap Waste Rock Facility and Pipeline South Area Heap Leach Facility ⁶	0	129	65	64
Additional Mine Infrastructure	220	227	0	7

Table 2-1 Currently Authorized and Proposed Surface Disturbance

Facility	No Action Alternative Total Authorized Disturbance by Facility (acres)	Proposed Action		
		Proposed Total Disturbance by Facility (acres)	Proposed Reallocation of Use of Currently Authorized Disturbance ¹ (sum total acres)	Proposed New Surface Disturbance ¹ (acres)
Pipeline Ancillary Area	913	825	-161	72
Growth Media Stockpiles	27	57	30	0
Cortez Hills Complex				
Canyon Waste Rock Facility ⁷	1,505	1,633	126	2
RFDs and Surface Support Facilities	0	33	33	0
Cortez Ancillary Area ⁸	679	795	62	54
Cortez Hills Ancillary Area ⁹	688	590	-98	0
Ancillary Support Facilities				
Gold Acres Haul Road	110	167	-5	62
Post-mining Water Management Features ¹⁰	0	75	8	67
Total Proposed New Disturbance				581¹¹

¹ Disturbance acreages on BLM-managed lands.

² Inclusive of 200-foot-wide pit adjustment zone.

³ Reflects total acreage for the Pipeline Pit Complex, inclusive of the Gap Pit.

⁴ Proposed change for Gap Pit portion of the Pipeline Pit Complex.

⁵ A proposed growth media stockpile, an expanded refractory ore stockpile area, and proposed water treatment plant would be placed on top of, and within the footprint and maximum crest elevation, of the Pipeline Waste Rock Facility.

⁶ The storm water diversion channels would be retained as post-mining water management features.

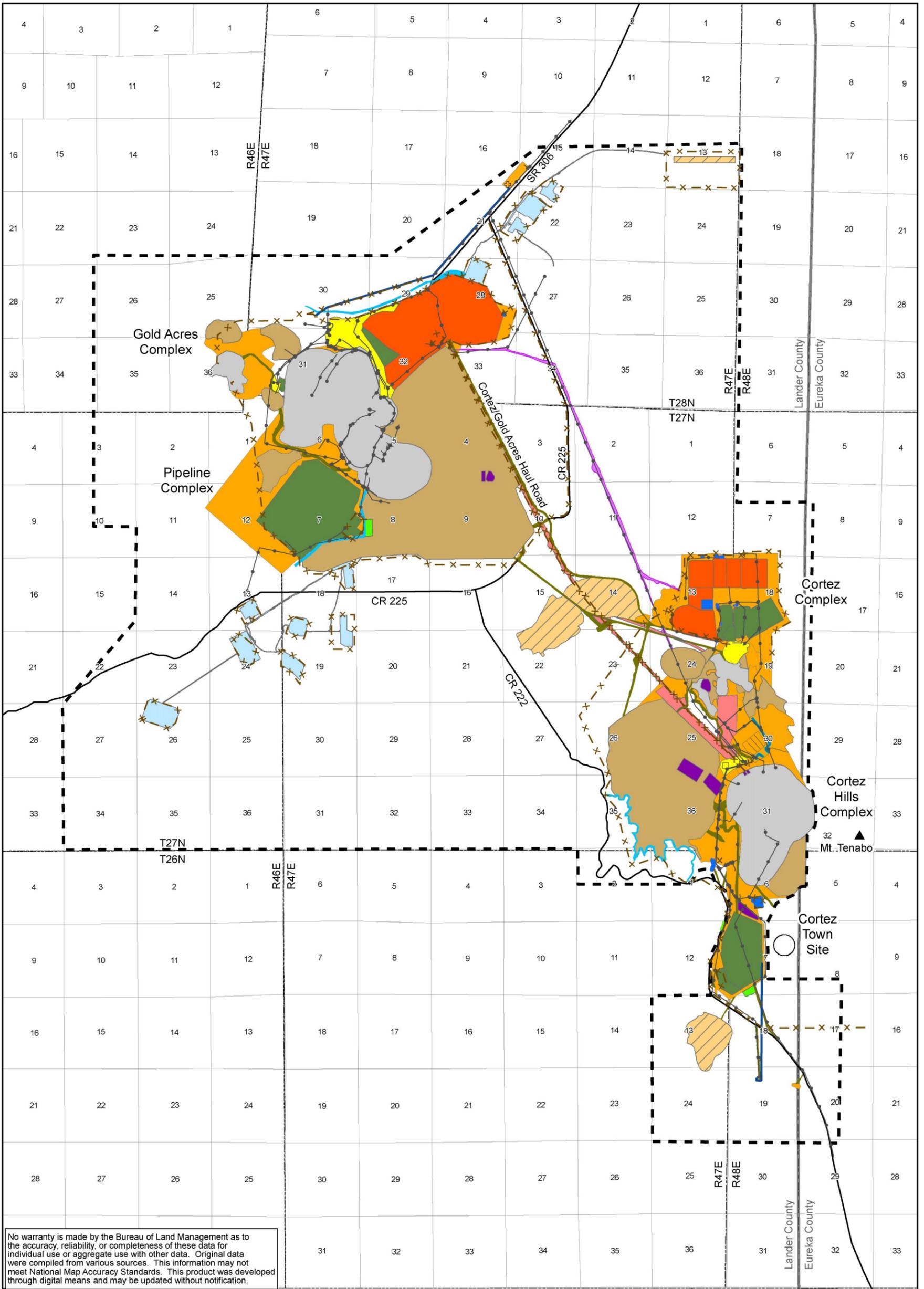
⁷ Proposed ore stockpiles would be placed on top of, and within the footprint of, the Canyon Waste Rock Facility. The proposed northern stockpile would be lined to receive refractory ore from authorized underground operations; the relocated southern stockpile would receive oxide ore from the authorized open pits and, consistent with existing authorizations for the current ore stockpiles on the Canyon Waste Rock Facility, would not be lined.

⁸ Proposed new disturbance is related to construction of additional surface facilities for currently authorized Cortez Hills Underground operations.

⁹ Lined refractory ore stockpiles would be located within the Cortez Hills ancillary area footprint.

¹⁰ Includes post-mining storm water diversions for Pipeline heap leach facilities (37 acres) and the Canyon Waste Rock Facility (30 acres).

¹¹ Difference is due to rounding.



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Legend

- CGM Operations Area Boundary
- Ancillary Facilities
- Borrow Areas
- Conveyor Corridor
- Growth Media Stockpile
- Haul Road
- Heap Leach Facilities
- Infiltration Facilities
- Open Pits
- Process Facilities
- Ore Stockpiles
- Tailings Facilities
- Utilities
- Waste Rock Facilities
- Water Storage Reservoirs
- Diversion Channel
- Powerline
- Rangeland Fence
- Water Pipeline
- Road

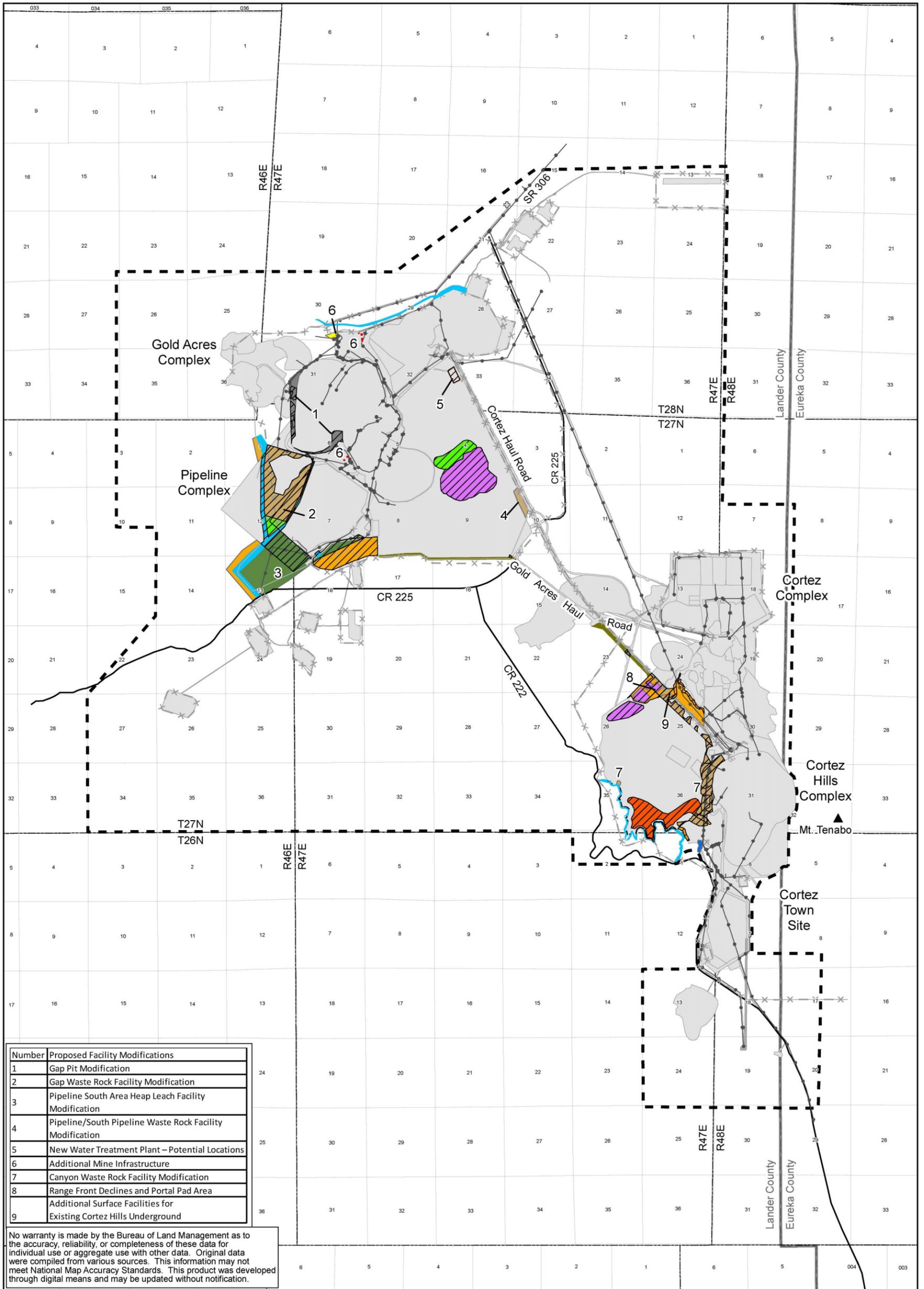


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**Amendment 3 to
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Figure 2-1
 No Action Alternative -
 Currently Authorized Facilities





Number	Proposed Facility Modifications
1	Gap Pit Modification
2	Gap Waste Rock Facility Modification
3	Pipeline South Area Heap Leach Facility Modification
4	Pipeline/South Pipeline Waste Rock Facility Modification
5	New Water Treatment Plant – Potential Locations
6	Additional Mine Infrastructure
7	Canyon Waste Rock Facility Modification
8	Range Front Declines and Portal Pad Area
9	Additional Surface Facilities for Existing Cortez Hills Underground

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Legend

- CGM Operations Area Boundary
- Existing Facilities
- Powerline
- Rangeland Fence
- Road
- Overlap of Existing and Proposed Facilities
- Proposed Ancillary Facilities
- Proposed Growth Media Stockpile
- Proposed Haul Road
- Proposed Heap Leach Expansion
- Proposed Pit Modification
- Proposed Mine Infrastructure Area Expansion
- Proposed Oxide (Mill-grade) Ore Stockpile
- Proposed Refractory Ore Stockpile
- Proposed Waste Rock Facility Modification
- Proposed Diversion Channel/Sediment Control Pond/Storm Water Pond
- Pond
- Proposed Water Treatment Plant
- Proposed Building



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Figure 2-2
 Proposed Action



No change in the life of operations within the CGM Operations Area would occur under the Proposed Action. A contract work force of approximately 60 workers would be used to develop the proposed RFDs and associated ancillary facilities; the work would be conducted 24 hours per day, 7 days per week over approximately a 3-year period. No increase in BCI's current work force at the CGM Operations Area would be required for ongoing underground or surface operations. The ongoing transport of refractory ore shipments from the CGM Operations Area to the Goldstrike Mill for processing, and the proposed backhaul of Arturo Mine oxide (mill- and heap-leach grade) ore through the Goldstrike Mine to the Pipeline Complex for processing, would be conducted by contract haulers.

2.2.1 Pipeline Complex Modifications

2.2.1.1 Gap Pit

Under the Proposed Action, the depth of the currently authorized Gap Pit portion of the Pipeline Pit Complex would increase by 40 feet, lowering the authorized Gap Pit bottom elevation from 4,400 to 4,360 feet above mean sea level (amsl). A bench height of 40 feet would be used, and the overall pit slope angles would range from 0.9 horizontal (H):1 vertical (V) to 2.5H:1V. Consistent with current authorizations, a 200-foot-wide pit adjustment zone would extend around the rim of the pit area, within which the pit could be laid back if necessary for safety or engineering considerations. The proposed deepening of the Gap Pit would result in the additional production of approximately 300,000 tons of ore and 500,000 tons of waste rock. No associated change in the configuration of the currently authorized Gap Pit backfill area is proposed. The associated proposed change in disturbance area for this facility is presented in **Table 2-1** and shown in **Figure 2-2**.

No increase in the dewatering rate at the Pipeline Complex is proposed to facilitate the deepening of the Gap Pit, as current dewatering maintains the groundwater level below the 4,360-foot elevation.

To accommodate the proposed Gap Pit reconfiguration, a segment of the existing 120-kilovolt power line would be rerouted around the west of the proposed pit disturbance area.

2.2.1.2 Pipeline South Area Heap Leach Facility

Proposed modifications to the existing Pipeline South Area Heap Leach Facility would include expansion of the heap leach pad to accommodate the processing of approximately 133 million tons of additional low-grade run-of-mine ore, resulting in a total storage capacity of 467 million tons. The overall height of the heap leach facility expansion area would be 300 feet. The associated proposed change in disturbance area for this facility is presented in **Table 2-1** and shown in **Figure 2-2**.

The proposed Pipeline South Area Heap Leach Facility expansion area would be separated from upgradient watersheds by the proposed Gap Waste Rock Facility expansion and by a new storm water diversion system designed to withstand a 24-hour/100-year storm event (**Figure 2-2**). The new storm water diversion also would extend between the proposed Gap Waste Rock Facility and Pipeline South Area Heap Leach Facility expansion areas to connect to the existing storm water diversion infrastructure. The storm water diversion channel would route flow from upgradient areas around the proposed heap leach expansion area to the downgradient natural drainages southwest of the proposed leach pad expansion area. A box culvert or equivalent system would be installed where the drainage crosses County Road (CR) 225 to safely route design storm flows under the roadway. To provide for access and routine maintenance, new ancillary disturbance areas are proposed adjacent to portions of the proposed diversion channels (**Figure 2-2**). The proposed ancillary disturbance areas and reallocation of currently authorized Pipeline ancillary disturbance to facilitate development of proposed facility modifications would result in an overall reduction in currently authorized Pipeline ancillary disturbance as shown in **Table 2-1**.

To contain storm water runoff from the proposed heap leach facility expansion area (a closed circuit, zero discharge facility), a new storm water pond designed to contain runoff from a 24-hour/100-year storm event would be constructed adjacent to the proposed expansion area (**Figure 2-2**). The pond would be double-lined with a leak detection and collection system similar to the existing process ponds. Water from the pond would be allowed to evaporate or be used as process make-up water. The proposed Pipeline South Area Heap Leach Facility expansion area would be designed, constructed, and operated in a manner similar to existing heap leach facilities in the CGM Operations Area as described in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and summarized below. The facility would be operated in accordance with Nevada Division of Environmental Protection (NDEP) permit criteria and the BLM Cyanide Management Plan. No change to the existing carbon-in-column process circuit, process flow rates, or reagent consumption are proposed.

Heap Leach Design and Construction

Prior to placement of heap-leach grade ore, an engineered leach pad would be constructed. The pad design would be similar to currently authorized heap leach facilities in the CGM Operations Area. As described in the Cortez Hills Expansion Project Final EIS (BLM 2008a), the leach pad would be constructed in compliance with Nevada Administrative Code (NAC) 445A.434 and 445A.438 and would utilize a composite-lined system with leak detection. Eighty-mil high density polyethylene (HDPE) geomembrane would be used for the primary liner. The liner would be placed on a 12-inch-thick soil subliner compacted to provide an in-place permeability of 1×10^{-6} centimeters per second or less. A drainage layer consisting of a network of 4- to 10-inch drainage pipe covered by 18 to 24 inches of crushed rock or screened gravel would be placed on top of the primary liner to provide for collection of pregnant (gold-bearing) solution and reduce the hydraulic head on the liner. The final design for the Pipeline South Area Heap Leach Facility would be submitted to BLM and NDEP for approval prior to construction.

Consistent with existing operations, leach-grade run-of-mine ore would be placed in lifts on the pad using mine haulage trucks. The rock would be placed in lifts up to 50 feet in height, with each lift setback to yield overall slope angles of 2.5H:1V to facilitate reclamation activities and provide for mass and erosional stability.

Consistent with currently authorized heap leach facilities, a network of sprinkler pipes would be placed on top of the ore pile once a lift is completed, and a dilute solution of sodium cyanide would be sprayed on the ore. Scarifying areas on the heaps would be done on an as needed basis to prevent ponding or pooling of process solution.

Solution Collection System

Consistent with existing operations, leach solution would be pumped from the existing process plant to the proposed heap leach pad expansion area. The solution would be conveyed via barren solution pipelines that would be routed through the existing HDPE-lined Pipeline South Area Heap Leach Facility to provide secondary containment. Following percolation of the leach solution through the heap, pregnant (gold-bearing) solution would be collected at the base of each cell of the heap leach pad, with solution subsequently routed to a new pregnant leach solution tank(s) fitted with pumps. The solution then would be pumped directly to the existing process plant and process ponds.

The proposed solution collection tank(s) would be placed on a geomembrane lined shelf that would be constructed to drain to the existing pregnant solution pond. The shelf would be lined with a primary liner consisting of 80-mil HDPE, a geonet drainage layer, and a 60-mil HDPE secondary liner. The shelf would have an intermediate leachate collection and removal system independent of the existing pregnant solution pond. In the event of a power outage or other operational upset condition, solution would overflow the tank(s) and drain to the existing process pond(s), consistent with existing operations.

2.2.1.3 Gap Waste Rock Facility

Proposed modifications to the existing Gap Waste Rock Facility would include an expansion of the facility footprint into areas currently authorized for disturbance (see **Table 2-1** and **Figure 2-2**). In addition, there would be a 200-foot increase in the height of the facility, resulting in a change in the authorized elevation from 5,450 to 5,650 feet amsl. The expanded facility would accommodate approximately 110 million tons of additional waste rock that would include approximately 500,000 tons of waste rock from the proposed expansion of the Gap Pit and approximately 109.5 million tons of waste rock currently authorized for placement in the Pipeline/South Pipeline Waste Rock Facility. The resulting total storage capacity for the facility would be 154 million tons.

Consistent with existing operations, the expanded Gap Waste Rock Facility would be constructed in up to 200-foot lifts, with setbacks to yield overall slope angles of 2.5H:1V to facilitate reclamation activities and provide for mass and erosional stability.

As required by NDEP, quarterly samples of distinct waste rock units currently are collected from the active mine pits and subjected to meteoric water mobility and acid base accounting tests. Based on the results, any localized areas of acid generating waste rock currently are placed internal to the waste rock disposal facilities and encapsulated or blended with acid neutralizing waste rock prior to placement. These procedures also would be implemented for the modified Gap Waste Rock Facility in accordance with the Integrated Monitoring Plan (CGM and SRK Consulting, Inc. [SRK] 2008b).

An engineered storm water diversion channel designed to accommodate flow from a 24-hour/100-year storm event would be constructed upgradient of the expanded Gap Waste Rock Facility and would merge with the storm water diversion channel for the Pipeline South Area Heap Leach Facility expansion area (see **Figure 2-2** and **Table 2-1**). The water would be conveyed to existing downgradient drainages as discussed in Section 2.2.1.2.

2.2.1.4 Pipeline/South Pipeline Waste Rock Facility

Under the Proposed Action, the height of the currently authorized Pipeline/South Pipeline Waste Rock Facility would increase by 300 feet, resulting in a change in the authorized elevation from 5,100 to 5,400 feet amsl. In addition, there would be an adjustment to the facility footprint as presented in **Table 2-1** and shown in **Figure 2-2**. The modified facility would accommodate a total of approximately 850 million tons of additional waste rock, approximately 268 million tons less than the currently authorized capacity of 1,118 million tons.

Construction of the modified Pipeline/South Pipeline Waste Rock Facility and waste rock sampling and associated handling would be the same as described in Section 2.2.1.3, Gap Waste Rock Facility.

Under the Proposed Action, the current refractory ore stockpile area on the Pipeline/South Pipeline Waste Rock Facility would be expanded (see **Figure 2-2**). The existing stockpile is unlined except for a portion dedicated to underground refractory ore. The proposed stockpile expansion area would be unlined, consistent with the current authorized stockpile design. Based on material characterization, refractory ore from the Pipeline pit complex either would be placed on the proposed stockpile expansion area or on the existing lined refractory ore stockpile. The maximum height of the stockpiles would be 200 feet, with ore placed in lifts up to 100 feet in height.

2.2.1.5 New Water Treatment Plant

Under the Proposed Action, a new water treatment plant would be constructed to reduce naturally occurring arsenic concentrations in the mine dewatering water from both the Pipeline and Cortez Hills complexes, prior to irrigation use or infiltration as currently authorized. The water treatment plant would be used to reduce arsenic concentrations to the levels required under the recently authorized Profile I

reference values (NAC 445A). The plant would be located within the previously authorized disturbance area on the northeast end of the existing Pipeline/South Pipeline Waste Rock Facility (**Figure 2-2**). The plant would have a design capacity to accommodate a peak total flow rate of 37,500 gallons per minute.

The treatment process would include iron co-precipitation and the use of mechanical clarifiers. In the initial step, a form of ferric iron would be added to tanks containing raw dewatering water, resulting in the formation of ferric hydroxide particles (floc) that would adsorb the arsenic. The treated water subsequently would be piped to mechanical clarifiers and the floc allowed to settle. Up to six clarifiers would be constructed in 20-foot-deep circular concrete basins with sloped bottoms and central sludge draw-off mechanisms. Each approximately 125-foot-wide clarifier would be equipped with a rotating clarifier rake mechanism to facilitate sludge removal. The sludge would be pumped to and disposed of in the existing Pipeline Tailings Facility.

Effluent from the clarifiers would be piped to a new surge pond that would be constructed adjacent to the clarifiers. The 315-foot by 125-foot by 14-foot surge pond would be designed with a minimum freeboard of 4 feet and would be double lined and equipped with leak detection. A combination of HDPE and steel pipelines would be installed to convey treated water from the surge pond to the existing infiltration water distribution system.

A pre-engineered steel framed building would be constructed to provide housing for reagent storage, mixing process equipment, and maintenance equipment. The building also would include a control room and laboratory space.

Power requirements for the water treatment facility (480 /277 kilovolt) would be obtained from the existing power distribution system at the Pipeline Complex. Dedicated diesel generators would provide backup power; an automated transfer switch would provide rapid transfer to backup power, as needed.

2.2.1.6 Additional Mine Infrastructure

Under the Proposed Action, additional infrastructure would be constructed in the existing Pipeline office area and Pipeline operations area located on the north and south side, respectively, of the Pipeline Pit complex. The existing process facilities disturbance footprint also would be expanded (see **Figure 2-2** and **Table 2-1**). Proposed new facilities at the office area would include an emergency medical building, maintenance building, and truck wash. New facilities at the operations area would include administration offices and a fuel skid. The buildings would be constructed in a similar manner as the existing buildings, and each would have an approved septic system. Potable water would be provided by existing water supply wells. Power for these facilities would be provided by connection to the existing life-of-mine power lines.

2.2.1.7 Growth Media Stockpiles

Under the Proposed Action, two new growth media stockpiles would be constructed within previously authorized disturbance areas at the Pipeline Complex (see **Figure 2-2** and **Table 2-1**). One stockpile would be located adjacent to the Pipeline South Area Heap Leach Facility and would accommodate material salvaged during the proposed expansion of the heap leach pad. The second growth media stockpile would be located on the Pipeline/South Pipeline Waste Rock Facility and would accommodate growth media salvaged from the Pipeline Pit Complex.

2.2.2 Cortez Hills Complex Modifications

2.2.2.1 Canyon Waste Rock Facility

Under the Proposed Action, the Canyon Waste Rock Facility would be reconfigured to accommodate a larger refractory ore stockpile and an oxide ore stockpile on the top of the facility (see **Figure 2-2**). The

associated change in disturbance area for the Canyon Waste Rock Facility is presented in **Table 2-1**. In addition, there would be a 160-foot increase in the height of the facility, resulting in a change in the authorized elevation from 6,280 to 6,440 feet amsl (see **Figure 2-3**). The modified facility would accommodate approximately 65 million tons of additional waste rock, resulting in a total storage capacity of 1,270 million tons.

The proposed oxide ore stockpile on the southern portion of the Canyon Waste Rock Facility would be constructed in 100-foot lifts, with a maximum overall height of 200 feet and overall capacity of 4 million tons of oxide ore from the currently authorized open pits. The southern stockpile would not be lined, consistent with current authorizations. The northern stockpile area would receive refractory ore from the existing underground operations and would be lined. The liner requirements would be determined based on material characterization. The liner system design would include storm water controls to handle the 100-year, 24-hour storm event, and storm water run-on would be diverted around the stockpiles. In accordance with NDEP requirements, Barrick would submit lined ore storage stockpile design drawings to the NDEP. This stockpile would be constructed in 25-foot lifts, with a maximum overall height of 100 feet and overall capacity of approximately 2.2 million tons. Construction of the modified Canyon Waste Rock Facility and waste rock sampling and associated handling would be the same as described in Section 2.2.1.3, Gap Waste Rock Facility.

2.2.2.2 Range Front Declines and Surface Support Facilities

Under the Proposed Action, twin RFDs and associated surface facilities would be constructed within the currently authorized disturbance area north of the existing Canyon Waste Rock Facility to further underground development, exploration, and production (see **Figure 2-2** and **Table 2-1**). Once the declines connect to the currently authorized underground mining operations, they would serve as ventilation and a secondary emergency means of egress for existing underground operations and provide for conveyance of underground ore and waste. The currently authorized F-Canyon portals would continue to be used for personnel, supplies, services, and utilities for the underground mining operations. A new surface facilities area for the existing Cortez Hills Underground operations also would be developed south of the proposed RFD surface infrastructure area to provide additional support facilities for currently authorized underground operations.

Range Front Declines

The proposed RFD portals and approximately first 50 feet of the declines would be excavated to approximately 22 feet tall and 20 feet wide to accommodate the installation of arch sets for ground support. Consistent with current underground operations, the declines would taper to approximately 16 feet tall and 18 feet wide. Underground mining methods as discussed in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and currently used for the existing underground operations would be used for RFD development and mining, including overhand and underhand drift and fill, longhole or blasthole stoping, and blind bench stoping. Other conventional methods also may be used as the underground mine develops. The depth of the underground workings would not exceed the currently authorized elevation of approximately 3,800 feet amsl. No increase in the currently authorized dewatering rate would be required to facilitate development of the RFDs. A total of approximately 500,000 tons of waste rock would be mined during RFD development.

During RFD development and production, up to 6,500 tons per day (tpd) would be mined, with up to 6,200 tpd of waste rock placed as backfill in the mined-out workings. Waste rock not disposed of underground and the mined ore would be transported to the surface by a conveyor system or hauled directly to the surface by truck. The proposed conveyor system would be capable of delivering 350 tons per hour to the dedicated stockpiles in the RFD surface facilities area (see **Figure 2-4**). Stockpiled mill-grade ore subsequently would be transferred by front-end loader to either haul trucks or to the cross-valley conveyor system for transport to the existing Pipeline Mill for processing; no associated increase

in the existing Pipeline Tailings Facility would be required to accommodate the resulting tailings. Refractory ore would be hauled to and placed in the proposed refractory ore stockpiles on the northern portion of the Canyon Waste Rock Facility (see Section 2.2.2.1, Canyon Waste Rock Facility) or in the proposed refractory ore stockpile adjacent to the portal pad area. The refractory ore stockpiles would be lined with a system that satisfies the requirements of NAC 445A.438. Waste rock would be hauled to and placed in one of the existing waste rock facilities at the Cortez/Cortez Hills complexes. Based on geochemical analysis of the waste rock (Geomega 2014a), the material is similar to waste rock from the Cortez Hills Pit that previously was approved for placement in the existing waste rock facilities.

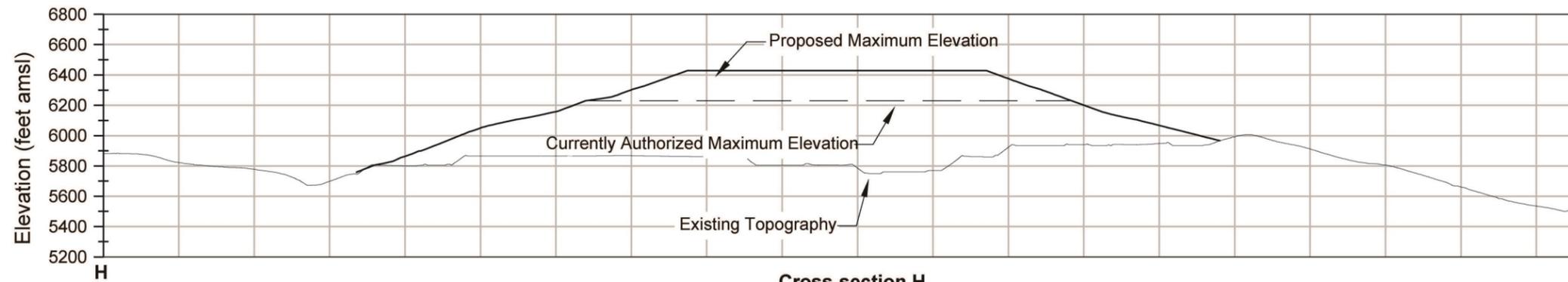
To provide access to the RFD pad site and facilitate truck transport of mill-grade ore to the Pipeline Mill, the existing single-lane access road that runs northwest from proposed RFD infrastructure area to the existing Gold Acres haul road would be expanded to a width of 140 feet, with safety berms installed per Mine Safety and Health Administration requirements (see **Figure 2-2** and **Table 2-1**).

Range Front Declines Surface Facilities Area

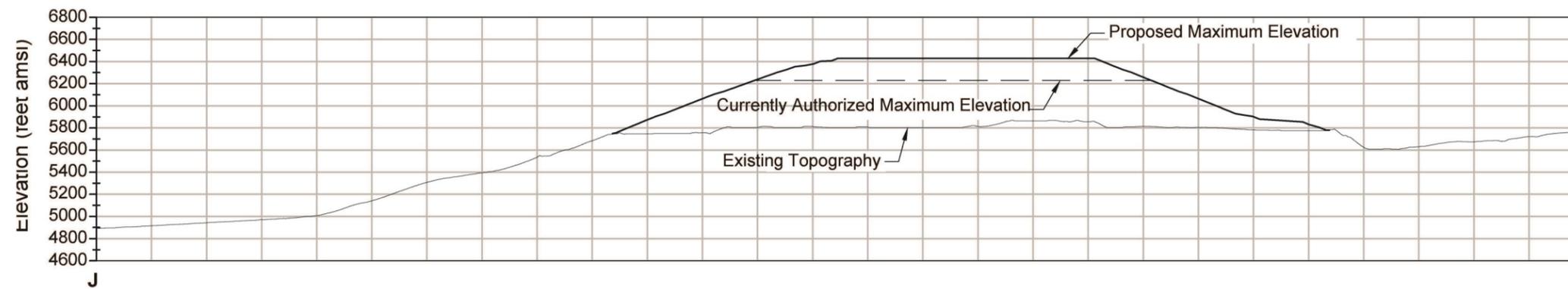
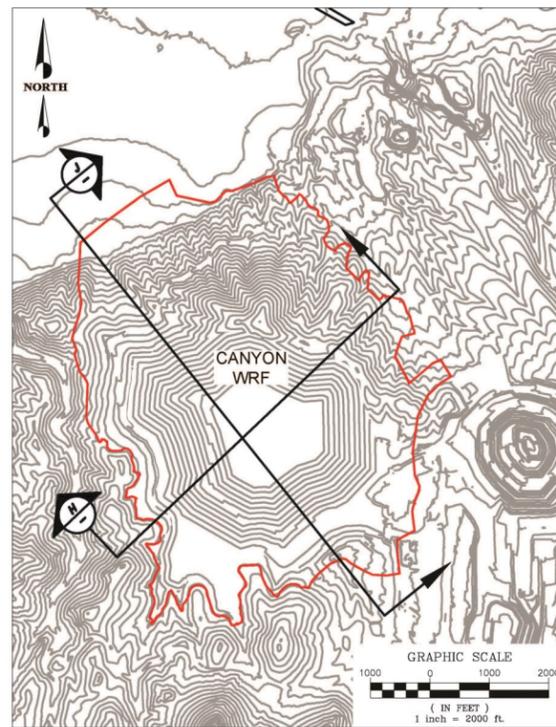
Site preparation for the RFD surface facilities area would include installation of storm water management controls, construction of an operating pad, and installation of a liner system under the dedicated stockpile area. Storm water management would include grading of the portal area to facilitate drainage of storm water runoff away from each portal and construction of ditches and berms above highwalls to divert storm water runoff around the portal area. Storm water collected in the ditch on the east side of the RFD area would flow into the existing storm water diversion that runs along the conveyor corridor area. Storm water that collects in the ditch on the west side of the RFD area would flow into Crescent Valley. Waste rock generated during portal excavation or from other nearby currently authorized facilities would be used to construct the RFD operating pad (**Figure 2-4**). A liner system would be constructed under the proposed dedicated ore stockpile area in the RFD surface facilities area prior to placement of ore. Barrick would submit lined ore storage stockpile design drawings to the NDEP. Runoff from the dedicated ore stockpile area would be diverted to a new lined storm water pond designed to contain storm water runoff from the stockpile area during a 24-hour/100-year storm event plus 12 hours of 1,000 gallons per minute underground mine water inflow (**Figure 2-4**). During operations, excess water from the storm water pond would be pumped to the existing ponds at the Cortez Complex and subsequently to the Pipeline Mill, as needed, for makeup water.

Until permanent facilities are constructed, a temporary portable shotcrete plant, backfill plant, and fuel/lube, warehouse, laydown, and aggregate storage areas would be constructed for use during the initial development of the declines. Other temporary support facilities would include modular trailers to provide office space, a change house, and portable sanitary waste facilities. These facilities would be decommissioned and removed from the site following construction of permanent facilities.

Permanent facilities at the portal site would include infrastructure to provide for access, ventilation, compressed air, drill water, shotcrete, ore and waste rock handling, and mine water management. The existing Cortez Hills substation would supply power for the RFD portal area via overhead power lines along the currently authorized cross-valley conveyor corridor. To provide for maintenance of underground mining and surface equipment, a maintenance shop and fuel and lubricant stations would be constructed on concrete pads with secondary containment. Office and change house facilities also would be constructed. Potable water would be piped from the existing nearby Mill One system at the Cortez Complex to a new potable water tank located above the RFD area.



Cross-section H



Cross-section J



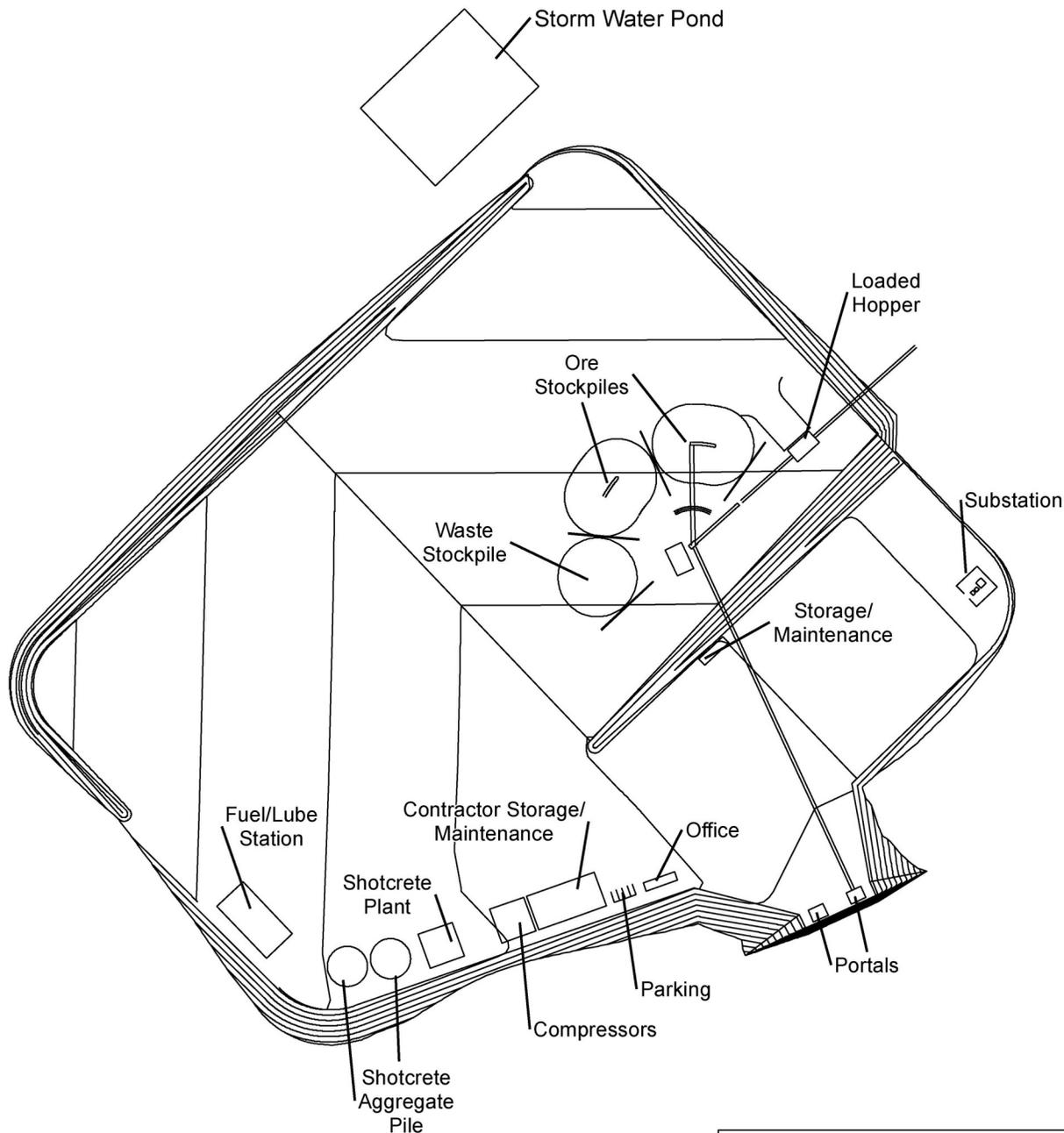
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Figure 2-3

Canyon Waste Rock Facility
 Cross-sections



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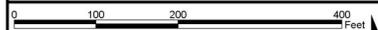


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Figure 2-4

**Range Front Declines and
 Portal Pad Area**



1:2,800



Note: The location of the proposed RFD portal pad area is shown in Figure 2-2.

Mine water holding tanks and a compressor/generator house would be installed and used for the duration of RFD development and operations. Mine water would be piped to holding tanks (located southeast of the RFD portal pad) for use as underground service water or piped to the existing ponds at the Cortez Complex. Additional water for underground operations would be conveyed from the existing storage tanks near the currently authorized F-Canyon portals to the RFD portal area via an approximately 8-inch-diameter pipeline. Additional make-up water, as needed, would be obtained from existing groundwater wells.

Surface Facilities Area for Existing Cortez Hills Underground

Additional surface facilities for currently authorized Cortez Hills Underground operations would be located in the ancillary area south of the proposed RFD surface facilities area (see **Figure 2-2**). This area would accommodate shotcrete and backfill plants, underground fuel and lubricant storage and distribution, as well as power distribution, utility holes, and material stockpiles. Power for the proposed surface facilities would be obtained from the existing Cortez Hills substation. Ventilation raises also may be constructed in this area to provide ventilation to the underground workings and an emergency escape. The associated change in the Cortez Hills ancillary disturbance area to accommodate these facilities and activities is presented in **Table 2-1**.

2.2.3 Overall Operations Modifications

2.2.3.1 Mining Rate

Under the Proposed Action, the surface mining rate between the Pipeline and Cortez Hills complexes would be modified to provide operational flexibility, and the overall surface mining rate from operations in the CGM Operations Area would be reduced as shown in **Table 2-2**.

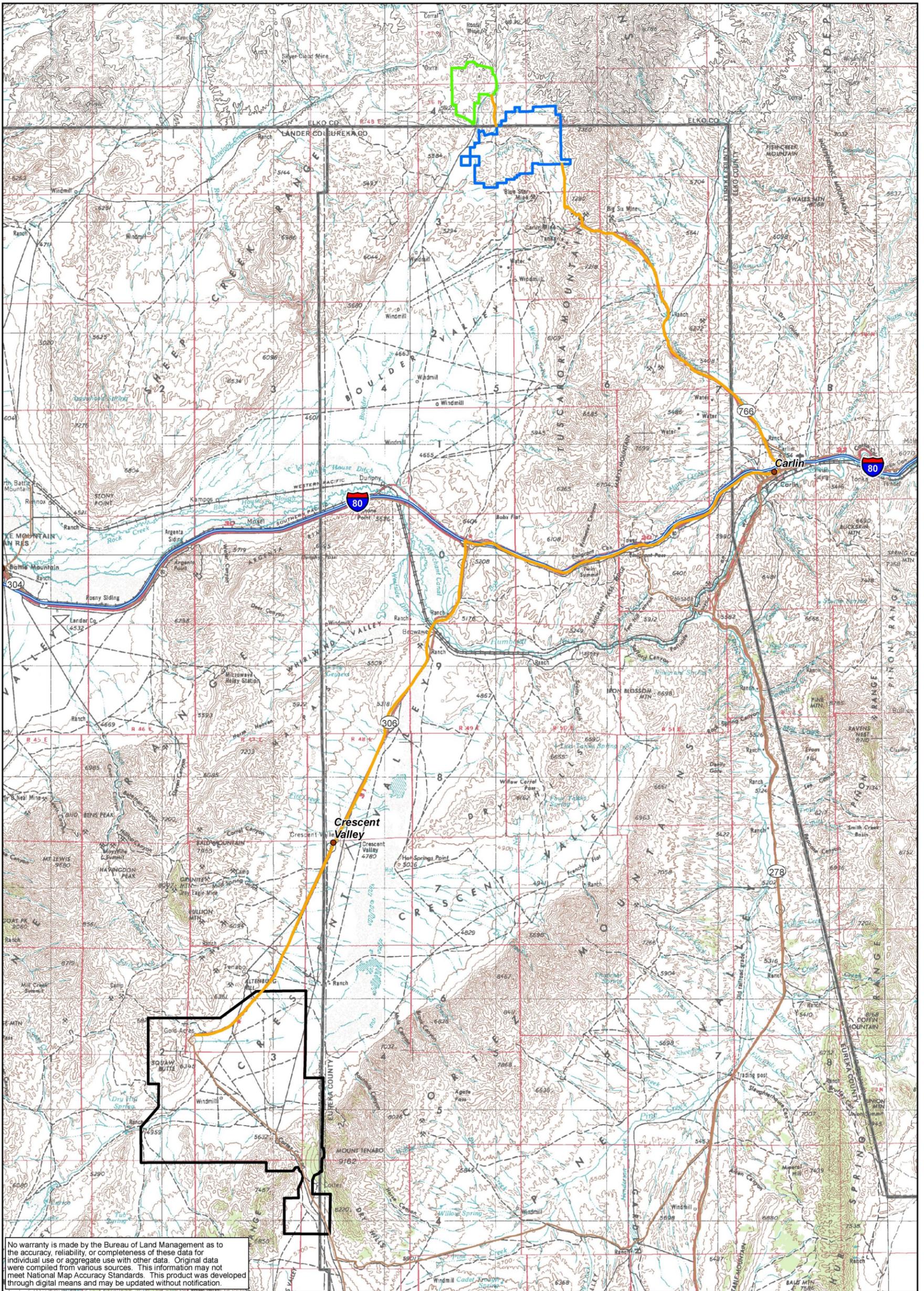
Table 2-2 Proposed Surface Mining Rate Modifications

Location	Currently Authorized Mining Rate (tpd)	Proposed Maximum Mining Rate ¹ (tpd)
Pipeline Complex	350,000	540,000
Cortez Hills Complex	500,000	
Cortez Complex	40,000	40,000
Total	890,000	580,000

¹ Reflects a yearly maximum rate averaged on a daily basis.

2.2.3.2 Refractory Ore Shipment

Refractory ore mined in the CGM Operations Area currently is, and would continue to be, trucked off site at a rate of up to 1.2 million tpy through 2031 for processing at the Goldstrike Mill under an existing ore sales agreement and current authorizations. Under current authorizations, the total rate of 1.2 million tpy consists of 400,000 tpy from any refractory ore stockpile from within the CGM Operations Area and 800,000 tpy from the Pipeline refractory ore stockpile. The proposed modification to refractory ore shipments would provide for transport of up to 1.2 million tpy from any refractory ore stockpile in the CGM Operations Area. The refractory ore sent to Goldstrike for processing would continue to be processed through either the existing roasters or the autoclaves as currently authorized. No change in the currently authorized shipping rate, shipping route (**Figure 2-5**), or duration of shipment is proposed.



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- Legend**
- CGM Operations Area Boundary
 - Goldstrike Mine Operations Boundary
 - Arturo Mine Operations Boundary
 - Ore Transportation Route

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Figure 2-5
Ore Transportation Route



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Note: No change to the currently authorized ore transportation route between the CGM Operations Area and the Goldstrike Mine is proposed.

2.2.3.3 Backhaul of Arturo Oxide Ore for On Site Processing

Following the delivery of refractory ore from the CGM Operations Area to the Goldstrike Mine as discussed in Section 2.2.3.2, BCI proposes to use the ore transport trucks (that currently are returning empty) to backhaul oxide (mill- and heap leach-grade) ore from the Arturo Mine (located approximately 7 miles from Goldstrike [see **Figure 2-5**]) at a rate of up to 600,000 tpy through the Goldstrike Mine to the Pipeline Complex for processing. The ore would be delivered to the existing oxide ore stockpiles at the Pipeline Complex for subsequent crushing and processing at the existing Pipeline Mill or for placement on the Pipeline South Area Heap Leach Facility. The Arturo ore would be sampled to ensure that only ore suitable for mill or heap leach processing would be backhauled to the Pipeline Complex. No associated change in the current mill throughput rate or increase in the existing Pipeline Tailings Impoundment would be required to accommodate the processing of Arturo Mine oxide ore.

2.2.4 Hazardous Materials and Waste Management

Procedures for fuel, lubricant, and reagent transportation and storage; waste management; and spill prevention and emergency response programs currently are in place and implemented for existing operations in the CGM Operations Area (Barrick Gold of North America 2013b; JBR Environmental Consultants, Inc. [JBR] 2006). These procedures and plans would continue to be implemented under the Proposed Action. The transport and handling of fuel, lubricant, and reagents would continue to be conducted by licensed carriers and properly trained workers in accordance with applicable regulations. These materials currently are, and would continue to be, transported to the CGM Operations Area via federal (Interstate 80 [I-80]), state (State Route [SR] 306), and county (CR 225) roads and highways.

The additional fuels and lubricants that would be transported to, and stored and used at, the CGM Operations Area under the Proposed Action are identified in **Table 2-3**. Consistent with existing operations, these materials would continue to be trucked to the site in tanker trucks and transferred to aboveground storage tanks. The proposed storage tanks would be located within concrete secondary containment structures designed to contain 110 percent of the capacity of the largest tank within the containment area as well as the precipitation from the 24-hour/25-year storm event.

No increase in the currently authorized reagent consumption rate would be required for the proposed processing of Arturo Mine oxide (mill- and heap leach-grade) ore at the Pipeline Complex. Reagent usage for the proposed water treatment plant is identified in **Table 2-3**. The water treatment plant reagent systems would be contained within individual dry sumps with concrete secondary containment structures designed to contain 110 percent of the largest tank or series of tanks, as well as the precipitation from the 24-hour/25-year storm event.

To support the proposed development of the RFDs, a temporary explosives storage area would be located on the operating pad at the portal site within a locked fence with controlled access. As per currently authorized operations, the explosives would be transported to the site by licensed haulers and stored in compliance with applicable Department of Homeland Security; Bureau of Alcohol, Tobacco, Firearms; and Mine Safety and Health Administration regulations.

Under the Proposed Action, the majority of the hazardous materials would be spent or consumed on site. Materials that are not spent or consumed (e.g., petroleum oils, antifreeze, etc.) currently are and would continue to be recycled to the extent possible, or disposed of off site in an approved depository in accordance with all applicable federal and state regulations.

Table 2-3 Hazardous Materials Delivery, Storage, and Usage Summary for the Proposed Action

Material	Use Location	Approximate Usage per Day	On Site Storage Capacity	Storage Method	Anticipated Trucks per Month	Amount per Load
Temporary						
Diesel (storage)	RFD	1,550 gal	10,000 gal	Tank	18	8,500 gal
Lubricant (storage)	RFD	150 gal	500 gal	Tank	9	500 gal
Portland cement/shotcrete	RFD	14 tons	200 tons	Silo	11	40 tons
Meyco SA 430	RFD	81 gal	3,000 gal	Tank	2	3,600 gal
Master rheobuild 1000	RFD	35 gal	1,500 gal	Tank	2	3,600 gal
Life-of-Mine						
Diesel	Pipeline truck shop	1,500 gal	32,000 gal	Tank	6	8,000 gal
Gasoline	Pipeline truck shop	500 gal	12,000 gal	Tank	4	4,000 gal
Antifreeze	Pipeline truck shop	10 gal	2,500 gal	Tank	1	975 gal
Diesel	Pipeline fuel skid	55,000 gal	80,000 gal	Tank	90	12,000 gal
Gasoline	Pipeline fuel skid	800 gal	10,000 gal	Tank	6	4,000 gal
Ferric chloride	Water treatment facility	1,416 gal	40,000 gal	Tank	2	Bulk
Sodium hypochlorite	Water treatment facility	628 gal	18,200 gal	Tank	2	Bulk
Polymer	Water treatment facility	230 lbs	1,750 lbs	Sacks/Totes	2	Bulk
Portland cement	RFD	426 tons	225 tons	Silo	320	40 tons
Master pozzolity 300R	RFD	98 gal	3,000 gal	Tank	2	3,500 gal
Portland cement/shotcrete	RFD	64 gal	225 tons	Silo	48	40 tons
Meyco SA 430	RFD	379 gal	6,000 gal	Tank	3	3,500 gal
Master rheobuild 1000	RFD	165 gal	1,500 gal	Tank	2	3,500 gal
Diesel (storage)	RFD	3,400 gal	30,000 gal	Tank	12	3,500 gal
Diesel (dispensing)	RFD	3,200 gal	1,250 gal	Tank	--	--
Lubricant (storage)	RFD	330 gal	5,000 gal	Tank	2	5,000 gal

Table 2-3 Hazardous Materials Delivery, Storage, and Usage Summary for the Proposed Action

Material	Use Location	Approximate Usage per Day	On Site Storage Capacity	Storage Method	Anticipated Trucks per Month	Amount per Load
Lubricant (dispensing)	RFD	300 gal	500 gal	Tank	--	--
Diesel (storage)	Underground	3,200 gal	6,000 gal	Tank	-- ¹	--
Lubricant (storage)	Underground	625 gal	1,000 gal	Tank	-- ¹	--

¹ Transfer from surface fuel station by fuel truck, totes/cassettes, or piped through borehole.

2.2.5 Sanitary and Solid Waste Disposal

Portable sanitary facilities would be provided in the RFD contractor area for use during the RFD construction and development phase, with a septic system installed for use during operations. Septic systems also would be installed for each of the proposed buildings at the Pipeline operations and office areas. Approval for the septic systems would be obtained from the State of Nevada prior to installation. The systems would be installed in accordance with all applicable state regulations.

Consistent with currently authorized operations, non-toxic, non-hazardous solid waste materials generated under the Proposed Action would be disposed of in one of the currently authorized on site Class III waived landfills. Disposal of non-toxic, non-hazardous solid wastes would be conducted in accordance with all applicable federal, state, and county laws and regulations as outlined in the existing Solid and Hazardous Waste Management Plan (JBR 2006) for the CGM Operations Area.

2.2.6 Safety and Fire Protection

BCI's existing fire protection plan currently is, and would continue to be, implemented under the Proposed Action. A copy of the plan previously was provided to the State Fire Marshal. The procedures as outlined in the fire protection plan are in accordance with Mine Safety and Health Administration and applicable state and county fire code regulations. Adequate fire protection equipment would be maintained on site during operation. A fire water reserve would be maintained in the facility water supply tanks.

2.2.7 Applicant-committed Environmental Protection Measures

BCI's committed environmental protection measures for operations in the CGM Operations Area were identified in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and PoO (CGM and SRK 2008a) and incorporated into the Cortez Hills Expansion Project Record of Decision (ROD) (BLM 2008c). Additional BLM-stipulated mitigation measures also were identified in the Final EIS and incorporated into the ROD. All of these measures currently are, and would continue to be, implemented as standard operating procedures to mitigate potential impacts to environmental and human resources to prevent undue and unnecessary degradation of the environment. The measures that specifically would apply to construction, operation, and reclamation of the currently proposed project modifications are identified below and described in APO3 (BCI 2014a).

2.2.7.1 Geology

- Geotechnical monitoring, consisting of geologic structure mapping, groundwater monitoring, and slope stability analyses, would be conducted during active mining to assist in optimizing final pit designs. Slope movement monitoring also would be initiated to evaluate the safety of the open pit highwalls. In addition, operational procedures for controlling blasting and bench scaling would facilitate mining with stable pit walls.
- Waste rock characterization would continue to be performed in accordance with the site's water pollution control permit requirements.
- BCI previously implemented management, monitoring, and mitigation measures to address possible future fissuring in the Pipeline Complex area. These measures are described in the Pipeline/South Pipeline Pit Expansion Project Final SEIS (SEIS) (BLM 2004). These measures, which currently are and would continue to be implemented, include integration of the following components:

- Storm water diversion ditch to intercept and route surface water runoff away from the fissure area;
- Dewatering pipeline instrumentation and pressure monitoring;
- Intercept trench east of the existing Pipeline/South Pipeline Heap Leach Facility and west of the main fissure complex;
- Backfilling of existing open fissure gullies;
- Protective berms and surface grades to exclude water from the fissure field;
- Alluvial waste rock dikes to provide containment and channelization in the event of a dewatering line break; and
- Monitoring of subsidence rates and horizontal strain.

2.2.7.2 Water Resources

- To minimize impacts to water resources, the proposed expanded heap leach facility would be designed and operated as a zero discharge facility, with a composite liner system constructed in accordance with the NDEP criteria.
- Selective placement of waste rock, as needed, and routine monitoring of the waste rock disposal facilities during operations would be implemented to reduce the potential for acid rock drainage that does not meet applicable Nevada water quality standards.
- To limit erosion and reduce sediment transport from project disturbance areas, erosion control measures as outlined in the project's Stormwater Pollution Prevention Plan (BCI 2014c) and Reclamation Plan would be installed, as needed, and maintained. To further reduce erosion potential, storm water diversions would be installed around project facilities, as needed, to divert storm water runoff around disturbance areas. Facilities would be monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective and operating properly. In addition, implementation of concurrent reclamation would further reduce erosion potential.
- Groundwater monitoring would be conducted to ensure compliance with permit criteria and to provide for early identification of potential impacts. If any monitoring wells go dry due to dewatering activities, the monitoring program would be re-evaluated in coordination with the NDEP.
- The site's Integrated Monitoring Plan (CGM and SRK 2008b) would be reviewed and updated annually to include additional surface water and groundwater resources monitoring locations in the project vicinity.
- Mineral exploration and development drill holes, monitoring and observation wells, and production dewatering wells would be properly abandoned following completion of their functions, to prevent migration of potential contaminants to groundwater.

2.2.7.3 Soils, Vegetation, and Invasive and Non-native Plant Species

- To minimize impacts to soils and provide for re-establishment of vegetation, suitable growth media would be salvaged and stockpiled during the development of the mine open pits and during construction of the waste rock facilities and heap leach pads for subsequent use in reclamation. Alternately, the growth media may be transported to, and redistributed on, mine related surface disturbance areas undergoing concurrent reclamation (e.g., waste rock disposal facilities).

- Best management practices (BMPs) (BCI 2013) would be used to limit erosion from project facilities and disturbance areas during and following construction and operations. These practices may include, but would not be limited to, installation of storm water diversions to route water around disturbance areas and project facilities and the placement of erosion control devices (e.g., silt fences, staked weed-free straw bales, riprap, etc.). To ensure long-term erosion control, all sediment and erosion control measures would be inspected periodically, and repairs would be performed, as needed.
- Prior to the initiation of ground-disturbing activities in any unsurveyed areas, BCI would obtain information from the Nevada Natural Heritage Program (NNHP) regarding any known occurrences of special status plant species that occur within this area. If known populations occur within the proposed disturbance area, an additional field survey would be conducted for the appropriate species prior to mine development in order to determine the extent of these populations. A survey report, which would include survey methods, results, summary, a map illustrating the areas surveyed, and any populations observed during the survey, would be submitted to the BLM. After BLM's review of the report, BCI would coordinate with the BLM to develop appropriate mitigation measures.
- Revegetation of disturbance areas would be conducted at the soonest optimal season for seeding and plant establishment (e.g., fall) to reduce the potential for wind and water erosion, minimize impacts to soils and vegetation, help prevent the spread of invasive and non-native species in disturbance areas, and facilitate post-mining land uses. Following construction activities, areas such as cut and fill embankments and growth media stockpiles would be seeded. Concurrent reclamation would be conducted to the extent practical to accelerate revegetation of disturbance areas. Areas undergoing concurrent reclamation would be fenced, as necessary, to minimize livestock and wildlife access until vegetation has been re-established. All sediment and erosion control measures and revegetated areas would be inspected periodically to ensure long-term erosion control and successful reclamation.
- To minimize the introduction and spread of noxious weeds in project-related disturbance areas, BCI's Noxious Weed Management Plan (SRK 2014) would be implemented. The plan outlines procedures for the prevention, monitoring, and treatment of noxious weed infestations. The results of the monitoring program would provide the basis for updating the plan, if needed.
- Heavy equipment would be washed and inspected prior to entering the project area so that weeds are not spread to new locations.
- Certified weed-free seed mixes would be used for reclamation.
- Implementation of the project's fire control plan would minimize potential fire-related impacts to vegetation.

2.2.7.4 Wildlife, Special Status Species, and Livestock Protection

- Implementation of the Reclamation Plan would minimize habitat impacts for wildlife species. Implementation of the plan also would minimize impacts to range resources through the re-establishment of forage.
- Eight-foot-high chain link fencing (i.e., Nevada Department of Wildlife [NDOW]-approved exclusion fencing per the Industrial Artificial Pond Permit) would be installed around the heap leach ponds, and netting, pond covers, or floating "bird balls," as appropriate, would be installed over ditches and ponds that would contain leach solutions to minimize potential impacts to avian and terrestrial wildlife species. In addition, the heaps would be scarified to minimize ponding and pooling of process solutions.
- The transmission lines would be designed and constructed in accordance with applicable regulations to minimize raptor electrocution and collision potential. To minimize the collision

potential for foraging raptors and other birds, standard safe designs as outlined in Reducing Avian Collisions with Power Lines: The State of the Art in 2012 (Avian Power Line Interaction Committee [APLIC] 2012) would be incorporated, as applicable. To minimize the potential for electrocution of raptor species attempting to perch on the lines in areas of identified avian concern, standard safe designs as outlined in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC 2006) and Avian Protection Plan Guidelines (APLIC and United States [U.S.] Fish and Wildlife Service [USFWS] 2005) would be incorporated, as applicable.

- To minimize potential impacts to wildlife species, weak acid dissociable cyanide concentrations in the tailings impoundments would be maintained at non-lethal levels. As added protection, the existing cyanide detoxification system (which uses in-line addition of ferrous sulfate to the tailings solution) would be used if it should become necessary to lower the cyanide levels in the tailings discharge to the tailings facility.
- To minimize potential impacts to wildlife species, the top of leach pads would be monitored daily for any substantial pooling of cyanide solutions, and wildlife mortalities would be reported in accordance with the NDOW Industrial Artificial Pond Permit.
- CGM would work with the BLM and local permittees to develop livestock fencing that would preserve grazing to the extent possible while providing protection for both reclaimed mine facilities and livestock.
- Livestock watering troughs may be installed to deter livestock from attempting to access water in the infiltration basins and would continue to be operated on a rotational basis in coordination with the BLM and grazing permittees.
- In the event that initiation of the proposed project should occur during the raptor nesting season (March 1 through July 31), a raptor survey would be conducted. Project-related disturbance for a specific location would be conducted within 14 days of the survey, or another survey would be conducted. If active nests are located, or if other evidence of nesting (i.e., mated pairs, territorial defense, carrying nesting material, transporting food) is observed, a protective buffer (the size depending on the habitat requirements of the species and location of the nest) would be established around the nests following consultation with the BLM resource specialist. No construction would occur within the avoidance buffer until the birds are no longer actively breeding or rearing young, or until the young have fledged.
- Raptor surveys would be conducted annually during the raptor breeding season in the spring, utilizing the methods outlined in Pagel et al. (2010). These include a survey area encompassing the CGM Operations Area and 10-mile buffer, two rotor wing (helicopter) aerial surveys, and subsequent ground surveys of identified occupied nests. The annual survey report would be provided to BLM.
- To protect nesting birds, removal of migratory bird habitat on currently undisturbed lands in the proposed disturbance areas would be avoided to the extent possible between March 1 and July 31. Should removal of habitat be required during this period, BCI would coordinate with the BLM and NDOW to conduct breeding bird surveys and implement appropriate mitigation, such as buffer zones around occupied nests, as needed. Project-related disturbance for a specific location would be conducted within 14 days of the survey, or another survey would be conducted.
- In order to reduce impacts from disturbance within greater sage-grouse preliminary general habitat (PGH), habitat restoration/enhancement would be implemented. Restoration and enhancement acreage for greater sage-grouse habitat would be calculated at 2:1 (2 acres of restoration/enhancement for every 1 acre of disturbance) for disturbance in PGH. Since piñon-juniper thinning within the CGM Operations Area is not a viable option, off site piñon-juniper

thinning to benefit greater sage-grouse habitat would be considered. A BLM biologist, in coordination with the Nevada Sagebrush Ecosystem Technical Team and a NDOW biologist, would choose a piñon-juniper thinning area analyzed in any of the following EAs for potential off site mitigation: Bald Mountain Wildlife Habitat Enhancement Project (BLM 2010, NV062-EA08-083-EA), Eagle Butte Wildlife Habitat Enhancement Project (BLM 2011, DOI-BLM-NV-B010-2011-0021-EA), and Toiyabe West Wildlife Enhancement Project (BLM 2013, DOI-BLM-NV-B010-2013-0020-EA). These EAs identified and assessed crucial greater sage-grouse habitat where piñon-juniper thinning projects would be beneficial due to piñon-juniper encroachment into sagebrush communities. BLM, the Nevada Sagebrush Ecosystem Technical Team, and NDOW preferably would choose piñon-juniper thinning projects located within the greater sage-grouse Population Management Unit nearest to the CGM Operations Area and analyzed in one of the EAs. Any off site mitigation plan would be provided to BLM for approval. BCI would implement restoration/enhancement measures within 2 years of the proposed disturbance-related activities. Completed measures would be reported in the annual disturbance report that is provided to the BLM and NDEP by April 15th each year. Impacts associated with the off site mitigation areas were addressed in the corresponding EAs; therefore, no additional NEPA analysis would be required for this mitigation option.

As outlined in the Memorandum of Understanding *Regarding the Establishment of a Partnership for the Conservation and Protection of the Greater sage-grouse and Greater sage-grouse Habitat*, payment may be made into a greater sage-grouse mitigation bank account. The Nevada Standardized Reclamation Cost Estimator (SRCE) model would provide the basis for negotiating costs for public lands.

- Prior to ground disturbing activities, dark kangaroo mouse surveys would be conducted in areas of potentially suitable habitat, with survey results submitted to the BLM.

2.2.7.5 Paleontological Resources

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

2.2.7.6 Cultural Resources

- If previously undocumented cultural resource sites are discovered during construction of the mine facilities, all ground-disturbing activities would be halted in the area of the discovery, and the BLM Authorized Officer would be contacted to evaluate the finding. If the site is eligible for inclusion in the National Register of Historic Places (NRHP), impacts would be mitigated through avoidance or an appropriate data recovery program developed pursuant to the Programmatic Agreement (PA) (effective September 28, 2005) among the BLM, Nevada State Historic Preservation Officer (SHPO), and BCI.
- BCI would train employees and contractors in their responsibilities to protect cultural resources and enforce BCI's policy against off-road cross-country travel and the removal of artifacts.

2.2.7.7 Native American Cultural Concerns

- Formally trained Western Shoshone observers would be provided the opportunity to be present during project-related construction activities (i.e., new surface disturbance) to provide information and/or recommendations to the BLM, as well as during any data recovery

(i.e., archaeological excavation) within the project boundary. BCI would select a Native American observer from a list of previously used observers. If the selected Native American observer is not available upon 2 days' notice, a different observer may be selected. If none are available within a reasonable period, BCI would document that a reasonable attempt was made to contact the Tribes and obtain an observer.

2.2.7.8 Air Quality

- Fugitive dust controls, including water application on haul roads and other disturbed areas, chemical dust suppressant application (e.g., magnesium chloride), where appropriate, and application of other BMPs (BCI 2013) as approved by the NDEP Bureau of Air Pollution Control, currently are, and would continue to be, implemented. (Current operating permits include: Class I [Title V] Air Quality Operating Permit [Permit No. AP1041-2141] and Mercury Operating Permit to Construct: Phase 2 [Permit No. AP1041-2220].)
- Temporary disturbance areas (e.g., growth media stockpiles, cut and fill embankments, etc.) would be seeded with an interim seed mix, and concurrent reclamation would be implemented on completed portions of the waste rock facilities, thereby minimizing fugitive dust emissions.
- To reduce the generation of fugitive dust from the previously authorized overland conveyor (BLM 2008c), the conveyor would be partially covered on the south side, which is the predominant wind direction in the Plan Area. If needed, a water line and water sprays would be installed on the conveyor to further reduce fugitive dust generation.
- As part of the Nevada Mercury Control Program, BCI currently uses, and would continue to use, chemical mercury precipitants in the processing circuit to inhibit the adsorption of mercury on the air control's activated carbon and remove the mercury from the system.

2.2.7.9 Land Use and Access

- Post-mining safety barriers (e.g., berms, fencing, or other appropriate barriers) would be installed peripherally to the ultimate perimeters of the pits after mining has been completed, if practical and safe to install.

2.2.7.10 Visual Resources

- During operations, the margins of the waste rock facilities would be constructed to provide for variable topography during final regrading, thereby providing a more natural post-mining landscape.
- Concurrent reclamation would be implemented to the extent possible.
- Following the completion of mining operations, structures and buildings would be dismantled and removed from the site.
- To minimize effects from lighting, hooded stationary lights and light plants would be used. Lighting would be directed onto the work area only and away from adjacent areas not in use, with safety and proper lighting of the active work areas being the primary goal. Lighting fixtures would be hooded and shielded as appropriate. Lighting designed to reduce the impacts to night skies would be used.

2.2.7.11 Hazardous Materials

- The Emergency Response Plan for the site (Barrick Gold of North America 2013b) would be updated, if needed, and maintained and implemented throughout the life of the project. Implementation of the prevention, containment, and cleanup procedures in this plan would minimize the potential for related impacts to soils, vegetation, wildlife, and water resources.

- The existing Solid and Hazardous Waste Management Plan (JBR 2006) outlines the procedures for the handling of solid and hazardous waste generated at the site, reagent storage, transportation, and handling requirements. This plan currently is, and would continue to be, implemented to minimize the potential for related impacts to soils, vegetation, wildlife, and water resources.
- The current employee training program would continue to be implemented to inform employees of their responsibilities in proper waste disposal procedures.

2.2.7.12 General

- The existing perimeter fence would be extended to encompass proposed project facilities for security and safety purposes. BLM-approved four-strand range fencing (three strands barbed wire and a smooth bottom strand per the BLM Handbook 1741-1) would be used. The leach pad, ponds, and process areas would be fenced for wildlife exclusion.
- To the extent practical, all survey monuments, witness corners, reference monuments, bearing trees, and line trees would be protected against unnecessary or undue destruction or damage. Public land survey system monuments would be protected and preserved in accordance with Nevada BLM Instructional Memorandum (IM) No. NV-2007-003. If monuments, corners, or accessories are destroyed in the course of operations, BCI immediately would report the matter to the BLM Authorized Officer. BCI would replace any damaged monuments precisely, with the approval of the BLM Authorized Officer.

2.2.8 Reclamation

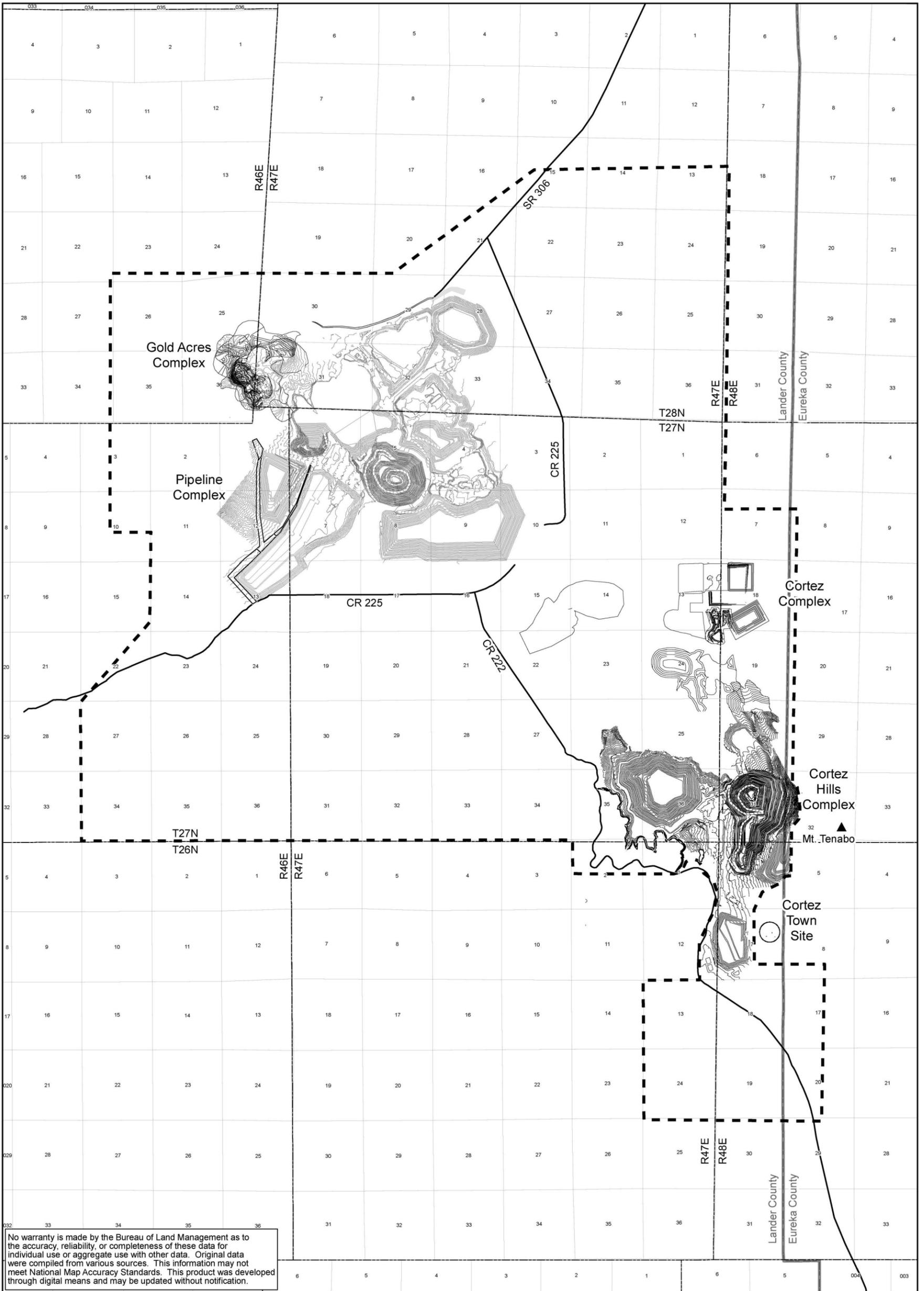
BCI's currently authorized Reclamation Plan for the CGM Operations Area is included in the currently authorized 2011 Amendment to the PoO (BCI 2012). Reclamation activities for the proposed modifications in the CGM Operations Area that may differ from the currently authorized Reclamation Plan are described in APO3 (BCI 2014a). Based on these documents, the reclamation procedures that specifically would apply to the proposed project modifications are summarized below. The conceptual post-mining reclamation topography is shown in **Figure 2-6**.

2.2.8.1 Reclamation Schedule

Revegetation of disturbance areas would be conducted as soon as practical to reduce the potential for wind and water erosion. Following construction activities, areas such as cut and fill embankments and growth media stockpiles would be seeded. Concurrent waste rock facility reclamation would occur during the life of the mine when practical and safe and would include recontouring and revegetating the completed sections of the waste rock facilities incrementally during operations. Upon completion of mining, final reclamation of the proposed facilities would be completed pursuant to the final closure plan and schedule that would be submitted to the BLM and NDEP for approval. The detailed closure plan would be prepared at least 2 years prior to the anticipated closure date (NAC 445A.447). The closure plan would conform with the Water Pollution Control regulations in effect at the time of closure.

2.2.8.2 Post-mining Land Uses and Reclamation Goals

Post-mining land uses (i.e., livestock grazing, wildlife habitat, and recreation) and reclamation goals would be the same as described in Section 2.4.12.2 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).



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

Legend
 ICGM Operations Area Boundary



BATTLE MOUNTAIN DISTRICT OFFICE
 Mount Lewis Field Office
 50 Bastian Road
 Battle Mountain, Nevada 89820

**Amendment 3 to
 Plan of Operations EA**

Figure 2-6
 Conceptual Post-mining
 Reclamation Topography



2.2.8.3 Growth Media Stockpiling and Use

Suitable growth media would be salvaged during development of the open pits, construction of waste rock facilities, and construction of heap leach pads for subsequent use in reclamation. Suitable colluvium/alluvial material from the open pits also would be salvaged as growth media. Additionally, supplemental growth media would be obtained from existing alluvial borrow sources at the CGM Operations Area, as needed (Figure 2-1).

Growth media would be placed in stockpiles within proposed or currently authorized disturbance areas and would be located such that mining operations would not disturb them. To minimize wind and water erosion, the stockpiles would be recontoured to slopes of 2.5H:1V and seeded with an interim seed mix (Table 2-4). Diversion channels and/or berms would be constructed around the stockpiles, as needed, to prevent erosion from overland runoff. BMPs (e.g., silt fences or staked weed-free straw bales) also would be used, as necessary, to control sediment transport. Alternately, the growth media may be transported to, and redistributed on, mine-related disturbance areas undergoing concurrent reclamation.

Table 2-4 Interim Reclamation Seed Mix

Common Name	Scientific Name	Application Rate ¹ (pounds pure-live-seed [PLS] per acre)
Alfalfa	<i>Medicago sativa</i>	1.0
Crested wheatgrass	<i>Agropyron cristatum</i>	1.0
Total Application Rate		2.0

¹ Application rate is for broadcast seeding.

Based on reclamation experience at the existing facilities, the growth media replacement depth for the mine facilities (with the exception of the open pits) will be a minimum of 6 inches. The proposed heap leach pad expansion area would be covered to a depth of at least 18 inches. Based on the Cortez Hills Expansion Project Final EIS (BLM 2008a), an excess of approximately 5 million cubic yards of available suitable growth media (inclusive of suitable alluvial material from the open pits) was identified at that time. The growth media placement depth would be reviewed in coordination with the BLM and the NDEP for specification in the final closure plan for the site.

Following placement of growth media, BMPs for erosion control (e.g., silt fences or staked weed-free straw bales) would be installed and maintained to minimize erosion from the reclaimed areas until vegetation has been re-established. To further reduce erosion of growth media from the slopes of the waste rock facilities and heap leach pads, benches would be constructed every 100 to 200 vertical feet. All sediment and erosion control measures and revegetated areas would be inspected periodically to ensure long-term erosion control and successful reclamation.

2.2.8.4 Seed Mixes

Prior to seeding, disturbance areas would be recontoured, surfaces would be ripped or scarified (where conditions warrant), and growth media would be redistributed. Following the placement of growth media, the final surface would be contour scarified (as needed) to promote water retention, reduce erosion, and prepare the final seedbed. Seedbed preparation and seeding would be conducted in the fall to take advantage of winter and spring moisture.

Seeding would be conducted using a rangeland drill, a broadcast seeder and harrow, or hydroseeder depending on site accessibility. The seed mixes presented in Tables 2-5 and 2-6 were developed and approved by the BLM (2008a,c) for use in the CGM Operations Area. The seed mixes are based on the

species' effectiveness in providing erosion protection, the ability to grow within the constraints of the low annual precipitation experienced in the region, the species' suitability for site aspect, and the site elevation and soil type (BLM 2008a). Modification to the seed mixes, if needed, would be made in coordination with the BLM.

Table 2-5 Reclamation Seed Mix for Elevations below 5,500 feet amsl

Common Name ¹	Scientific Name ¹	Application Rate ² (pounds PLS per acre)
Shrub Species (use four of the following shrubs at the rates identified)		
Fourwing saltbush	<i>Atriplex canescens</i>	4.0
Shadscale saltbush	<i>Atriplex confertifolia</i>	4.0
Winterfat	<i>Krascheninnikovia lanata</i>	4.0
Forage kochia	<i>Bassia prostrata</i>	0.5
Nevada jointfir	<i>Ephedra nevadensis</i>	10.0
Spiny hopsage	<i>Grayia spinosa</i>	2.0
Yellow rabbitbrush	<i>Chrysothamnus viscidiflorus</i>	0.5
Forb Species (use two of the following forbs at the rates identified)		
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	0.50
Palmer's penstemon	<i>Penstemon palmeri</i>	0.25
Lewis flax	<i>Linum lewisii</i>	0.75
Grass Species (use four of the following grasses at the rates identified)		
Crested wheatgrass	<i>Agropyron cristatum</i>	1.0
Indian ricegrass	<i>Achnatherum hymenoides</i>	1.0
Great Basin wildrye	<i>Leymus cinereus</i>	1.0
Bottlebrush squirreltail	<i>Elymus elymoides</i>	1.0
Saltgrass	<i>Distichlis spicata</i> var. <i>stricta</i>	0.5
Alkali sacaton	<i>Sporobolus airoides</i>	0.1
Russian wildrye	<i>Psathyrostachys junceus</i>	1.0
Total Average Application Rate ³		18.1

¹ No change in the currently authorized seed mix is proposed; however, the common and scientific names have been updated, as applicable, to follow the U.S. Department of Agriculture, Natural Resources Conservation Service (2015) PLANTS database.

² Drill seeding rates are provided. Rates would be doubled for broadcast seeding, if used.

³ Total average application rate as identified in the Cortez Hills Expansion Project Final EIS (BLM 2008a).

Note: If seed mix and application rates need to be modified as a result of limited species availability, poor seed quality, and/or the results of concurrent reclamation and revegetation test plots, the modifications would be undertaken with the concurrence of the BLM.

Table 2-6 Reclamation Seed Mix for Elevations between 5,500 and 7,500 feet amsl

Common Name ¹	Scientific Name ¹	Application Rate ² (pounds PLS per acre)
Shrub Species (use four of the following shrubs at the rates identified)		
Wyoming big sagebrush	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	0.1
Fourwing saltbush	<i>Atriplex canescens</i>	2.0
Forage kochia	<i>Bassia prostrata</i>	0.25
Nevada jointfir	<i>Ephedra nevadensis</i>	4.0
Spiny hopsage	<i>Grayia spinosa</i>	1.0
Forb Species (use three of the following forbs at the rates identified)		
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	0.5
Palmer's penstemon	<i>Penstemon palmeri</i>	0.5
Lewis flax	<i>Linum lewisii</i>	1.0
Utah sweetvetch	<i>Hedysarum boreale</i>	2.0
Grass Species (use four of the following grasses at the rates identified)		
Crested wheatgrass	<i>Agropyron cristatum</i>	2.0
Indian ricegrass	<i>Achnatherum hymenoides</i>	2.0
Basin wildrye	<i>Leymus cinereus</i>	2.0
Squirreltail	<i>Elymus elymoides</i>	2.0
Total Average Application Rate ³		19.35

¹ No change in the currently authorized seed mix is proposed; however, the common and scientific names have been updated, as applicable, to follow the U.S. Department of Agriculture, Natural Resources Conservation Service (2015) PLANTS database.

² Drill seeding rates are provided. Rates would be doubled for broadcast seeding, if used.

³ Total average application rate as identified in the Cortez Hills Expansion Project Final EIS (BLM 2008a).

Note: If seed mix and application rates need to be modified as a result of limited species availability, poor seed quality, and/or the results of concurrent reclamation and revegetation test plots, the modifications would be undertaken with the concurrence of the BLM.

In addition to seeding the waste rock facilities, BCI would evaluate the planting of piñon pine seedlings in suitable areas as part of the reclamation program. Piñon pines are the dominant tree species in the Cortez Hills Complex area. The planting of seedlings could help accelerate re-establishment of the species in mine-related disturbance areas.

2.2.8.5 Noxious Weed Management

BCI's updated Noxious Weed Management Plan (SRK 2014) would be implemented at the site as a property-wide program. The plan contains management strategies, provisions for annual monitoring and treatment evaluation, and provisions for treatment. The results from annual monitoring would provide the basis for updating the plan and developing annual treatment programs. Weed control practices would be

implemented in coordination with the BLM and Lander County Conservation District to limit the spread of noxious weeds in the project-related disturbance areas and to ensure successful reclamation.

2.2.8.6 Facility Reclamation

Reclamation procedures specific to the proposed project modifications are summarized below.

Reclamation of the Open Pits

The objective of mine pit reclamation is to create safe and stable topographic features. Following the completion of mining, in-pit benches, highwalls, and haul roads would be left in place where safe and practical to do so. Post-mining safety barriers (e.g., berms, fencing, or other appropriate barriers) would be installed peripherally to the crest of each pit (based on predicted wall stability at the time of closure) to control access by people, livestock, and most wildlife, where safe and practical to install. Pit ramps would be barricaded to prevent entrance. Storm water runoff would be diverted around each pit by storm water diversions.

As per the currently authorized Gap Pit, the bottom elevation of the modified Gap Pit (approximately 4,360 feet amsl) would be below the groundwater table elevation (approximately 4,770 feet amsl). Consistent with existing authorizations, the northern portion of the Gap Pit would be partially backfilled with waste rock from the currently authorized Pipeline Pit. Following the completion of mining, a post-mining pit lake would form in the southern portion of the Gap Pit.

Closure of Underground Operations

The removal of buildings and structures from the surface facilities areas, and reclamation of the associated surface disturbance, would be conducted as described below under Reclamation of Ancillary Facilities. Closure of underground mine facilities, including the RFDs, would parallel the procedures described in the closure plan prepared by Golder Associates, Inc. (2006) for the Cortez Underground Exploration Project. Underground facilities would be closed in phases starting at the lowest points of the underground mine working up to the surface. The closure procedures are summarized below.

In general, removal and cleanup of water management equipment would consist of: 1) grouting of dewatering drillholes; 2) construction of water-tight dams (i.e., concrete core bulkheads with compacted waste rock backfill and pressure grouting) in select portions of the declines to re-establish pre-mining hydrologic conditions; 3) backfilling or grouting of sumps; 4) removal and salvage or disposal in an approved off site waste disposal facility of underground and surface piping, pumps, and pumping equipment; and 5) abandonment of surface dewatering wells in accordance with applicable rules and regulations. Piping that cannot be salvaged for reuse would be dismantled as required for backfill placement and left underground.

Fans, motors, pumps, compressors, power supply and distribution equipment, ventilation curtains and ducts, and other equipment would be removed and salvaged for use at another CGM facility or disposed of off site in an approved waste disposal facility. Alternately, non-reactive equipment (e.g., HDPE pipe) may be left underground.

All remaining fuels, lubricants, and explosives would be removed from the underground workings and disposed of as described in Section 2.2.4, Hazardous Materials and Waste Management. In addition, any contaminated areas would be cleaned using approved methods (e.g., detoxification, bioremediation, steam cleaning).

To prevent access to underground workings, an earthen plug a minimum of 30 feet in length would be placed in each of the RFDs. Shotcrete, approximately 4 inches thick, subsequently would be sprayed over the fill and adjacent area to connect the fill to the native rock wall and provide a continuous barrier.

All other surface openings would be backfilled and leveled to blend with the surrounding topography, concrete capped, or closed with cemented backfill.

Reclamation of Waste Rock Facilities

The reclamation goals for the waste rock facilities include stabilizing slopes, ensuring mass stability, rounding edges to minimize visual impacts, revegetating surfaces, and erosion control. Reclamation of the waste rock facilities would be conducted concurrently with operations, to the extent practical. As areas of the facilities reach their ultimate configuration and become permanently inactive, the slopes would be regraded. The final overall slopes of the reclaimed waste rock facilities would be approximately 2.5H:1V. Benches would remain on facility slopes at intervals as needed to minimize surface water runoff velocities and associated erosion. Growth media subsequently would be placed on the prepared surfaces to a minimum depth of approximately 6 inches, and the areas reseeded. To minimize erosion until vegetation has re-established, silt fences, sediment traps, or other appropriate BMPs would be installed. In addition, the storm water diversion on the southwest side of the Canyon Waste Rock Facility would be retained to minimize erosion over the long term. Reclamation of the proposed reconfigured Gap Waste Rock Facility, Pipeline/South Pipeline Waste Rock Facility, and Canyon Waste Rock Facility would be consistent with these procedures.

Stockpiled refractory ore on top of the Pipeline/South Pipeline and Canyon waste rock facilities would be removed and transported to the Goldstrike Mill for processing as described in Section 2.2.3.2, Refractory Ore Shipment, prior to final reclamation of these facilities. Stockpiled mill-grade ore, including Arturo Mine oxide ore, would be processed at Pipeline or reclaimed as described above for the waste rock facilities.

As described in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and currently authorized, the portion of the Gap Pit backfill that would be above the projected groundwater table would be reclaimed in a similar manner as described above for the out-of-pit waste rock facilities. Waste rock in the Gap Pit backfill facility that would be located in proximity to the ultimate pit lake surface would consist of selected waste rock that would not be easily eroded by wave action.

Reclamation of the Heap Leach Facilities

Reclamation of the heap leach facilities, including the proposed expansion of the Pipeline South Area Heap Leach Facility, would be reclaimed in accordance with final closure plans. As discussed in Section 2.2.8.1, the final reclamation of the proposed facilities would be completed pursuant to the final closure plan and schedule that would be submitted to the BLM and NDEP for approval at least 2 years prior to the anticipated closure date. In general, closure and reclamation of the Pipeline South Area Heap Leach Facility expansion area would be similar to the heap leach facility reclamation procedures described in the Cortez Hills Expansion Project EIS (BLM 2008a).

Following the completion of leaching, the heaps would be allowed to drain. Draindown solution would be used at other active process facilities or would be evaporated via evaporation or evapotranspiration (ET) cells to provide for on site containment and evaporation of solution (zero-discharge facility). ET cells would remain in place in perpetuity. It is anticipated that under normal weather conditions, approximately 2 years would be required for draindown.

Following draindown, the surface solution circulation piping would be removed from the heaps, and the perimeter ditches would be filled with clean growth media and/or barren rock. The heaps then would be regraded to their final configuration with overall slopes of 2.5H:1V and rounded bench edges. This design would mitigate aesthetic impacts, ensure stability, promote runoff, and reduce infiltration. The recontoured heap piles would be covered with a minimum of 18 inches of growth media and revegetated. To minimize erosion until vegetation has re-established, silt fences, sediment traps, or other appropriate

BMPs would be installed. In addition, the storm water diversion structures constructed upgradient of the heaps prior to operation would be retained to minimize erosion over the long term.

Reclamation of Solution Ponds

Following heap draindown, the remaining water in each of the solution ponds would be allowed to evaporate. Solids also would be present in some quantity in most of the ponds at the time of closure. Representative samples of the solids would be obtained and analyzed to determine their chemical characteristics. Depending on the results of the characterization testing, the solids would be left in the ponds and buried in place, removed and placed on the heaps, or placed in existing tailings impoundments. The ponds subsequently would be reclaimed or converted to post-closure ET cells.

Where ponds would be reclaimed, the pond liners either would be removed and disposed of in a permitted landfill, or removed from the sides of the ponds and folded into the pond bottoms. The ponds subsequently would be backfilled and graded to prevent accumulation of water and to blend with the surrounding topography. A minimum of 6 inches of growth media would be redistributed prior to seeding.

Where ponds would be converted into ET cells, a detailed engineering design would be submitted to BLM and NDEP prior to construction. In general, the pond liners would be inspected and repaired, as necessary; a 2-foot overliner layer, or other suitable protective layer, would be placed over the liner; and the ponds would be partially or completely backfilled, with any required fluid conveyance/distribution piping installed. The surface subsequently would be graded to prevent accumulation of water and to blend with the surrounding topography. Approximately 12 inches of growth media would be redistributed prior to seeding.

The carbon-in-column and reagent tanks would be removed from the mine site and either reused at other Barrick sites or appropriately disposed of off site. The related disturbance subsequently would be ripped to relieve compaction, recontoured, as needed, covered with growth media, and reseeded.

Reclamation of Other Ponds

Other lined ponds, such as those for the proposed water treatment facility, would be reclaimed in a similar manner as described above for the solution ponds.

Reclamation of Road Features

Once haul, access, and exploration roads are no longer necessary, they would be recontoured to approximate original contours, to the extent possible, culverts removed or plugged, and the area revegetated. Where a road is located on fill, the side slopes would be rounded and regraded to a 2.5H:1V slope. Road surfaces at grade would be ripped to relieve compaction, covered with soil from the safety berms, and revegetated. Dikes and ditches that no longer would be required also would be regraded and revegetated. Some access roads would be maintained following the completion of mining to provide access to monitoring sites.

As determined by BLM, any roads on public lands determined to be suitable for public access or which continue to provide public access consistent with pre-mining conditions would not be reclaimed.

Reclamation of Ancillary Facilities

During final mine closure, buildings and structures would be dismantled, and materials would be salvaged or disposed of in one of the currently authorized on site Class III waived landfills or a permitted off site landfill. Concrete foundations and slabs would be broken up and buried in place under approximately 4 feet of material to prevent ponding and provide for revegetation. The associated disturbance areas subsequently would be covered with growth media and revegetated.

Above ground pipelines would be removed and properly disposed of in one of the currently authorized on site Class III waived landfills or a permitted off site landfill. Underground pipeline ends would be capped and the pipe left in place. Unneeded utility poles would be cut off at ground level and disposed of at an approved off site location or in one of the currently authorized on site Class III waived landfills.

2.2.8.7 Post-reclamation Monitoring and Maintenance

Following mine closure, BCI would conduct maintenance, site inspections, and any other necessary monitoring for the period of reclamation responsibility. Post-mining groundwater quality would be monitored according to the requirements established by NDEP, with the goal of demonstrating non-degradation to waters of the state. Monitoring of revegetation success would be conducted annually for a minimum of 3 years or until the revegetation standards have been met, as determined by the jurisdictional agencies. In addition, noxious weed monitoring and control would be implemented for a period of 5 years.

2.3 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada; proposed modifications as described for the Proposed Action would not be implemented. The currently authorized operations (**Figure 2-1**) and associated impacts were described in detail in the Cortez Hills Expansion Project Final EIS (BLM 2008a), Final SEIS (BLM 2011), and EA for Barrick Cortez Inc. 2011 Amendment to PoO and Reclamation Permit Application (BLM 2014a). The currently authorized surface disturbance for operations within the CGM Operations Area is 16,119 acres.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

No other alternatives were considered since the proposed project would be a modification of the surface disturbance and activities associated with the currently authorized facilities and operations.

2.5 Past, Present, and Reasonably Foreseeable Future Actions

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and RFFAs regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time” (40 CFR 1508.7).

Projects and actions considered in the cumulative effects analysis are defined for this EA as those past and present actions and RFFAs that could interact with the Proposed Action in a manner that would result in cumulative impacts. These past and present actions and RFFAs were described in detail in the Cortez Hills Expansion Project Final EIS (BLM 2008a), were updated for the subsequent Final SEIS (BLM 2011) and EA (BLM 2014a), and have been updated for this EA analysis. These projects and actions are identified in **Table 2-7** and shown in **Figure 2-7**.

The area of concern for cumulative effects varies by resource, with impacts for certain resources being restricted to the actual area of disturbance. Other resources, such as livestock and wildlife, may range over a wide area, and cumulative impacts could involve more than surface disturbance. The resource-specific cumulative effects study areas for this EA analysis are the same as described in the Cortez Hills Expansion Project Final EIS (BLM 2008a).

Table 2-7 Surface Disturbance Associated with Past and Present Actions and RFFAs

Action	Past and Present Approved Disturbance (acres)	RFFA Projected Disturbance (acres)	Total Approved/ Projected Disturbance (acres)
Mining Projects			
Black Rock Canyon Mine	117	0	117
Buckhorn Mine	820	0	820
Clipper Mine	400	0	400
BCI CGM Operations Area	16,119	0	16,119
BCI Horse Canyon	698	0	698
BCI Robertson Mine	285	0	285
Cortez Silver Mining District ¹	92	0	92
Elder Creek Mine	143	0	143
Fox Mine	4	0	4
Greystone Mine	242	0	242
Grey Eagle Project	5	0	5
Hot Springs Sulfur Mine	5	0	5
May Mine	1	0	1
Mill Canyon	18	0	18
Mud Spring Gulch	10	0	10
South Silicified Project	31	0	31
Utah Mine and Camp	6	0	6
Other Mining Projects ²	87	0	87
Subtotal	19,083	0	19,083
Exploration			
Notices BLM-Battle Mountain District Office: 118 expired, 8 pending, and 30 authorized ³	265	0	265
Plans (7) BLM-Battle Mountain District Office ³	306	0	306
Notices (10) BLM-Ely Field Office ³	50	0	50
BCI Cortez Underground Exploration Project	5	0	5
BCI Horse Canyon/Cortez Unified Exploration Project (HC/CUEP)	549	0	549
BCI West Pine Valley	150	0	150
BCI Hilltop Exploration/Mine	92	0	92
BCI Pipeline/South Pipeline/Gold Acres Exploration Project	50	0	50
BCI Robertson Project	12	0	12
Coral Resources Robertson Mine	22	0	22
Dean Mine	67	0	67
Fire Creek Exploration/Underground Project	50	0	50

Table 2-7 Surface Disturbance Associated with Past and Present Actions and RFFAs

Action	Past and Present Approved Disturbance (acres)	RFFA Projected Disturbance (acres)	Total Approved/Projected Disturbance (acres)
Mud Springs	0	10	10
Mill Canyon Exploration ⁴	250	0	250
Robertson Exploration Project ⁵	194	0	194
South Roberts	0	3	3
Toiyabe Project	20	0	20
Uhalde Lease	100	0	100
Other Mining Exploration ⁶	25	1,620	1,645
Subtotal	2,207	1,633	3,840
Utilities/Community			
SR 306 (100 feet wide)	327	0	327
Gravel Roads in Crescent Valley (50 feet wide)	1,370	0	1,370
Dirt Roads in Crescent Valley (30 feet wide)	644	64	708
Power lines in Crescent Valley (60 feet wide)	364	0	364
BCI Fiber Optic Cable (20 feet wide) ⁷	0	53	53
BCI Jeremy's Knob Communications Tower and Right-of-Way (ROW) ⁸	0	0.5	0.5
Towns of Crescent Valley and Beowawe ⁹	900	0	900
Other ROWs (Roads, Mining)	13	175	188
Other Utilities (Electric, Communications, Federal Aviation Administration)	1,175	0	1,175
Subtotal	4,793	292	5,085
Other Development and Actions			
BLM Fuels Reduction Projects ¹⁰	5,641	900	6,541
Wildfires ¹¹	90,099	0	90,099
Recreation ¹²	0	0	0
Livestock ¹³	10	4,313	4,323
Wildlife	0	0	0
Agriculture Development ¹⁴	9,750	0	9,750
BCI Additional Irrigation Pivots at Dean Ranch ¹⁵	0	640	640
Lodge at Pine Valley ¹⁶	30	0	30

Table 2-7 Surface Disturbance Associated with Past and Present Actions and RFFAs

Action	Past and Present Approved Disturbance (acres)	RFFA Projected Disturbance (acres)	Total Approved/Projected Disturbance (acres)
Crescent Valley Water Supply	2	0	2
BCI Cottonwood Infiltration Basins ¹⁵	0	104	104
Subtotal	105,532	5,957	111,489
Total	131,615	7,882	139,497

¹ Historic mining- and exploration-related disturbance first began in 1862, prior to the promulgation of surface land management laws and regulations governing mining activities on public lands (e.g., FLPMA and 40 CFR 3809). Since there were no laws or regulatory programs in place at that time, there were no regulatory or administrative approvals granted. Therefore, the identified disturbance acreage does not include all historic mining-related disturbance in the area.

² Includes projects by McEwen Gold and Pyramid Lake/Rye Patch Gold.

³ Plans and notices outside of the general Crescent Valley area have not been quantified.

⁴ Barrick has submitted a plan amendment to the Mill Canyon Exploration Project for construction of underground exploration declines, ancillary facilities, and continued surface exploration. There would be no net increase in surface disturbance beyond 250 acres of disturbance authorized in 1993.

⁵ Coral Resources' Robertson Exploration Project boundary is located immediately north of, and partially within, the CGM Operations Area as shown in **Figure 2-7**.

⁶ Includes projects by Barrick Cortez Exploration, Nu Legacy Gold, and 777 Minerals Inc.

⁷ ROW would run from the Lodge at Pine Valley to the southeast boundary of the CGM Operations Area. Projected ROW length of approximately 21.8 miles.

⁸ BCI facility located in T28N, R47E, Section 18 SESE just north of the CGM Operations Area; ROW N-092170.

⁹ Surface disturbance associated with the towns of Crescent Valley and Beowawe is assumed to be 640 and 160 acres, respectively, with approximately 100 acres of private developed land peripheral to the towns.

¹⁰ Inclusive of acreage associated with the Crescent Valley Wildland Urban Interface Fire Defense System, Tonkin Hazardous Fuels Reduction Project, and Red Hills Hazardous Fuels Reduction Project. Of the total acreage, planned prescribed burns would affect up to 2,537 acres of piñon-juniper woodland, and 800 acres of piñon-juniper woodland would be thinned. Also includes future treatment of 900 acres of encroaching piñon-juniper woodland for enhancement of greater sage-grouse habitat in the HC/CUEP PoO (BLM 2014c).

¹¹ Reflects acreage of vegetation affected by wildland fires from 1998 through 2006 within the vegetation cumulative effects study area. The acreage is inclusive of approximately 22,918 acres of fire-affected piñon-juniper woodland.

¹² Surface disturbance associated with recreation activities has occurred; however, the acreages have not been quantified.

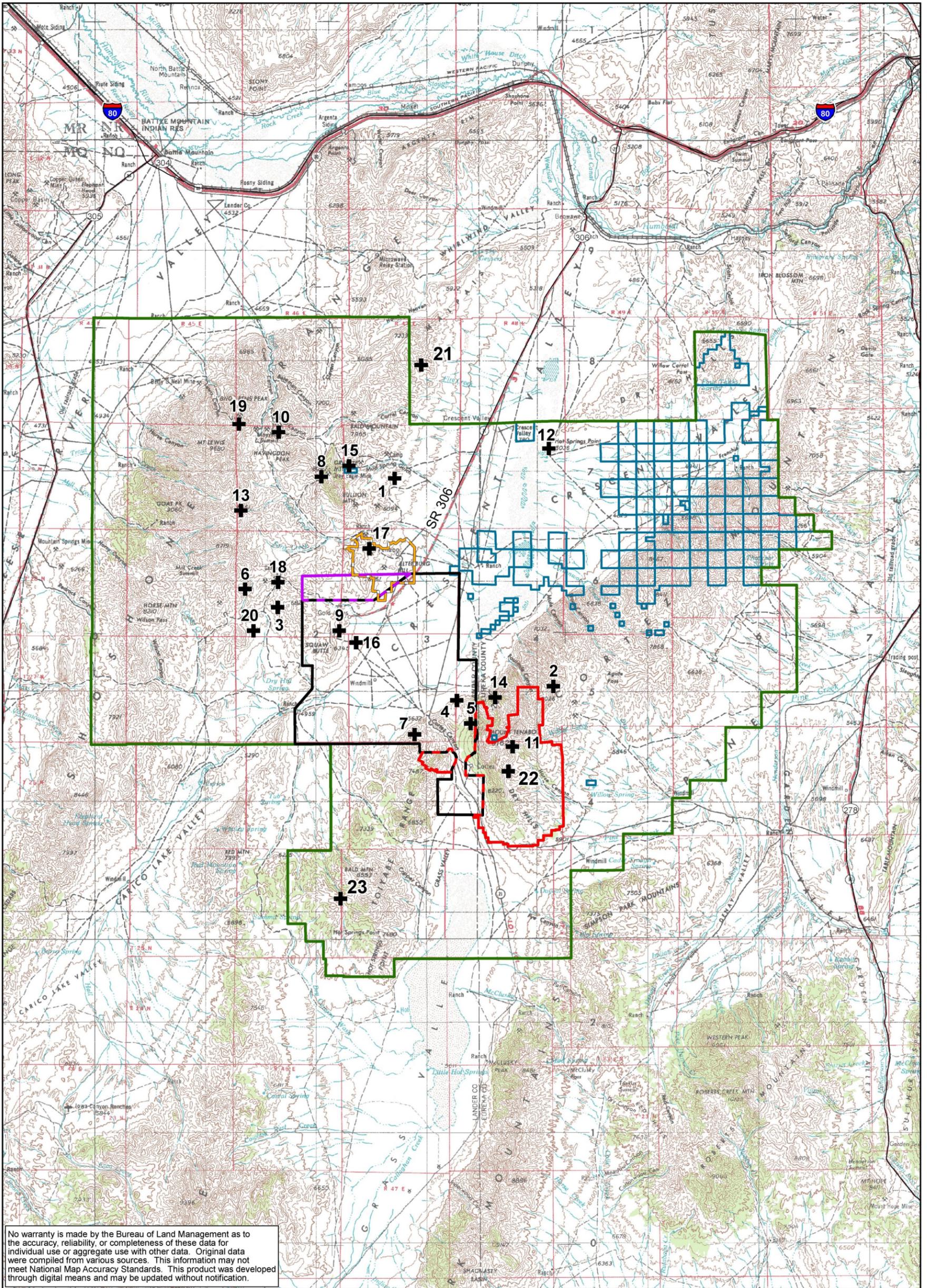
¹³ Surface disturbance associated with existing and proposed livestock water use is assumed to be 0.5 acre per water right. The surface disturbance associated with the livestock RFFAs is based on projected seeding activities (change in vegetation and habitat), 0.5 acre per water development activity, and 43 acres for fencing and cattle guards. Livestock-related activities outside of the Carico Lake Allotment have not been quantified.

¹⁴ Surface disturbance associated with agricultural development is based on the acreage under irrigation and assumes that a change in vegetation and habitat equates to surface disturbance. Acreage values were based on a February 15, 1998, special hydrographic abstract for Hydrographic Basin No. 054 from the Nevada Department of Water Resources (NDWR). These values are based on permitted or authorized use of water and may not reflect actual use in a given year.

¹⁵ Surface disturbance located on private (Barrick owned) land outside of the CGM Operations Area.

¹⁶ This facility is located on the JD Ranch Road approximately 4 miles west of SR 278 at the BCI-owned JD Ranch.

Source: BCI 2014a; BLM 2015, 2014a,c, 2008a.



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

Legend

- CGM Operations Area Boundary
- Past and Present Actions RFFAs
- Cortez Joint Venture Area
- Dean Ranch
- HC/CUEP
- Pipeline/South Pipeline/Gold Acres Exploration Boundary
- Robertson Exploration Project

- 1) Black Rock Canyon Mine
- 2) Buckhorn Mine
- 3) Clipper Mine
- 4) Cortez Mine
- 5) Cortez Silver Mining District
- 6) Elder Creek Mine
- 7) Fox Mine
- 8) Grey Eagle Project
- 9) Gold Acres
- 10) Hilltop Exploration/Mine
- 11) Horse Canyon Mine
- 12) Hot Springs Sulfur Mine
- 13) May Mine
- 14) Mill Canyon
- 15) Mud Springs Gulch
- 16) Pipeline/South Pipeline Project
- 17) Robertson Mine
- 18) Utah Mine and Camp
- 19) Dean Mine
- 20) Greystone Mine
- 21) Fire Creek Exploration/Underground
- 22) South Silicified Project
- 23) Toiyabe Project

Source: BLM 2014a, 2008a.

Note: The Lander/Eureka County line was adjusted subsequent to the date of this USGS map base.



BATTLE MOUNTAIN DISTRICT OFFICE
 Mount Lewis Field Office
 50 Bastian Road
 Battle Mountain, Nevada 89820

**Amendment 3 to
 Plan of Operations EA**

Figure 2-7
 Minerals -
 Past and Present Actions and RFFAs

0 1.25 2.5 5 Miles

3.0 Affected Environment and Environmental Consequences

This chapter describes the environment that would be affected by development of the Proposed Action, the anticipated direct and indirect impacts of the Proposed Action and the No Action Alternative, as well as potential cumulative impacts. The analysis of potential impacts of the Proposed Action assumes the implementation of the applicant-committed environmental protection measures identified in Section 2.2.7. Monitoring and mitigation identified for individual resources in response to anticipated impacts are discussed at the end of each resource section, as applicable. For resources where project-specific impacts are identified, the Proposed Action may result in cumulative effects with other past and present actions and RFFAs in the area. The period of potential cumulative impact is defined as the approximately 4-year remaining life of the project plus 3 years of reclamation.

The BLM's NEPA Handbook (BLM 2008b) and Nevada IM 2009-030, Change 1, require that NEPA documents address specific elements of the environment that are subject to requirements specified in statute, regulation, or Executive Order (EO) (i.e., supplemental authorities). **Table 3-1** lists the supplemental authorities that must be addressed in all environmental analyses, as well as other resources deemed appropriate for evaluation by the BLM. Other resources of the human environment that have been considered for this EA are listed in **Table 3-2**. If the element or resource is present and potentially would be affected, the location in this chapter where the element or resource is addressed is identified in **Tables 3-1** and **3-2**. The elements and resources that do not occur in the project area are not discussed further in this EA; however, brief discussions may be provided. Present resources or uses are discussed and analyzed in Chapter 3.0, including justification for the resources present and determined not affected by the Proposed Action. The elimination of non-relevant elements complies with the CEQ policy in 40 CFR 1500.4.

As discussed in Section 2.2, Proposed Action, and shown in **Figure 2-2**, the proposed water treatment plant, RFDs and surface support facilities, additional mine infrastructure, growth media stockpiles, and refractory and oxide ore stockpiles would be located in areas currently authorized for waste rock, process facilities, conveyor corridor, and ancillary disturbance. Portions of the proposed modifications to three waste rock facilities (Gap, Pipeline/South Pipeline, and Canyon), one heap leach facility (Pipeline South Area), one open pit (Gap), ancillary areas (Pipeline, Cortez Hills, and Cortez), diversion channels, and a haul road would be located in areas currently authorized for waste rock, heap leach, conveyor corridor, and ancillary disturbance. The remainder of the proposed facilities modifications would be located in areas of proposed new surface disturbance. Potential impacts associated with the currently authorized disturbance areas previously were analyzed in the Cortez Hills Expansion Project Final EIS (BLM 2008a), Pipeline/South Pipeline Pit Expansion Project Final EIS (BLM 2004), and South Pipeline Project Final EIS (BLM 2000). The elements of the Proposed Action that would result in new surface disturbance (total of 581 acres) are identified in **Table 2-1**. The Proposed Action also includes proposed overall operations modifications, including: 1) modification of the surface mining rates for the Pipeline, Cortez Hills, and Cortez complexes; 2) elimination of the on site location restrictions for shipment of refractory ore to Goldstrike for processing; and 3) the backhaul up to 600,000 tpy of oxide (mill- and heap leach-grade) ore from the Arturo Mine through the Goldstrike Mine to the Pipeline Complex for processing. Potential impacts associated with the transport of refractory ore from the CGM Operations Area to Goldstrike for processing previously were analyzed in the Cortez Hills Expansion Project Final Supplemental EIS (BLM 2011) and EA for Barrick Cortez Inc. 2011 Amendment to PoO and Reclamation Permit Application (BLM 2014a).

The resource-specific project study areas and analyses for this EA focus on those elements, or certain aspects of elements, for which prior NEPA analyses have not been conducted or authorizations

obtained. The proposed project components and their applicability to each resource are identified in **Tables 3-3** and **3-4** and are further described in the introduction to each resource section.

The resource-specific cumulative effects study areas for most resources parallel those addressed in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and are described in the introduction to each resource section in this EA. For resources for which the cumulative effects study area has been modified for this EA, the revised cumulative effects study area is described in the respective resource section of this EA. The past and present actions and RFFAs for the cumulative effects analyses are identified in **Table 2-7**; locations for minerals-related actions are shown in **Figure 2-7**.

Table 3-1 Supplemental Authorities to be Considered

Supplemental Authority	Not Present	Present/ Not Affected	Present/ May be Affected	EIS Section Number or Rationale for Elimination
Air Quality			x	Section 3.10
Areas of Critical Environmental Concern	x			Would not be affected (No Areas of Critical Environmental Concern occur in the project vicinity.)
Cultural/Historical			x	Section 3.8
Environmental Justice		x		No minority or low-income groups would be disproportionately affected by health or environmental effects as a result of implementation of the Proposed Action. See Section 3.14.
Farmlands (prime or unique)	x			Would not be affected (No prime or unique farmlands occur in the proposed disturbance areas.)
Floodplains	x			Would not be affected (No Federal Emergency Management Agency [FEMA]-designated floodplains occur in the proposed disturbance areas.) See Section 3.2.
Forests and Rangelands (Healthy Forest Restoration Act only)	x			Would not be affected (Project does not meet the requirements to qualify as a Healthy Forest Restoration Act project.)
Human Health and Safety	x			This project may use herbicides in accordance with BCI's authorized Noxious Weed Management Plan (see Section 2.2.8.5); however, EO 13045 would not apply as pesticides and herbicides would not be used in locations where children would be exposed.
Migratory Birds			x	Section 3.5
Native American Religious Concerns			x	Section 3.9
Noxious Weeds/Invasive Non-native Species			x	Section 3.4
Riparian/Wetlands	x			Would not be affected (No riparian or wetland areas occur in the proposed disturbance areas.)

Table 3-1 Supplemental Authorities to be Considered

Supplemental Authority	Not Present	Present/ Not Affected	Present/ May be Affected	EIS Section Number or Rationale for Elimination
Threatened and Endangered Species	x			Federally threatened and endangered species have been determined not to be present within the project area. A brief discussion is presented in Sections 3.4 and 3.5
Waste – Hazardous/Solid			x	Section 3.17
Water Quality			x	Section 3.2
Wild and Scenic Rivers	x			Would not be affected (No wild and scenic rivers occur in the project vicinity.)
Wilderness/Wilderness Study Areas/Lands with Wilderness Characteristics	x			Wilderness or wilderness study areas are not present within the project area or vicinity (the nearest wilderness study area is approximately 20 miles away). The BLM conducted a lands with wilderness characteristics inventory of the project area in June 2015, and determined there are no lands with wilderness characteristics in the project area.

Table 3-2 Other Resources of the Human Environment

Other Resources	Not Present	Present/ Not Affected	Present/ May be Affected	EIS Section Number or Rationale for Elimination
Grazing Management			x	Section 3.6
Land Use Authorizations			x	Section 3.11
Minerals			x	Section 3.1
Noise			x	Section 3.16
Paleontological Resources			x	Section 3.7
Recreation			x	Section 3.12
Socioeconomic Values			x	Section 3.13
Soils			x	Section 3.3
Vegetation			x	Section 3.4
Visual Resources			x	Section 3.15
Wild Horses and Burros	x			Would not be affected (The proposed project is outside the boundaries of designated herd management areas.)
Wildlife			x	Section 3.5

Table 3-3 Project Elements that Comprise Resource-specific Study Areas and Analyses – Pipeline Complex Modifications

Resource	Gap Pit	Pipeline South Area Heap Leach Facility	Gap Waste Rock Facility	Pipeline/South Pipeline Waste Rock Facility	Storm Water Diversions/ Post-mining Water Management Features	Mine Infrastructure	Pipeline Ancillary Area	Refractory Ore Stockpile ¹	Water Treatment Facility ¹
Geology and Minerals	X	X	X	X	X	X	X	X	
Water Resources, including Geochemistry	X	X	X	X	X	X	X	X	
Soils and Reclamation	X	X	X	X	X	X	X		
Vegetation ²	X	X	X	X	X	X	X		
Wildlife and Fisheries Resources ³	X	X	X	X	X	X	X		
Range Resources	X	X	X	X	X	X	X		
Paleontological Resources	X	X	X	X	X	X	X		
Cultural Resources	X	X	X	X	X	X	X		
Native American Cultural Concerns	X	X	X	X	X	X	X		
Air Quality	X	X	X	X	X	X	X	X	X
Land Use and Access	X	X	X	X	X	X	X		
Recreation	X	X	X	X	X	X	X		
Social and Economic Values	X	X	X	X	X	X	X		X
Environmental Justice	X	X	X	X	X	X	X		X
Visual Resources	X	X	X	X	X	X	X	X	X

Table 3-3 Project Elements that Comprise Resource-specific Study Areas and Analyses – Pipeline Complex Modifications

Resource	Gap Pit	Pipeline South Area Heap Leach Facility	Gap Waste Rock Facility	Pipeline/South Pipeline Waste Rock Facility	Storm Water Diversions/ Post-mining Water Management Features	Mine Infrastructure	Pipeline Ancillary Area	Refractory Ore Stockpile¹	Water Treatment Facility¹
Noise	X	X	X	X	X	X	X		X
Hazardous Materials and Solid Waste	X	X	X	X	X	X	X		X

¹ The proposed refractory ore stockpile expansion area and water treatment facility would be located on top of, and within the currently authorized disturbance footprint of, the Pipeline/South Pipeline Waste Rock Facility.

² Inclusive of special status species and noxious weeds/invasive and non-native species.

³ Inclusive of special status species.

Table 3-4 Project Elements that Comprise Resource-specific Study Areas and Analyses – Cortez Hills Complex and Overall Operations Modifications

Resource	Cortez Hills Complex						Overall Operations		
	Canyon Waste Rock Facility	Range Front Declines and Surface Support Facilities	Cortez Hills/Cortez Ancillary Area	Refractory and Mill-grade Ore Stockpiles ¹	Gold Acres Haul Road	Post-mining Water Management Features	Mining Rate	Elimination of On Site Restrictions Relative to Refractory Ore Shipment ²	Backhaul of Arturo Oxide Ore for On Site Processing
Geology and Minerals	X	X	X	X	X	X	X	X	X
Water Resources, including Geochemistry	X	X	X	X	X	X			
Soils and Reclamation	X		X		X	X			
Vegetation ³	X		X		X	X			X ⁴
Wildlife and Fisheries ⁵ Resources	X		X		X	X			
Range Resources	X		X		X	X			
Paleontological Resources	X		X		X	X			
Cultural Resources	X		X		X	X			
Native American Cultural Concerns	X		X		X	X			
Air Quality	X	X	X	X	X	X	X	X	X
Land Use and Access	X		X		X	X			X
Recreation	X		X		X	X			X
Social and Economic Values	X	X	X		X	X	X	X	X
Environmental Justice	X	X	X		X	X	X	X	X
Visual Resources	X	X	X	X	X	X			

Table 3-4 Project Elements that Comprise Resource-specific Study Areas and Analyses – Cortez Hills Complex and Overall Operations Modifications

Resource	Cortez Hills Complex						Overall Operations		
	Canyon Waste Rock Facility	Range Front Declines and Surface Support Facilities	Cortez Hills/Cortez Ancillary Area	Refractory and Mill-grade Ore Stockpiles ¹	Gold Acres Haul Road	Post-mining Water Management Features	Mining Rate	Elimination of On Site Restrictions Relative to Refractory Ore Shipment ²	Backhaul of Arturo Oxide Ore for On Site Processing
Noise	X	X	X		X	X	X	X	X
Hazardous Materials and Solid Waste	X	X	X		X	X			

¹ The proposed refractory and mill-grade ore stockpiles would be located on top of, and within the currently authorized disturbance footprint of, the Canyon Waste Rock Facility.

² As discussed in Section 2.2.3.2, Refractory Ore Shipment, no increase in the currently authorized shipping rate, shipping route, or duration of shipment is proposed.

³ Inclusive of special status species and noxious weeds/invasive and non-native species.

⁴ As related to noxious weeds/invasive and non-native species.

⁵ Inclusive of special status species.

3.1 Geology and Minerals

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that may have the potential to result in impacts to geology and minerals include the proposed deepening of the Gap Pit, expansion of the Gap Waste Rock Facility, increasing the height and storage capacity of the Pipeline/South Pipeline Waste Rock Facility, expansion of the Pipeline South Heap Area, reconfiguration of the Canyon Waste Rock Facility, development of the RFDs, and relocation and expansion of the refractory ore stockpiles (**Figure 2-2**).

The project study area for potential direct and indirect impacts to geology and minerals encompasses the area within the CGM Operations Area boundary (**Figure 2-2**). The cumulative effects study area, as shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), encompasses the project study area and includes surface disturbance associated with past and present actions and RFFAs within a 30-mile radius.

3.1.1 Affected Environment

The geologic conditions, mineral resources, seismic conditions, and ground subsidence relevant to the Cortez Hills and Pipeline complexes are described in Section 3.1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The following paragraphs provide a brief overview of the geologic conditions in the vicinity of the proposed reconfigured and/or expanded facilities in the Pipeline Complex and Cortez Hills Complex.

Pipeline Complex

The existing mining facilities within the Pipeline Complex are located along the southwest portion of Crescent Valley and include the Pipeline/South Pipeline and Gap open pits; waste rock, heap leach, and tailings facilities; and other associated mine facilities. The surface topography of the mine site generally slopes gently toward the southeast. The project facilities are underlain by a variable thickness of alluvial basin fill sediments that unconformably overlie Paleozoic bedrock. The thickness of the basin fill sediments increases from less than 200 feet along the west margin to greater than 1,000 feet along the east margin of the Pipeline Complex. These basin fill sediments have been removed in the open pit areas to allow for mining of the mineralized bedrock.

The basin fill sediments include alluvial deposits that accumulated in coalescing alluvial fans along the margin of the valley, and stream deposits and finer-grained material deposited in playas and/or lakes in the more central portions of the valley (AMEC Environment & Infrastructure, Inc. [AMEC] 2014). Drilling to depths of 100 feet in the vicinity of the Pipeline South Area Heap Leach Facility (Area 30) encountered basin fill sediments consisting of lenticular deposits of silts, silty gravels, silty sands, clayey sand, and clayey gravel with minor clay. In addition, the borings logs in this area indicate that the lenses of clayey gravel become thicker and more prominent with depth (BCI 2015b).

The lowering of groundwater levels associated with ongoing dewatering activities at the Pipeline Pit has resulted in ground subsidence and the development of earth fissures in the vicinity of the Pipeline Pit. The earth fissures and the area identified as being favorable for future fissure development are discussed in Section 3.1.1.7 and shown in Figure 3.1-8 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Monitoring for ground subsidence and earth fissures has been conducted on the site since 2004. The current monitoring program includes: 1) quarterly ground inspections, 2) field survey measurements of survey monuments, 3) vertical optical surveys, 4) an annual evaluation of synthetic aperture radar interferometry, and 4) preparation of an annual ground subsidence monitoring report. As of the end of 2013, monitoring indicated that the ground surface north and east of the existing South Area Heap Leach Facility had settled locally up to 4 feet since the beginning of 2004, with most of the

settlement occurring prior to 2010 (AMEC 2014). In addition, no new evidence of ground strain or earth fissuring was observed in 2013.

Cortez Hills Complex

The Cortez Hills Complex occurs in a feature known as the Cortez window where the upper plate rocks (Western Assemblage) have been removed, and the lower plate (Eastern Assemblage) rocks are exposed or concealed beneath surficial deposits. A summary of the geologic units, structure, and mineralization within the Cortez window is provided in the Cortez Hill Expansion Project Final EIS (BLM 2008a).

The proposed reconfigured Canyon Waste Rock Facility and associated ore stockpile would be situated immediately west and northwest of the Cortez Hills Pit. Quaternary alluvial fan deposits make up the southern quarter of the Canyon Waste Rock Facility. Soils associated with the alluvial fan deposits consist of two main units: 1) a near-surface unit consisting of silt, silt with gravel and sand, and silt with sand or gravel, and 2) a lower unit consisting of gravel, gravel with sand, or silty gravel with sand. The remainder of the facility is underlain by a thin layer of colluvial soils ranging from 0.25 to 2 feet thick above bedrock. This thin layer of soil consists mostly of silt with gravel, gravelly silt with sand, and silt with sand. The underlying bedrock consists of silty limestone from the Devonian Wenban Formation that is thin to medium bedded, slightly weathered, very closely fractured rock. Minor amounts of chert and shale from the Devonian Slaven unit also occur, primarily on the southern margin of the waste rock facility footprint. All of these bedrock units exhibit strong competency (CGM 2006b).

The proposed RFDs would provide access to the lower zone Cortez Hills underground operations. The portals for the declines would be situated at the southeast margin of Crescent Valley at an elevation of approximately 5,000 feet amsl (**Figure 2-2**). From the portals, the declines would extend approximately 10,900 amsl to the southeast and terminate at an elevation of approximately 3,800 feet amsl beneath the footprint of the currently authorized Cortez Hills Pit. An estimated 66 percent of the waste rock generated during mining of the declines would be limestone from the Silurian Roberts Mountain Formation and the remainder would be dolomite from the Ordovician Hanson Creek Formation (Geomega 2014b).

3.1.2 Environmental Consequences

Potential issues related to geology and minerals include: 1) geologic hazards created or exacerbated by development of the proposed project modifications; 2) damage to critical facilities caused by seismically induced ground shaking; 3) surface subsidence and ground deformation resulting from lowering the groundwater table or from the proposed RFDs ; and 4) exclusion of future mineral resource availability caused by the placement of mine facilities, such as the placement of permanent waste rock storage facilities.

Exposure of rocks to air and water during and after mining can cause increased weathering reactions that could result in the mobilization of constituents from the exposed rocks and potentially affect surface and groundwater resources. Potential impacts to groundwater and surface water quality from the construction, operation, and closure of the expanded or reconfigured waste rock facilities, associated oxide (mill-grade) ore stockpile, and proposed heap leach facility expansion are addressed in Section 3.2, Water Resources, including Geochemistry.

3.1.2.1 Proposed Action

Under the Proposed Action, an additional 300,000 tons of ore would be removed from the proposed expansion of the Gap Pit. Mining and processing of the additional ore from the geologic units would result in a permanent loss or reduction in the mineral resource potential in the Gap Pit area. Removal of this additional ore would entail the extraction 500,000 tons of waste rock material. An additional

500,000 tons of waste rock would be generated from the proposed RFDs that would be placed in the proposed modified Canyon Waste Rock Facility.

Under the Proposed Action, implementation of surface disturbance associated with open pit expansion, and expansion of the waste rock and heap leach facility would affect approximately 387 acres within the project study area. Impacts to geology and mineral resources would include the potential loss of access to future mineral resources as a result of permanent placement of the proposed expanded waste rock facilities and heap leach facility. It is anticipated that these surface disturbances would have a minor effect on potential future access to remaining ore.

The approximate 387 acres of new mining-related disturbance associated with the expanded Gap Pit, expansion and modifications of the waste rock disposal facilities and heap leach facility, and post-mining water management features permanently would alter the natural topographic and geomorphic features. The Gap Pit would not be reclaimed, while the waste rock and heap leach facilities would be reclaimed but still alter the topography and geomorphology of the study area. Temporary facilities such as haul roads, growth media stockpiles, process facilities, and ancillary and support facilities would be reclaimed to the approximate pre-mining topography.

Gap Pit Expansion

Under the Proposed Action, the depth of mining at the Gap Pit would increase from the current plan of 4,400 feet amsl to 4,360 feet amsl. The overall depth of the pit would increase from approximately 700 feet (BLM 2008a) to 740 feet. The primary geologic units in both the currently authorized and proposed modified Gap Pit consist of the Roberts Mountain Formation overlain by the Wenban Limestone. The Horse Canyon Formation, which overlies the Wenban Limestone, occurs locally in the upper portion of the northeast and east wall of the pit. Basin fill alluvial deposits occur in the upper portion of the southeast highwall. Under both the currently authorized pit and proposed pit modification, the bulk of the mining would be from the Roberts Mountain Formation and Wenban Limestone (Geomga 2014b).

The predicted lithologic materials to be exposed in the pit shell at the conclusion of mining are summarized in **Table 3-5**. Under the Proposed Action, the percentage of the surface area of the pit to be covered by backfill would increase from 22 percent (currently authorized) to 37 percent. The backfill would consist of waste rock material generated during mining of the currently authorized Pipeline and Crossroads pit areas of the Pipeline Pit complex. Potential impacts associated with the predicted pit lake development are discussed in Section 3.2.2.

Table 3-5 Predicted Lithologic Materials Exposed in the Gap Pit

Material	Currently Authorized Gap Pit (percent of pit surface area)	Proposed Gap Pit Modification (percent of pit surface area)
Backfill		
Alluvium	12	3
Calcareous Siltstone	10	26
Marble	-	7
Scarn	-	1
Total	22	37
Bedrock and Basin Fill		
Basin Fill (alluvium)	-	8

Table 3-5 Predicted Lithologic Materials Exposed in the Gap Pit

Material	Currently Authorized Gap Pit (percent of pit surface area)	Proposed Gap Pit Modification (percent of pit surface area)
Calcareous Siltstone	48	31
Marble	25	18
Scarn	5	6
Total	78	63

Source: Geomega 2015.

Gap Pit Slope Stability

Open-pit mines can experience periodic slope instability problems due to weak geologic materials; adversely oriented geologic structures, such as bedding, faults, and jointing; and groundwater presence. Ground movement caused by seismic events can trigger failure of slopes that are marginally stable under static conditions. Impacts associated with potential instability of the Gap Pit walls could occur during both the operation and post-closure period. Unforeseen conditions in pit walls can sometimes result in major pit wall stability problems during construction and operation. During the post-closure period, progressive slope failure through time is expected to expand the perimeter of the pits and reduce the overall angle of pit slopes. If adjacent facilities are not located a sufficient distance away from the final pit rim, progressive failure of the pit walls during the post-closure period eventually could damage the adjacent reclaimed facility.

Slope stability analysis for the proposed modified Gap Pit configuration was not available for review for this EA. The proposed Gap Pit expansion area would have a 200-foot-wide pit adjustment zone that would extend around the rim of the pit expansion area, within which the pit could be laid back if necessary for safety or engineering considerations. Continued data collection and analysis, including groundwater monitoring, pit wall mapping, slope stability monitoring, and controlled blasting techniques, would minimize the potential for slope stability problems during active mining and backfilling of the southern portion of the Gap Pit expansion area.

Waste Rock Facilities Expansion and Reconfiguration

Under the Proposed Action, the maximum height of the waste rock facilities would increase by 200 feet for the Gap Waste Rock Facility, 300 feet for the Pipeline/South Pipeline Waste Rock Facility, and 160 feet for the Canyon Waste Rock Facility. In addition, the currently authorized ore stockpiles on the Pipeline/South Pipeline Waste Rock Facility, and Cortez Waste Rock Facility (see **Figure 2-1**) would be expanded and modified as shown on **Figure 2-2**. The final reclaimed slope angle under both the currently authorized and proposed modified waste rock facility designs would be 2.5H:1V.

NewFields (2014) performed a geotechnical evaluation of the proposed modified waste rock facilities. The evaluation included a stability assessment of the facility foundation and slopes, and an estimate of potential settlement beneath each of the waste rock facilities with proposed design changes (i.e., Gap, Pipeline/South Pipeline, and Canyon).

The geotechnical evaluation was based on available information on the properties of the waste rock and subgrade materials for each facility. The stability analysis was performed on critical cross-sections selected based on the topography of the existing ground surface and reclaimed surface of the facility. The stability analysis required input values for slope geometry, material shear strength, unit weight, and groundwater conditions. Estimates of soil shear strength and soil unit weight were based on assumed properties for materials at each facility area. Groundwater was assumed to be at depths below the

facilities that would not influence stability. A seismic stability analysis was performed to evaluate the stability of the facility under earthquake loading resulting from a peak ground acceleration associated with an estimated seismic event with a 475-year return interval and a 10 percent probability of exceedences in 50 years. The results of the slope stability evaluation indicate adequate factors of safety for both static and pseudo-static (i.e., seismic) conditions. The existing Pipeline/South Pipeline Waste Rock Facility is located adjacent to the proposed final margin of the currently authorized Pipeline and Crossroads pit areas of the Pipeline Pit complex. The stability evaluation indicates that loading associated with the additional 300 feet of waste rock material under the Proposed Action would not affect the stability of the pit slopes or waste rock facility (NewFields 2014). Therefore, impacts associated with instability of the waste rock facilities under static or seismic loading conditions are not anticipated.

Settlement was evaluated to estimate the potential vertical deformation within the foundation materials resulting from the increased height (and load) of the facilities. Results indicate that additional settlement would range from 2 to 4 inches for the Gap and Canyon waste rock facilities, and up to 24 inches beneath the Pipeline/South Pipeline Waste Rock Facility. This magnitude of settlement beneath the waste rock facilities would not impact the geotechnical stability of the waste rock facilities (NewFields 2014).

Pipeline South Heap Leach Facility Expansion

The proposed expansion of the existing Pipeline South Area Heap Leach Facility (Area 30) is described in Section 2.2.1.2. The proposed Pipeline South Area Heap Leach Facility expansion area would be designed, constructed, and operated in a manner similar to existing heap leach facilities in the CGM Operations Area as described in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and summarized in Section 2.2.1.2.

The proposed Pipeline South Area Heap Leach Facility expansion would be constructed on unconsolidated basin fill alluvial material. Drilling to depths of 100 feet in the vicinity of Area 30 encountered basin fill sediments consisting of lenticular deposits of silts, silty gravels, silty sands, clayey sand, and clayey gravel with minor clay (BCI 2015b). The depth to groundwater in the vicinity is greater than 100 feet. Although a geotechnical design was not available for review, based on the site conditions, depth to groundwater, and state requirements for geotechnical design of heap leach facilities, potential liquefaction and slope stability problems are not anticipated.

As described in Section 3.1.1, the lowering of groundwater levels associated with currently authorized ongoing dewatering activities at the Pipeline Pit has resulted in ground subsidence and development of earth fissures in Crescent Valley in the vicinity of the Pipeline Pit. The earth fissures and the area identified as being favorable for future fissure development are discussed in Section 3.1.1.7 and shown in Figure 3.1-8 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The nearest mapped earth fissures are located approximately 1 mile northwest of the proposed footprint for the heap leach expansion. This northeast-southwest trending zone of fissure, known as the "Windmill Earth Fissure Field," originally was mapped in 2002. Quarterly monitoring of the facilities and earth fissure zone conducted since 2004 has not identified new earth fissures or expansion of existing fissures (AMEC 2014). The results of ongoing ground monitoring suggest that the risk of future earth fissure development extending into the proposed Pipeline South Area Heap Leach Facility expansion area is low. The requirement of the continuation of the existing monitoring and mitigation for subsidence and earth fissures throughout the life of the project is expected to effectively mitigate potential adverse effects to the proposed heap leach expansion associated with future earth fissure development. Therefore, potential damage to the proposed facility expansion area from groundwater induced subsidence and associated earth fissure development are not anticipated.

Range Front Declines

Under the Proposed Action, twin RFDs would be constructed to connect with the currently authorized underground operations as described in Section 2.2.2.2. The proposed RFD portals and approximately the first 50 feet of the declines would be approximately 22 feet tall and 20 feet wide and supported by arch steel sets. The remainder of the declines would be approximately 16 feet tall and 18 feet wide. It is anticipated that ground control during construction of the declines would consist of rock bolts, chain link mesh, shotcrete, steel sets, or other appropriate ground control method typically used in modern underground mining operations. As described in the Cortez Hills Expansion Project Final EIS (BLM 2008a) for the existing twin declines located in similar bedrock materials, after closure, the proposed RFDs could eventually experience collapse that would develop isolated voids along localized sections of the declines. These voids are unlikely to impact the ground surface due to the rock strength and thickness of the overlying rock (Golder 2006).

3.1.2.2 No Action Alternative

Under the No Action Alternative, the proposed modifications to currently authorized mining operations within the CGM Operations Area would not be implemented, and there would be no impacts to geology and minerals beyond those currently authorized under existing permits. Mining, processing, and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals authorized by the BLM and the State of Nevada.

3.1.3 Cumulative Impacts

The cumulative effects study area, as shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), encompasses the project study area and includes surface disturbance associated with past and present actions and RFFAs within a 30-mile radius. Past and present actions and RFFAs are identified in **Table 2-7**; locations of the mining-related actions are shown in **Figure 2-7**.

For purposes of this analysis, geologic disturbance includes mine components (i.e., open pits, waste rock, heap leach, and tailings facilities), and other major developments that permanently alter the natural topographic and geomorphic features in the cumulative effects study area, even after successful reclamation. Past and present actions have resulted, or would result, in approximately 139,497 acres of total surface disturbance within the geology and minerals cumulative effects study area. An estimated 19,083 acres of the total surface disturbance is associated with mining projects, an unquantifiable portion of which would result in a permanent alteration of topographic or geomorphic features. Under the Proposed Action, the approximate 387 acres of proposed disturbance associated with the expanded Gap Pit, expansion and modifications of the waste rock disposal facilities and heap leach facility, and post-mining water management features incrementally would contribute to the permanent alteration of the natural topographic and geomorphic features in the cumulative effects study area.

3.1.4 Monitoring and Mitigation Measures and Residual Adverse Effects

BLM-stipulated mitigation measures that address the geotechnical design of waste rock facilities and heap leach facilities (Mitigation Measure GM1) and subsidence and earth fissures (Mitigation Measure GM3) were identified in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and incorporated into the ROD (BLM 2008c). No additional monitoring or mitigation measures for geology and mineral resources are recommended.

Residual adverse effects to geology and mineral resources as a result of the proposed project modifications are not anticipated.

3.2 Water Resources, including Geochemistry

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that have the potential to result in impacts to water resources include the proposed deepening of the Gap Pit, expansion of the Gap Waste Rock Facility and Pipeline South Area Heap Leach Facility, modification of the Pipeline/South Pipeline and Canyon waste rock facilities, development of the RFDs, and relocation and expansion of the refractory ore stockpiles (**Figure 2-2**).

The project study area for potential direct and indirect impacts to water resources encompasses the area within the CGM Operations Area boundary (**Figure 2-2**). The cumulative effects study area encompasses the Crescent Valley Hydrographic Area, northern portion of the Grass Valley Hydrographic Area, and westernmost portion of the Pine Valley Hydrographic Area as shown in Figure 3.2-1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

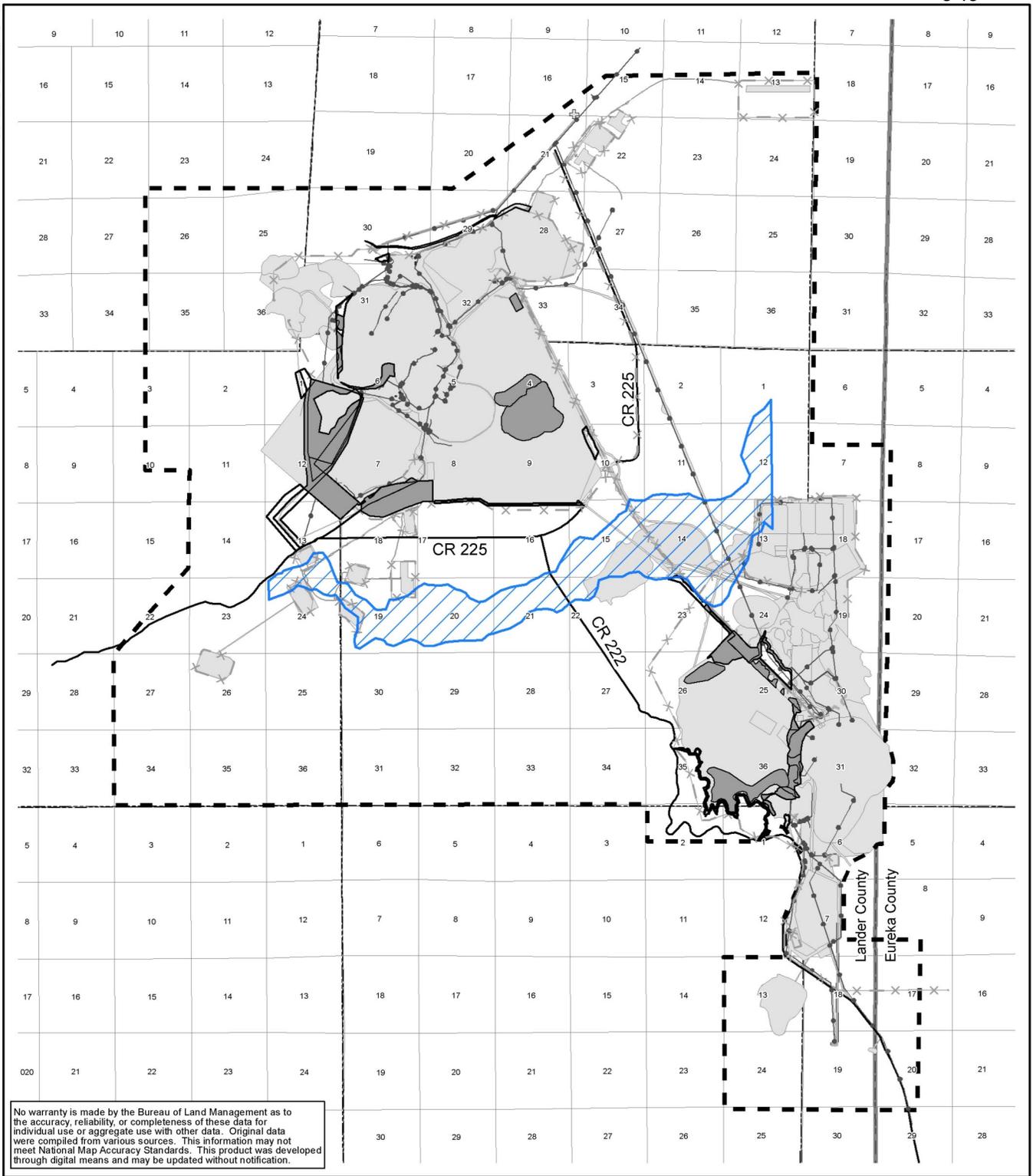
3.2.1 Affected Environment

The hydrologic setting for surface water resources and groundwater resources relevant to the Cortez Hills and Pipeline complexes is described in Section 3.2.1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The proposed facilities modifications would be located within the Crescent Valley Hydrographic Area that is part of the Humboldt River Basin. Within the Crescent Valley Hydrographic Area, ephemeral (with occasional intermittent and perennial) streams drain mountain watersheds that discharge to alluvial fans situated along the valley margin. Drainage that reaches the valley floor flows toward numerous alkali flats (playas) situated in the lowest areas within the valley. Few streams reach the playas except during periods of high runoff, and as such, surface water in the playas is ephemeral (Zones 1961). Surface runoff from the project study area does not contribute to the Humboldt River due to a low topographic divide just south of Beowawe and other watershed divides (BLM 2008a).

Surface water features and seeps and springs are presented in Figures 3.2-1 and 3.2-3, respectively, in the Cortez Hills Expansion Project Final EIS (BLM 2008a). The location of inventoried seeps and springs and a summary of the monitoring results are provided in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and the Cortez Hills Expansion Project Final SEIS (BLM 2011).

A FEMA, Special Flood Hazard Area Zone A delineation for the 100-year flood occurs across Crescent Valley through the central part of the project boundary (see **Figure 3-1**). This delineation follows the west to east low elevation drainage path across the southern portion of Crescent Valley and generally ranges from approximately 0.5 to 1 mile wide. No other Special Flood Hazard Areas are delineated in the project study area.

Groundwater flow occurs in the project study area through a complex assemblage of bedrock units and basin fill sediments that are described in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and groundwater flow model report for the existing project (Geomega 2012a). Active dewatering for the Pipeline Pit was initiated in 1996 and has continued uninterrupted through the present. The authorized final target elevation for dewatering at the Pipeline Pit is 3,400 feet amsl and represents a total drawdown of approximately 1,300 feet. The dewatering activities for the Cortez Hills area commenced in 2006 and continue to present with an authorized target maximum drawdown elevation of 3,800 feet amsl (for a total drawdown of approximately 1,600 feet) to allow for development of the Cortez Hills Pit and underground mine operations. Excess mine dewatering water not used for the mining operation is conveyed via pipeline to the existing water management system. The water management system conveys excess mine dewatering water to a series of infiltration basins or to the Dean Ranch for use in crop irrigation.



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

Legend

- CGM Operations Area Boundary
- Overlap of Existing and Proposed Facilities
- Existing Facilities
- Proposed Facilities
- Powerline
- Rangeland Fence
- Road
- Zone A


 BATTLE MOUNTAIN DISTRICT OFFICE
 Mount Lewis Field Office
 50 Bastian Road
 Battle Mountain, Nevada 89620

**Amendment 3 to
Plan of Operations EA**

Figure 3-1
FEMA Flood Hazard Areas

Zone A: Special flood hazard area, estimated 100-year floodplain.
 Source: FEMA 2013.



1:122,000



CGM's Integrated Monitoring Plan includes a network of monitoring wells distributed across the CGM Operations Area that are located upgradient and downgradient of major project facilities. The monitoring includes monthly measurements of water levels in selected wells, quarterly water level and water quality sampling of wells, pumping rate and quarterly water quality sampling of dewatering wells, quarterly sampling of groundwater quality near process facilities, and monitoring of process solutions and emergency/storm event ponds. The Integrated Monitoring Plan also included quarterly monitoring of flow and water quality at selected seeps and springs. This monitoring will continue through the life of the project.

3.2.2 Environmental Consequences

The primary issue related to water resources associated with the Proposed Action is the potential impact to groundwater and surface water quality from the proposed construction, operation, and closure of the modified Gap Pit, expanded or modified waste rock facilities, expanded or modified ore stockpiles, and proposed heap leach facility expansion. Other issues include potential impacts from flooding, erosion, and sedimentation associated with construction, operation, or closure activities for proposed facility modifications.

3.2.2.1 Proposed Action

Water Quantity Impacts

The currently authorized mine dewatering system is designed to allow for dry mining conditions to an approximate depth of 3,400 feet amsl in the Pipeline Pit complex and 3,800 feet amsl for the Cortez Hills underground mining operations (BLM 2008a). Potential impacts to flow in springs, seeps, streams (and associated surface water rights), and changes in groundwater levels (and associated groundwater rights) resulting from currently authorized mining previously were evaluated in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and Final SEIS (BLM 2011).

Under the Proposed Action, the Gap Pit would be deepened to 4,360 feet amsl. No additional dewatering would be required for the expansion of the Gap Pit because the maximum depth of the pit floor would be above the current groundwater elevation in the area that is controlled by active dewatering. Additional dewatering would not be required for development of the RFDs because the RFDs would not extend below the authorized 3,800 feet amsl target dewatering elevation. No springs, seeps, or perennial or intermittent streams occur within the footprint of the proposed new, modified, or expanded facilities. Therefore, the Proposed Action would not result in any incremental change in impacts to perennial or intermittent surface water resources (i.e. springs, streams), groundwater levels, or associated surface water or groundwater water rights in the area.

Gap Pit Expansion

Following the cessation of mining and dewatering operations, groundwater elevations would rebound and eventually result in the development of a pit lake in the Gap Pit under both the currently authorized operations and the Proposed Action. The predicted physical conditions for the pit lake are summarized in **Table 3-6**. The Gap Pit lake would encompass the western portion of the Pipeline Pit complex. Based on numerical modeling results, it is anticipated that the Gap Pit lake would behave as a sink, with no throughflow to the groundwater system (BLM 2008a). The potential changes in the predicted water quality of the pit lake that would develop after dewatering ceases is discussed below under the Water Quality Impacts.

The predicted lake surface area and estimated average annual evaporation rate for the lake would increase for the proposed Gap Pit as compared to the currently authorized pit as shown in **Table 3-6**. The total estimated evaporative loss for all pit lakes predicted at 100 years post-mining for the currently authorized mining operations was 1,591 acre-feet/year (Table 3.2-11, Cortez Hills Expansion Project

Final EIS [BLM 2008a]). Under the Proposed Action, with the increase in the evaporative loss for the Gap Pit, the total evaporative loss from all pit lakes at 100 years post-mining would increase to 1,629 acre-feet/year. This represents an increase of approximately 2.4 percent in the estimated evaporative loss from pit lakes developed in the CGM Operations Area at 100 years post-mining.

Table 3-6 Predicted Gap Pit Lake at 100 Years Post-mining – Currently Authorized and Proposed Action

Gap Pit Lake	Surface Area (acre)	Volume (acre-feet)	Surface Elevation (feet amsl)	Pit Floor Elevation (deepest) (feet amsl)	Maximum Depth (feet)	Evaporative Loss (acre-feet/year)	Groundwater Outflow (Yes/No) (acre-feet/year)
Currently Authorized ¹	33	6,550	4,770	4,400	370	114	No
Proposed Action ²	44	8,950	4,770	4,360	410	152	No

¹ Based on the Cortez Hills Expansion Project Final EIS (BLM 2008a).

² Based on Geomega 2015.

Water Quality Impacts

Gap Pit Lake Water Quality

The predicted long-term water chemistry for the currently authorized Gap Pit lake was summarized in the Cortez Hills Expansion Project Final EIS (BLM 2008a). The predicted water quality for the currently authorized Gap Pit lake had predicted water chemistries that slightly exceeded some water quality standards but would not affect the water quality of downgradient aquifers because groundwater outflow is not anticipated. Geomega (2015) reviewed the proposed Gap Pit modifications and concluded that the pit configuration and pit shell wall rock would be similar to those evaluated in 2007; and, therefore, should have no substantial effect on the pit lake chemistry predictions. The Gap Pit would be a closed basin such that surface water runoff from within the pit would not impact surface water outside the pit area. Therefore, potential water quality impacts associated with the proposed modified Gap Pit lake are expected to be essentially the same as for the previously evaluated and currently permitted Gap Pit (Geomega 2015).

Gap Waste Rock Facility

Under the Proposed Action, the footprint for the Gap Waste Rock Facility would be expanded to accommodate 110 million tons of additional waste rock. The 110 million tons would consist of 109.5 million tons of waste rock generated from the currently permitted Pipeline Pit (previously slated for disposal in the Pipeline/South Pipeline Waste Rock Facility), and 500,000 tons to be generated by deepening the Gap Pit (BCI 2015a). The 500,000 tons of new waste rock material would consist of mostly Roberts Mountain Formation that would be exposed in the lower portions of the pit (Geomega 2014b). The geochemical characterization and potential impacts associated with the placement of the 109.5 million tons of waste rock from the Pipeline Pit essentially would be the same as previously described for waste rock material for the currently approved Pipeline/South Pipeline Waste Rock Facility (BLM 2008a, 2004, 2000) and Gap Pit (BLM 2004). In summary, the waste rock from the Pipeline Pit complex has been subject to extensive waste rock geochemical characterization testing and analyses over the past two decades. The results of the waste rock characterization for the Pipeline Pit demonstrate that the waste rock has a high neutralization potential versus acid generation potential. Humidity cell test results indicate alkaline leachate with low concentrations of dissolved metals

(BLM 2008a, 2004, 2000). Based on the waste rock characterization, arid climatic conditions that limit infiltration and seepage migration, and depth to groundwater, potential impacts to groundwater quality would not be anticipated under the Proposed Action.

Pipeline/South Pipeline Waste Rock Facility

Under the Proposed Action, the Pipeline/South Pipeline Waste Rock Facility would be reconfigured to reduce the facility footprint and increase the height by 300 feet. These modifications would reduce the storage capacity of the facility from the currently authorized 1,118 million tons to 850 million tons. The geochemical characterization and potential impacts associated with the placement of waste rock in the currently authorized Pipeline/South Pipeline Waste Rock Facility was evaluated in earlier EISs for the site (BLM 2008a, 2004, 2000). The waste rock source (Pipeline Pit complex) and associated geochemical characterization, storm water controls, and closure and reclamation plans for the reconfigured waste rock facility essentially would be the same as for the currently authorized facility. These waste rock materials have been subject to extensive waste rock geochemical characterization testing and analyses over the past two decades. The results of the waste rock characterization for the Pipeline/South Pipeline Pit demonstrate that the waste rock leachate generated from these materials is alkaline with low concentrations of dissolved metals (BLM 2008a, 2004, 2000). Based on the waste rock characterization, arid climatic conditions that limit infiltration and seepage migration, depth to groundwater, storm water controls, and closure and reclamation plans (BLM 2008a), potential impacts to groundwater and surface water quality would not be anticipated under the Proposed Action.

Pipeline South Heap Leach Facility

As described in Section 2.2.1.2 of this EA, the modified Pipeline South Area Heap Leach Facility would be designed and constructed in accordance with standard geotechnical design practices and include a composite liner and leak detection system; the final design would be submitted to the BLM and NDEP for approval prior to construction. The facility would be operated as a zero discharge facility in accordance with NDEP permit criteria and the BLM Cyanide Management Plan.

A proposed new storm water diversion system designed to control flows from a 24-hour/100-year storm event would divert storm flows from upgradient watershed areas around the proposed heap leach expansion area. Storm water runoff from the proposed expansion area would be contained in a new double lined storm water pond with a leak detection system designed to contain runoff from the 24-hour/100-year storm event. As discussed in Section 2.2.8.6, final reclamation of the facility would be completed pursuant to the final closure plan that would be submitted to the BLM and NDEP for approval at least 2 years prior to the anticipated closure date. The proposed heap leach expansion would be covered with a minimum of 18 inches of growth media and revegetated. During closure of the heap leach facilities, all fluids would be contained in zero discharge facility components. Fluids would be managed using evaporation cells, evapotranspiration cells, or other approved methods as described in Section 2.4.12.6 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Considering the state requirements for the heap leach facility design (NAC 445A.434) and liner system (NAC 445A.438); the proposed storm water diversion system and storm water pond design flow and storage capacities, respectively; and heap leach closure and reclamation requirements; the construction, operation, and closure of the proposed heap leach facility expansion area is not expected to result in impacts to surface water or groundwater quality.

Canyon Waste Rock Facility

Under the Proposed Action, the Canyon Waste Rock Facility would be modified to increase the height of the facility by 160 feet to accommodate for the storage of ore stockpiles on the top of the facility and to expand the storage capacity to 1,270 million tons. The Canyon Waste Rock Facility is permitted for storage of waste rock generated from the existing Cortez Hills Pit and existing underground workings. Potential impacts to water resources associated with potential solute transport from the waste rock

material were addressed in the Cortez Hills Expansion Project Final EIS (BLM 2008a). Under the Proposed Action, 500,000 tons of waste rock generated from the proposed RFDs also would be placed in the Canyon Waste Rock Facility. The waste rock from the RFDs would represent a small percentage (0.04 percent) of the total to be stored in the facility.

The acid generating potential and waste rock leachate chemistry for the waste rock materials currently authorized for placement in the Canyon Waste Rock Facility were described in Section 3.2.1.4 in the Cortez Hills Expansion Project Final EIS (BLM 2008a). The waste rock was characterized by determining its acid generation potential using acid-base accounting analyses and geochemical composition through whole-rock chemical analyses. Leachate characterization for the waste rock was evaluated by performing kinetic tests that included humidity cell testing, column tests, and field oxidation tests. These leachate characterization results were used to establish the expected variations in leachate chemistry over time. Potential impacts to groundwater resources associated with the waste rock facilities at the Cortez Hills Complex were evaluated quantitatively, using modeling of variably saturated flow and transport through the waste rock facilities and the underlying vadose zone. The results of the geochemical evaluation indicated that leachate generated from the waste rock would not adversely impact downgradient groundwater quality (i.e., would not exceed applicable water quality standards) (BLM 2008a).

Geomega (2014a) evaluated the potential geochemical changes that would result from the addition of waste rock from the RFDs to the Canyon Waste Rock Facility. Geomega's evaluation concluded that this additional waste rock would consist of an estimated 166,500 tons of material derived from the Hanson Creek Formation (dolomite), and 333,500 tons from the Roberts Mountain Formation (limestone). The leachate characteristics for these materials are similar to the waste rock materials already permitted for placement in the facility in that they are non-acid-generating and have low metals concentrations. The addition of this material would be negligible compared to the overall volume of waste rock material in the facility and would not be expected to result in any changes to the leachate chemistry. Potential impacts to surface water quality would be the same or similar to those evaluated for the currently authorized Canyon Waste Rock Facility (BLM 2008a).

Refractory Ore Stockpiles

Refractory ore stockpiles would be constructed under the Proposed Action on the Pipeline/South Pipeline and Canyon waste rock facilities and adjacent to the RFD portals (see **Figures 2-2 and 2-4**). The ore stockpiles would be designed and constructed to prevent potential degradation to surface or groundwater resources in accordance with the NDEP water pollution control permit requirements. As described in Sections 2.2.1.4 and 2.2.2.1, the liner requirements for the refractory ore stockpiles would be determined based on rock characterization. Sampling and analytical testing of the refractory ore would be conducted in accordance with the Bureau of Mining Regulation and Reclamation waste rock, overburden, and ore evaluation guidelines (NDEP 2014a) to determine if the ore is considered a potentially acid generating material. Refractory ore materials characterized as potentially acid generating or that have the potential to generate leachate with elevated metals concentrations would be placed in a lined ore stockpile. Storm water would be diverted around the stockpiles as necessary to prevent run-on. The liner and storm water control designs for each lined stockpile would be submitted to NDEP for approval under the water pollution control permit requirements. The liner and storm water controls for refractory ore stockpiles requiring liners would meet the same design requirements used for the existing lined refractory ore stockpiles that previously were approved by NDEP (BCI 2015d). Based on the: 1) requirements for geochemical characterization of the refractory ore materials; 2) NDEP procedure for review and approval of the final design of the refractory ore stockpiles; and 3) NDEP requirements for liners and storm water controls to prevent potential degradation to water quality, impacts to surface water or groundwater quality resulting from the proposed refractory ore stockpiles are not anticipated.

Oxide Ore Stockpile

Under the Proposed Action, an unlined oxide ore stockpile would be located along the south margin of the Canyon Waste Rock Facility. Geomega (2012b) evaluated the potential impacts to water resources resulting from the addition of the oxide ore stockpile. It is assumed that the geochemical characterization of the oxide ore previously evaluated for placement in the currently authorized oxide ore stockpile on the existing North Waste Rock Facility would be the same as, or similar to, the oxide ore proposed for placement on the Canyon Waste Rock Facility. Geomega (2012b) compared available geochemical characterization data collected for waste rock and oxide ore from the Cortez Hills Pit with the waste rock characterization data used for the previous evaluation of waste rock facilities in the Cortez Hills Expansion Project Final EIS (BLM 2008a). The results of the comparison indicated that both materials (the waste rock and oxide ore) were geochemically equivalent. Based on the geochemical evaluation for the oxide ore stockpile material (Geomega 2012b), leachate generated from the waste rock or oxide ore stockpiles placed on top of the waste rock at the Canyon Waste Rock Facility is predicted to be generally neutral with elevated concentrations of arsenic. Impacts to water quality resulting from infiltration through the Canyon Waste Rock Facility with the addition of the oxide ore stockpile are expected to be the same as described in the Cortez Hills Expansion Project Final EIS (BLM 2008a). In summary, solute transport modeling indicated that arsenic and antimony concentrations reaching the water table beneath the Canyon Waste Rock Facility are predicted to be below the Nevada drinking water standards (BLM 2008a; Geomega 2007). Therefore, the addition of the oxide ore stockpile to the Canyon Waste Rock Facility, with similar geochemical leaching characteristics to the waste rock material (Geomega 2012b), is not anticipated to adversely impact downgradient groundwater quality. Potential impacts to surface water quality would be the same or similar to those described for the currently authorized Canyon Waste Rock Facility in the Cortez Hills Expansion Project Final EIS (BLM 2008a).

Erosion, Flooding, and Sedimentation

Under the Proposed Action, storm water diversions would be constructed to route surface runoff around the western margin of the Gap Waste Rock Facility and Pipeline South Area Heap Leach Facility, and the south and southwest margin of the Canyon Waste Rock Facility as shown on **Figure 2-2** and described in Section 2.2.1. These diversions would be designed to control runoff during a 24-hour/100-year flood event and would be retained at closure as post-mining water management features.

All diversions and storm water detention features required for the Proposed Action would be designed and constructed in accordance with NDEP requirements. BMPs to control runoff, erosion, and sedimentation would be implemented and maintained on new drainage features as part of permit approval and compliance. The Proposed Action would not result in disturbance or encroachment into the FEMA-designated floodplain mapped in southern Crescent Valley.

3.2.2.2 No Action Alternative

Under the No Action Alternative, the proposed modifications to currently authorized mining operations would not be implemented. Mining, processing, and closure and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals authorized by the BLM and the State of Nevada. Potential impacts to water quantity and quality from construction, operation, and closure and reclamation of the currently permitted and approved facilities are described in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and Final SEIS (BLM 2011).

3.2.3 Cumulative Impacts

As described above, the proposed modifications to the currently authorized operations within the CGM Operations Area are not expected to result in substantial direct or indirect impacts to water resources relative to the impacts evaluated in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and Final SEIS (BLM 2011). The Proposed Action would result in an increase of approximately 2.4 percent in the

estimated evaporative loss from pit lakes in the CGM Operations Area at 100 years post-mining. No other additional cumulative impacts to water resources would occur as a result of the Proposed Action.

3.2.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No additional monitoring or mitigation measures are recommended for water resources and geochemistry.

No residual adverse effects are anticipated for water resources and geochemistry.

3.3 Soils and Reclamation

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the element of the Proposed Action that potentially would result in new or previously unauthorized disturbance to soils is the proposed construction of the facilities modifications (see **Figure 2-2**).

The project study area for direct and indirect impacts to soils encompasses the proposed 581 acres of new disturbance. The cumulative effects study area, as shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), encompasses the project study area and includes surface disturbance associated with past and present actions and RFFAs within a 30-mile radius.

3.3.1 Affected Environment

The soil mapping units that occur in the CGM Operations Area, including the proposed new disturbance areas, are shown in **Figure 3-2**. A summary of the soil mapping units in the proposed new disturbance areas and their characteristics is presented in **Table 3-7**.

Soils in proposed new disturbance areas occur on fan skirts and piedmonts, inset fans, piedmont slopes, foothills, and mountains. The soils are shallow to very deep with medium or moderately fine textures. They typically have a gravelly or cobbly substratum and substantial salinity and alkalinity concentrations. Hardpans also are common. In the lowest topographic positions, the soils may be seasonally flooded. As part of the habitat evaluation conducted by ARCADIS (2014) for the proposed project, soil pits were dug at the center of each survey plot to evaluate soil characteristics. The reported soil textures and presence of salt deposits in some locations are consistent with the characteristics noted above.

BCI has implemented reclamation plans for disturbed areas at the existing facilities within the CGM Operations Area that are no longer active and continues to conduct reclamation and erosion control efforts concurrent with operations as areas become available for reclamation. To date, approximately 857 acres have been reclaimed. Examples of successful concurrent reclamation in the CGM Operations Area are shown in **Figure 3-3**. Reclamation plans for the CGM Operations Area have been developed in accordance with federal and state regulations and the Memorandum of Understanding between the NDEP, U.S. Forest Service, and BLM (2002) that exits for reclamation planning, bonding, implementation, and monitoring.

3.3.2 Environmental Consequences

3.3.2.1 Proposed Action

Under the Proposed Action, potential impacts to soils would be similar to those described in the Cortez Hills Expansion Project Final EIS (BLM 2008a). Generally, potential impacts associated with the Proposed Action would include decreased soil stability due to surface disturbing activities. Soil compaction would increase due to heavy equipment and vehicle travel, which would reduce infiltration rates and increase runoff and erosion. The mixing of surface and subsurface soil horizons could occur during soil salvage, which would modify soil structure and reduce porosity and soil productivity.



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**Amendment 3 to
Plan of Operations EA**

**Figure 3-3
Concurrent Reclamation
Examples**

Table 3-7 Summary of Soil Mapping Units and Characteristics

Map Symbol	Soil Association or Series	Proposed Disturbance (acres)	Dominant Physiographic Position	Ecological Site ID	Ecological Site Name	General Soil Depth (inches)	Dominant Soil Texture	Major Slope Range (%)	Erosion Hazard (water/ wind)	Other Characteristics
173	Beoska-Tenabo	176	Fan piedmonts	R024XY002NV	Loamy 5-8 Precipitation Zone.	60+, 20	Silty clay loam, gravelly clay loam, very gravelly loamy sand	2-8	Moderate/slight	Salinity/alkalinity at depths below 1 foot, hardpan (Tenabo)
167	Batan-Wendane-Valmy	13	Alluvial flats, fan skirts	R024XY003NV	Sodic Terrace 6-8 Precipitation Zone.	60+	Silt clay loam, fine sandy loam	0-2	Slight/slight	Salinity/alkalinity, occasional flooding
290	Creemon silt loam	14	Fan skirts	R024XY002NV	Loamy 5-8 Precipitation Zone	60+	Very fine sandy loam	0-2	Slight/slight	Salinity/alkalinity
855	Relley-Broyles	74	Fan skirts, inset fans	R024XY002NV	Loamy 5-8 Precipitation Zone	60+	Silt loam, very fine sandy loam	0-2	Slight/slight	Salinity/alkalinity, flooding (Broyles)
1169	Whirlo-Broyles	4	Fan skirts, inset fans	R024XY002NV	Loamy 5-8 Precipitation Zone	60+	Gravelly loam, extremely gravelly sandy loam	2-8	Slight/slight	Stoniness (Whirlo), salinity/alkalinity (Broyles)
1240	Redflame-Kingingham	38	Fan piedmonts	R024XY002NV	Loamy 5-8 Precipitation Zone	60+, 20	Very gravelly clay loam, gravelly sandy loam	2-15	Slight/slight	Stoniness, hardpan (Kingingham)

Table 3-7 Summary of Soil Mapping Units and Characteristics

Map Symbol	Soil Association or Series	Proposed Disturbance (acres)	Dominant Physiographic Position	Ecological Site ID	Ecological Site Name	General Soil Depth (inches)	Dominant Soil Texture	Major Slope Range (%)	Erosion Hazard (water/ wind)	Other Characteristics
1453	Atlow-Colbar-Rock Outcrop	10	Foothills	R024XY030NV	Shallow Calcareous Loam 8-10 Precipitation Zone	20	Very gravelly loam, very cobbly clay loam	15-50	Moderate/slight	Stoniness, depth to rock
1600	Disturbed land	0.5	Various			Various	Various	Various	Various	
1680	Zineb gravelly loam	1	Fan skirts	R024XY005NV	Loamy 8-10 Precipitation Zone	60+	Gravelly loam, extremely cobbly loamy coarse sand	2-8	Slight/slight	Stoniness
2060	Oxcorel-Beoska-Whirlo	124	Fan piedmonts	R024XY002NV	Loamy 5-8 Precipitation Zone.	60+	Clay loam, silt loam, very gravelly sandy loam	0-8	Slight/slight	Salinity/alkalinity, hardpan, stoniness
2098	Punchbowl-Clanalpine-Sumine	<0.1	Mountains	R024XY030NV	Shallow Calcareous Loam 8-10 Precipitation Zone	10, 20-40	Very gravelly loam, very cobbly clay loam	15-50	Severe/slight	Depth to rock (Punchbowl), stoniness
2104	Grassval-Zineb-Izod	3	Piedmont slopes	R024XY030NV	Shallow Calcareous Loam 8-10 Precipitation Zone	10, 60+, 10	Very gravelly loam	4-15	Moderate/slight	Hardpan (Grassval), stoniness (Zineb), depth to rock (Izod)

Table 3-7 Summary of Soil Mapping Units and Characteristics

Map Symbol	Soil Association or Series	Proposed Disturbance (acres)	Dominant Physiographic Position	Ecological Site ID	Ecological Site Name	General Soil Depth (inches)	Dominant Soil Texture	Major Slope Range (%)	Erosion Hazard (water/ wind)	Other Characteristics
3156	Robson-Old Camp-Rock Outcrop	2	Foothills	R024XY018NV	Claypan 10-12 Precipitation Zone	10-20	Extremely cobbly loam, very cobbly clay loam	8-15	Slight/Slight	Depth to rock, stoniness
3691	Izod-Rock Outcrop	54	Mountains	R024XY030NV	Shallow Calcareous Loam 8-10 Precipitation Zone	10-20	Very gravelly loam, extremely cobbly loam	15-50	Slight/Slight	Depth to rock, stoniness
3840	Jung-Norfolk-Buffaran	15	Foothills	R024XY030NV	Shallow Calcareous Loam 8-10 Precipitation Zone	<20	Very gravelly loam, very cobbly clay, gravelly clay loam	8-30	Moderate/slight	Depth to rock, depth to hardpan, stoniness
3841	Jung-Itca-Roca	17	Mountains	R024XY030NV	Shallow Calcareous Loam 8-10 Precipitation Zone	10-20, 20-40	Very cobbly loam, very cobbly clay loam	15-50	Moderate/slight	Depth to rock (Jung, Itca), stoniness
3843	Jung, steep-Robson-Jung	34	Mountains	R024XY030NV	Shallow Calcareous Loam 8-10 Precipitation Zone	10-20	Very gravelly loam, very cobbly clay loam	30-50	Moderate/slight	Depth to rock, stoniness, slope

Source: BLM 2008a; Natural Resources Conservation Service (NRCS) 2015b.

Of the 581 acres of proposed disturbance, potential impacts to soils on approximately 432 acres would be reduced over time by implementation of the site reclamation plan (inclusive of concurrent reclamation) as discussed in Section 2.2.8 and the applicant-committed environmental protection measures identified in Section 2.2.7. To minimize impacts to soils and provide for re-establishment of vegetation, suitable growth media would be salvaged during development of the open pits, construction of waste rock facilities, and construction of heap leach pads for subsequent use in reclamation. Suitable colluvium/alluvial material from the open pits also would be salvaged as growth media, with supplemental growth media obtained from existing alluvial borrow sources at the CGM Operations Area, as needed. Prior to seeding, disturbance areas would be recontoured, surfaces would be ripped or scarified (where conditions warrant) to relieve compaction, and growth media would be redistributed. BMPs would be used to limit erosion from project facilities and disturbance areas during and following construction and operations. These practices may include, but would not be limited to, installation of storm water diversions to route water around disturbance areas and project facilities and the placement of erosion control devices (e.g., silt fences, staked weed-free straw bales, riprap, etc.). To ensure long-term erosion control, all sediment and erosion control measures would be inspected periodically, and repairs would be performed, as needed. Based on these requirements, it is likely that short- to long-term (e.g., up to 10 years or more) decreases in soil quality would not limit the attainment of successful reclamation. Over time, soil quality on reclaimed sites would resemble pre-mining conditions. Therefore, the Proposed Action is not anticipated to result in substantial long-term impacts to soils in reclaimed areas. The loss of soil productivity on the remaining 149 acres of proposed disturbance associated with the Gap Pit modification and post-mining water management features would be permanent as these areas would not be reclaimed.

The proposed modification of the Pipeline South Area Heap Leach Facility would account for approximate 37 percent of the proposed new surface disturbance. The associated disturbance primarily would take place on the Beoska-Tenabo and Oxcorel-Beoska-Whirlo Associations (**Figure 3-2**). These soils have high salinity and/or alkalinity, typically have a hardpan within the subsoil, and also may have a high percentage of gravel and/or stones present (**Table 3-7**). These soils may not be ideal for salvage except the uppermost horizons due to the adverse chemical and physical characteristics of the subsoils. Based on the Cortez Hills Expansion Project Final EIS (BLM 2008a), an excess of approximately 5 million cubic yards of available suitable growth media (inclusive of suitable alluvial material from the open pits) previously was identified at the site (see Section 2.2.8.3 of this EA). Therefore, it is anticipated that sufficient suitable growth media would be available for reclamation purposes.

3.3.2.2 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. The proposed facility modifications as described for the Proposed Action would not be developed, and associated impacts to soil resources would not occur. Therefore, native undisturbed soils outside of the currently authorized disturbance areas would continue to develop in their natural state, assuming no change in land use activities. Soil fertility, productivity, and erosion rates in these areas would remain similar to historic values.

3.3.3 Cumulative Impacts

Past and present actions and RFFAs have resulted, or would result, in approximately 139,497 acres of soil disturbance, approximately 14 percent of which is associated with mining-related activities. The Proposed Action incrementally would increase soil disturbance-related impacts in the soils cumulative effects study area by approximately 581 additional acres, resulting in an overall cumulative disturbance to soils of 140,078 acres. It is assumed that portions of past mining-related disturbances have been reclaimed, and ongoing reclamation at existing operations would continue to reduce impacts to soils. The incremental addition of soils impacts as a result of the Proposed Action would be temporary in nature for

the majority of the project facilities, pending completion of successful reclamation. Based on permitting requirements relative to reclamation, it is assumed that the majority of the soil disturbance and associated impacts as a result of future operations also would be reclaimed and, therefore, temporary.

3.3.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No additional monitoring or mitigation beyond the measures identified in Sections 2.2.7.3 and 2.2.8.7 is recommended for soils.

Residual adverse effects to soils would include the permanent loss of soil productivity from approximately 149 acres of soils associated with the proposed Gap Pit modification, new storm water diversions at the Pipeline Complex, and other post-mining water management features.

3.4 Vegetation

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new impacts to vegetation include: 1) the proposed construction of the facilities modifications (see **Figure 2-2**) and 2) the proposed backhaul of Arturo oxide ore to the Pipeline Complex (as related to potential impacts associated with noxious weed, invasive, and non-native species).

The project study area for direct and indirect impacts to vegetation (including special status plant species, ethnobotanical plants, noxious weed, invasive, and non-native species, and woodland products) encompasses the proposed 581-acre disturbance area. The cumulative effects study area, as shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), encompasses the project study area and includes surface disturbance associated with past and present actions and RFFAs within a 30-mile radius.

3.4.1 Affected Environment

3.4.1.1 General Vegetation

The project study area is situated within the Northeastern Great Basin physiographic section of the Intermountain Semi-desert and Desert Province (Bailey 1994). The Intermountain Semi-desert and Desert Province is characterized as having hot summers and cool to cold winters, with low annual precipitation that mostly occurs as snow (McNab et al. 2007). The sub-region consists of mid- to high-elevation mountains with broad, sediment-filled valleys.

The project study area is within the Crescent Valley hydrographic area. Generally northeast trending mountain ranges bound the intervening basin, which is partly filled with deposits eroding from the adjacent mountain ranges. Elevations in the area range from approximately 9,680 feet amsl at the summit of Mount Lewis in the northern Shoshone Range to approximately 4,700 feet amsl at Beowawe, Nevada.

The vegetation types (including disturbed lands) that occur within the overall CGM Operations Area are shown in **Figure 3-4**. Descriptions of these vegetation types are presented in the Cortez Hills Expansion Project Final EIS (BLM 2008a). Shadscale/budsage is the most common vegetation type within the CGM Operations Area, occupying approximately 43,650 acres. The vegetation types that occur within the project study area include low sagebrush, mixed sagebrush, piñon/juniper, sagebrush/grassland, shadscale/budsage, Wyoming sagebrush, and disturbed lands.

Based on a 2013 habitat evaluation conducted by ARCADIS (2014), the area located on the north side of the Cortez Hills Complex was found to consist largely of greasewood- and sagebrush-dominated vegetation, intermixed with patches of saltbush-dominated vegetation. Vegetation communities located on the southwest side of the Pipeline Complex were reported to be predominantly Big Sagebrush Shrubland intermixed with Mixed Salt Desert Scrub, with Invasive Annual and Biennial Forbland along the southeastern edge of the existing Pipeline South Area Heap Leach Facility that primarily is adjacent to access roads and other previously disturbed areas. The sagebrush-dominated vegetation communities were reported to occur at the higher elevations and on steeper slopes near the Pipeline Complex. The mixed saltbush-dominated vegetation communities were reported to occur more often in the lower, gentler slopes north of the Cortez Hills Complex (ARCADIS 2014).

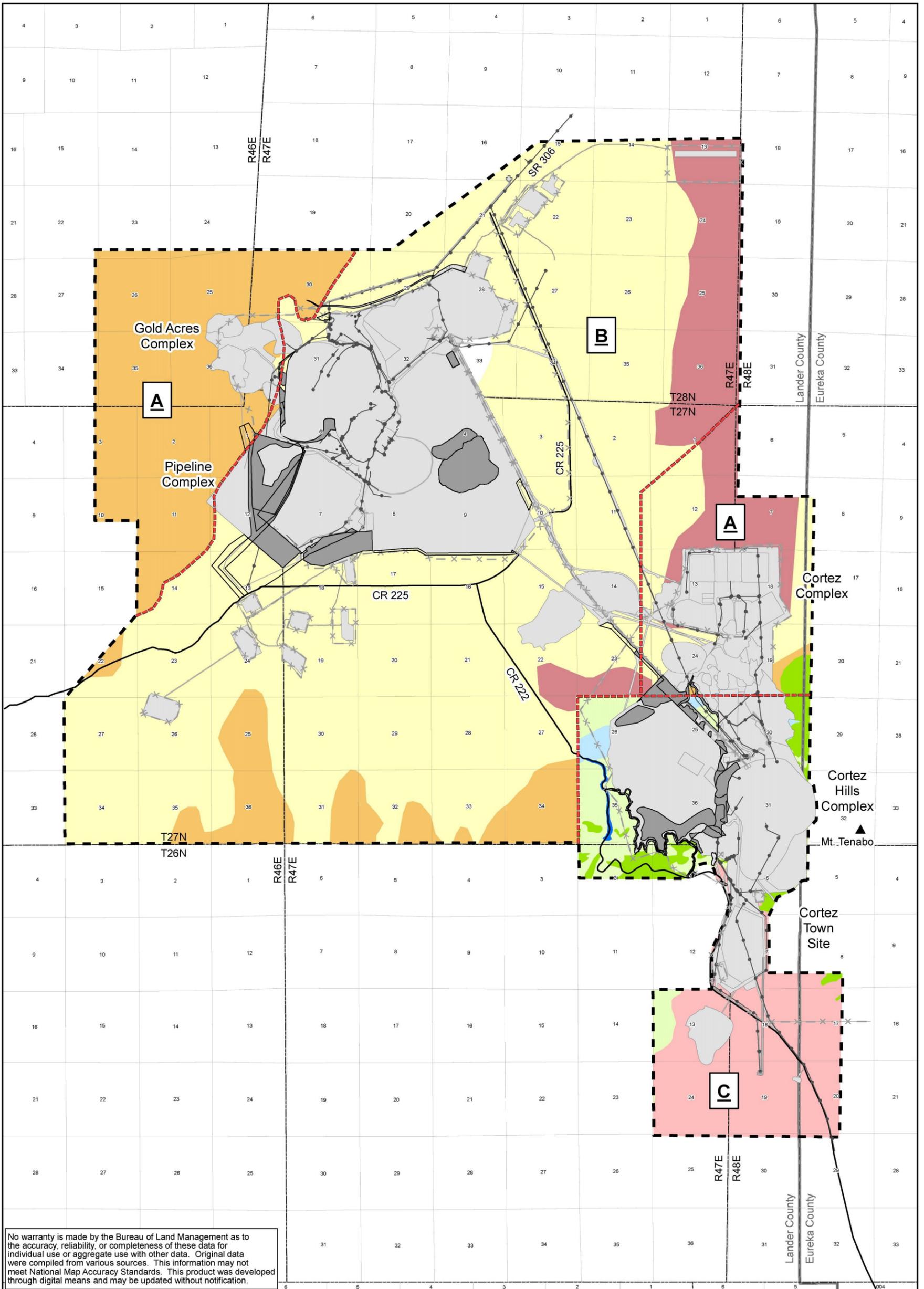
Five ecological sites occur within the project study area. Descriptions of these ecological sites are presented in **Table 3-8**. Their corresponding soil map units are identified in **Table 3-7** and shown in **Figure 3-2**.

Table 3-8 Ecological Sites in the Project Study Area

Ecological Site ID	Ecological Site Name	Ecological Site Description
R024XY002NV	Loamy 5-8 Precipitation Zone	A less productive site found at lower elevations on low hills, piedmont slopes, and alluvial plains. The reference plant community is typically dominated by shadscale (<i>Atriplex confertifolia</i>), bud sagebrush (<i>Picrothamnus desertorum</i>), and Indian ricegrass (<i>Achnatherum hymenoides</i>) (BLM 2008e).
R024XY005NV	Loamy 8-10 Precipitation Zone	Found at lower elevations on low hills, piedmont slopes, and alluvial plains at slightly higher elevation; is more productive. The reference plant community is dominated by big sagebrush (<i>Artemisia tridentata</i>) and deeprooted, cool season perennial bunchgrasses such as Thurber's needlegrass (<i>Achnatherum thurberianum</i>) and bluebunch wheatgrass (<i>Pseudoroegneria spicata</i>). Indian ricegrass and spiny hopsage (<i>Grayia spinosa</i>) are always found on this site but at low percentages (NRCS 2015a).
R024XY003NV	Sodic Terrace 6-8 Precipitation Zone	Found near valley bottoms on fans and alluvial flats. Slopes are generally less than 2 percent. The site has an appearance of micro playettes surrounded by low hummocks that accumulated at the base of shrubs. Soils are deep, but depth to the water table is less than 5 feet, which allows deep rooted shrubs and bunchgrasses to access water during the dry season. The reference plant community is a big sagebrush-black greasewood-basin wildrye community, with the balance of sagebrush and greasewood determined by sodic conditions of the soils (BLM 2013).
R024XY030NV	Shallow Calcareous Loam 8-10 Precipitation Zone	Found at lower elevations on low hills, piedmont slopes, and alluvial plains. The reference plant community is typically dominated by black sagebrush (<i>Artemisia nova</i>) with components of Thurber's needlegrass and Indian ricegrass (BLM 2008f).
R024XY018NV	Claypan 10-12 Precipitation Zone	Typically found on nearly level to moderately steep tablelands and alluvial fans. Slopes range from 0 to 70 percent but are typically less than 30 percent. The soils on this site are shallow, less than 10 inches deep, over a strongly developed claypan or shallow bedrock. There is often a high percentage of rock covering the surface with less rock fragments in the subsurface. The reference plant community is a bluebunch wheatgrass-low sagebrush community (NRCS 2005). The dominant perennial grass can change from bluebunch wheatgrass to Thurber's needlegrass on site with more gravel in the subsoil (NRCS 2015a).

3.4.1.2 Special Status Plant Species

Special status plant species include species that are listed as threatened or endangered under the Endangered Species Act (ESA), species that are proposed or are candidates for listing under the ESA, and species that are designated as sensitive by the BLM. These species are afforded an additional level of protection by law, regulation, or policy by federal or state agencies.



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Legend

- CGM Operations Area Boundary
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- Proposed Facilities
- Powerline
- Rangeland Fence
- Road
- Basin Big sagebrush
- Low sagebrush
- Mixed sagebrush
- Piñon/juniper
- Sagebrush/grassland
- Shadscale/black greasewood
- Shadscale/budsage
- Wyoming sagebrush
- Vegetation Type Source Areas

Sources: Adapted from: BLM 2008a.
 Area A - BLM 1992.
 Area B - BLM 2000.
 Area C - JBR 2005, 2000; ENSR 2006.



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Figure 3-4
 Vegetation



No federally listed plant species, federal candidate species, or species proposed for federal listing with potential to occur in or near the CGM Operations Area were identified in the Cortez Hills Expansion Project Final EIS (BLM 2008a) or the EA for Barrick Cortez Inc. 2011 Amendment to PoO and Reclamation Permit Application (BLM 2014a). Based on the USFWS (2015) species letter for the proposed project, IPaC Official Species List (USFWS 2015) confirmed that no such plant species are known or expected to occur in the project study area.

The Cortez Hills Expansion Project Final EIS (BLM 2008a) identified six BLM sensitive plant species as having potential to occur in the CGM Operations Area, including Elko rockcress (*Arabis falcifracta*), Nevada willowherb (*Epilobium nevadense*), windloving buckwheat (*Eriogonum anemophilum*), Eastwood's milkweed (*Asclepias eastwoodiana*), Colorado feverfew (*Parthenium ligulatum*), and Tiehm's beardtongue (*Penstemon tiehmi*). The potential for these species to occur in the CGM Operations Area was evaluated as part of the Cortez Hills Expansion Project Final EIS (BLM 2008a); the Colorado feverfew and Tiehm's beardtongue were eliminated from detailed analysis based on habitat requirements and/or known distribution (BLM 2008a). Species-specific field surveys for the Elko rockcress, Nevada willowherb, windloving buckwheat, and Eastwood's milkweed previously were conducted for the Cortez Hills Expansion Project; no occurrences were identified (BLM 2008a).

Additional surveys for Nevada willowherb and windloving buckwheat were completed in 2013 by ARCADIS (2014). The surveys were conducted in areas of potentially suitable habitat within two areas, one covering the general location of the proposed expansions for the Gap Waste Rock Facility and Pipeline South Area Heap Leach Facility and the other located north of the existing Canyon Waste Rock Facility. Neither of these species was observed during the survey (ARCADIS 2014). Habitat requirements (soils, associated species, and elevation characteristics) for three of the previously surveyed species (Nevada willowherb, Colorado feverfew, and Tiehm's beardtongue), were not present at either of the two survey areas (ARCADIS 2014). Habitat requirements for Elko rockcress is presented in Table 3.4-1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Based on the ecological site descriptions in **Table 3-8**, no potentially suitable habitat for this species is anticipated in the project study area.

One additional BLM sensitive plant species (Beatley buckwheat [*Eriogonum beatleyae*]) was included in the 2011 update to the Battle Mountain District sensitive species list. The NNHP (2012) identified this species as occurring within approximately 3 miles of the site. This species is found on dry, open to exposed, barren, basic, clay or rocky clay soils or crumbling outcrops on slopes and knolls of weathering rhyolitic or andesitic volcanic deposits, mostly on southerly to westerly aspects, in the sagebrush, piñon-juniper, mountain mahogany, and mountain sagebrush zones, with shadscale saltbush or low sagebrush, etc. (NNHP 2015). This species is not known to occur in salt desert scrub vegetation (Great Basin Ecology, Inc. [GBE] 2012), which includes the shadscale/budsage plant community in the project study area. However, potentially suitable habitat may exist in other appropriate plant communities in the project study area.

3.4.1.3 Ethnobotanical Plant Species

Lomatium dissectum, commonly referred to as fernleaf biscuitroot, desert parsley, giant lomatium, giant parsley, Indian parsley, and wild carrot, and as Toza by the Numic-speaking tribes of the Great Basin, has been valued and harvested for its medicinal properties by Native Americans throughout the West and Northwest for centuries (JBR 2002; Tilley et al. 2010). There is suitable habitat for *L. dissectum* in the Cortez Mountains, and the plant is abundant in numerous canyons throughout the range. It typically is associated with Wyoming big sagebrush, piñon-juniper, and mountain shrub communities (Tilley et al. 2010). Surveys for *L. dissectum* were conducted by JBR in 2000 and 2002, and no occurrences of this species were documented within the CGM Operations Area (JBR 2002, 2000). The species primarily was observed in the upper elevations of the Cortez Mountains (east-northeast of the CGM Operations Area). Based on the higher elevation occurrences of this species and known habitat association, no

suitable habitat for this species occurs in the study area. Therefore, the species has been eliminated from further evaluation in this EA.

3.4.1.4 Noxious Weed, Invasive, and Non-native Species

The BLM's policy relating to the management and coordination of noxious weeds and invasive plant species is outlined in BLM Manual 9015 – Integrated Weed Management. The BLM's primary focus is providing adequate capability to detect and treat smaller weed infestations before they have a chance to spread. Noxious weed control is based on a program of prevention, early detection, and rapid response.

Noxious weed, invasive, and non-native species are species that are highly competitive, aggressive, and spread easily. They typically establish and infest disturbed sites along roadsides and waterways. Changes in plant community composition from native species to non-native species can change fire regimes and negatively affect habitat quality, biodiversity, and ecosystem structure and function.

Noxious weeds and invasive plant species have been defined as pests by law or regulation. The BLM defines a noxious weed as a plant that interferes with management objectives for a given area of land at a given point in time. The BLM Battle Mountain District recognizes the current noxious weed list designated by the State of Nevada Department of Agriculture (NDOA) (NAC 555.010). Currently the list contains 47 noxious weed species. Designated noxious weeds are rated by the NDOA as Category A, B, or C (NAC 555.010), with the most stringent control requirements for those species found in Category A.

An invasive species is defined as a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (EO 13112, signed February 3, 1999).

No noxious weeds were observed in any of the vegetation plots located north of the Cortez Hills Complex and southwest of the Pipeline Complex that were surveyed in 2013 (ARCADIS 2014). Invasive, non-native species observed during the surveys included saltlover (*Halogeton* spp.), Russian thistle (*Salsola iberica*), red brome (*Bromus madritensis* var. *rubens*), cheatgrass (*Bromus tectorum*), and clasping pepperweed (*Lepidium perfoliatum*) (ARCADIS 2014).

In accordance with the currently approved Noxious Weed Management Plan (SRK 2014), noxious weed, invasive, and non-native species monitoring and treatment are conducted on an annual basis within the CGM Operations Area. As discussed in Section 2.2.8.5, the plan contains management strategies, provisions for annual monitoring and treatment evaluation, and provisions for treatment. The results from annual monitoring provide the basis for updating the plan and developing annual treatment programs.

3.4.1.5 Woodland Products

Piñon-juniper woodlands occur in the southeast portion of the CGM Operations Area as shown in **Figure 3-4**. As discussed in the Cortez Hills Expansion Project Final EIS (BLM 2008a), the piñon-juniper woodlands in the CGM Operations Area are not part of a designated greenwood (i.e., live tree) cutting area. However, dead wood may be cut for firewood, and pine nuts may be harvested from live trees (BLM 2008a).

3.4.2 Environmental Consequences

3.4.2.1 Proposed Action

General Vegetation

Under the Proposed Action, facilities modifications in the CGM Operations Area would result in approximately 581 acres of new surface disturbance, resulting in the removal of approximately 54 acres

of low sagebrush, 16 acres of mixed sagebrush, 5 acres of piñon/juniper, 37 acres of sagebrush/grassland, 444 acres of shadscale/budsage, 3 acres of Wyoming sagebrush, and 22 acres of disturbed land.

The 149 acres of proposed disturbance associated with the Gap Pit modification and post-mining water management features (including the 5 acres of piñon/juniper) would not be reclaimed, resulting in a permanent loss of vegetation. The remaining 432 acres of the proposed disturbance would be reclaimed concurrent with or following the completion of mining. Reclamation would be conducted in accordance with BCI's current Reclamation Plan for the CGM Operations Area (see Section 2.2.8) and the applicant committed environmental protection measures (see Section 2.2.7.3). The seed mixes developed and approved by the BLM (2008a,c) for use in the lower and upper elevations of the CGM Operations Area (inclusive of the proposed disturbance area) are presented in **Tables 2-5** and **2-6**, respectively.

On the reclaimed areas, there would be conversion of shrub dominated vegetation to grass/forb-dominated vegetation in the short term. Approximately 3 to 5 years following reclamation, the reclaimed plant communities likely would consist of adequate herbaceous plant cover with sufficient diversity to substantially reduce the potential for soil erosion and provide forage for use by livestock and wildlife, thus supporting the post-mining land uses (see Section 2.2.8.2). Examples of concurrent reclamation completed to date in the CGM Operations Area are presented in **Figure 3-3**. Over the long term, shrubs would become re-established and increase in abundance as a result of reclamation and natural recolonization.

Special Status Plant Species

Based on known distribution, no impacts to federally listed or federal candidate plant species or species proposed for federal listing are anticipated.

Potential impacts to BLM sensitive species could occur in unsurveyed portions of the proposed disturbance area, if present. Unserved areas include the proposed new disturbance areas associated with the Pipeline/South Pipeline and Canyon waste rock facilities and proposed ancillary facilities area at the Cortez Hills Complex. Also, potential impacts to the Beatley buckwheat could occur in other locations of the proposed disturbance, if present. Potential impacts to BLM sensitive species would be minimized with implementation of the applicant-committed environmental protection measure for special status plant species as presented in Section 2.2.7.3. In accordance with this measure, BCI would obtain information from the NNHP regarding any known occurrences of special status plant species that occur within this area prior to ground disturbing activities. If known populations occur within the proposed disturbance area, an additional field survey would be conducted for the appropriate species prior to mine development in order to determine the extent of these populations. A survey report, which would include survey methods, results, summary, a map illustrating the areas surveyed, and any populations observed during the survey, would be submitted to the BLM. After BLM's review of the report, BCI would coordinate with the BLM to develop appropriate mitigation measures.

Noxious Weed, Invasive, and Non-native Species

Implementation of BCI's weed control program in conjunction with the reclamation plan (including use of weed-free seed mixes) and applicant-committed environmental protection measures as discussed in Sections 2.2.8 and 2.2.7.3 of this EA, respectively, would minimize the potential for establishment and spread of noxious weeds, invasive, and/or non-native plant species as a result of the proposed 581 acres of new disturbance. In accordance with BCI's updated Noxious Weed Management Plan (SRK 2014), weed control practices currently are, and would continue to be, implemented in coordination with the BLM and Lander County Conservation District to limit the spread of noxious weeds in the project-related disturbance areas and to ensure successful reclamation as is discussed in Section 2.2.8.5 of this EA.

Contractor truck traffic associated with the backhaul of oxide ore from the Arturo Mine through the Goldstrike Mine to the Pipeline Complex for processing would not contribute to impacts associated with noxious weed, invasive, and non-native species, as the ore would be transported in trucks that currently are returning empty along the same route after hauling refractory ore from the CGM Operations Area to Goldstrike.

Woodland Products

Under the Proposed Action, there would be a permanent loss of productivity on approximately 5 acres of piñon-juniper woodlands associated with construction of post-mining water management features at the Cortez Hills Complex. As the Proposed Action is located in an area where abundant piñon-juniper woodlands exist on public lands, it is anticipated that this impact to woodland product productivity would be minimal.

3.4.2.2 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. Proposed modifications as described for the Proposed Action would not be implemented, and associated impacts to general vegetation, special status plant species, ethnobotanical plant species, and woodland products, and potential vegetation effects associated with noxious weed, invasive, and non-native plant species, would not occur.

3.4.3 Cumulative Impacts

Vegetation

Past and present actions (including wildfires) and RFFAs have resulted, or would result, in approximately 139,497 acres of disturbance to vegetation, approximately 14 percent of which is associated with mining related activities. The Proposed Action incrementally would increase surface disturbance and related impacts to vegetation in the cumulative effects study area by 581 additional acres, resulting in an overall cumulative disturbance to vegetation of approximately 140,078 acres. It is assumed that portions of past mining-related disturbances have been reclaimed, ongoing reclamation at existing operations would continue, and disturbance associated with future operations would be reclaimed in accordance with permit requirements, thus reducing cumulative impacts to vegetation. The incremental addition of vegetation impacts on approximately 432 acres as a result of the Proposed Action would be temporary in nature, pending completion of successful reclamation; vegetation impacts on the remaining 149 acres would result in a permanent contribution to cumulative impacts to vegetation in the cumulative effects study area.

No direct or indirect impacts to special status plant species would occur under the Proposed Action; therefore, the proposed modifications would not contribute to cumulative impacts to these species. Woodland products from approximately 5 acres of piñon-juniper woodlands permanently would be lost under the Proposed Action, resulting in a permanent contribution to cumulative impacts in the cumulative effects study area.

Noxious Weed, Invasive, and Non-Native Species

It is assumed that the majority of the surface disturbance associated with past and present actions and RFFAs would be reclaimed, which would minimize the establishment of noxious weed, invasive, and non-native species. Disturbance areas not reclaimed would be prone to the establishment of noxious weed, invasive, and non-native species. Implementation of BCI's committed environmental protection measures (Section 2.2.7.3), reclamation plan (Section 2.2.8), and Noxious Weed Management Plan (Section 2.2.8.5), would help minimize the establishment and spread of noxious weed, invasive and non-

native species associated with the Proposed Action and, therefore, would minimize the project's contribution to cumulative effects associated with these species.

3.4.4 Monitoring and Mitigation Measures and Residual Adverse Effects

Vegetation

No additional monitoring or mitigation beyond the measures identified in Sections 2.2.7.3 and 2.2.8.7 is recommended for vegetation.

Residual adverse effects to vegetation would include the permanent loss of vegetation on approximately 149 acres and the long-term change in vegetation composition (i.e., shrub-dominated community to grass- and forb-dominated community) on approximately 432 acres as a result of the proposed project. The effect on the 423 acres that would be reclaimed would diminish over time as shrubs become re-established.

Noxious Weed, Invasive and Non-native Species

No additional monitoring or mitigation is recommended for noxious weed, invasive and non-native plant species.

Residual adverse effects to vegetation communities may occur as a result of noxious weed and invasive and non-native species infestations; it is anticipated these effects would diminish following the completion of successful reclamation.

3.5 Wildlife and Fisheries Resources

As discussed in the introduction of Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the element of the Proposed Action that potentially would result in new impacts to wildlife habitat and species includes the proposed construction of the facilities modifications (see **Figure 2-2**).

The project study area for the direct and indirect impacts to wildlife and fisheries (including special status species) encompasses the proposed 581-acre disturbance area. The cumulative effects study area, as shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), encompasses the project study area and includes surface disturbance associated with past and present actions and RFFAs within a 30-mile radius.

3.5.1 Affected Environment

3.5.1.1 Terrestrial Wildlife

Habitat

Wildlife habitat in the project study area primarily consists of sagebrush shrublands, desert shrubland, and grassland communities as described in Section 3.4.1, Vegetation.

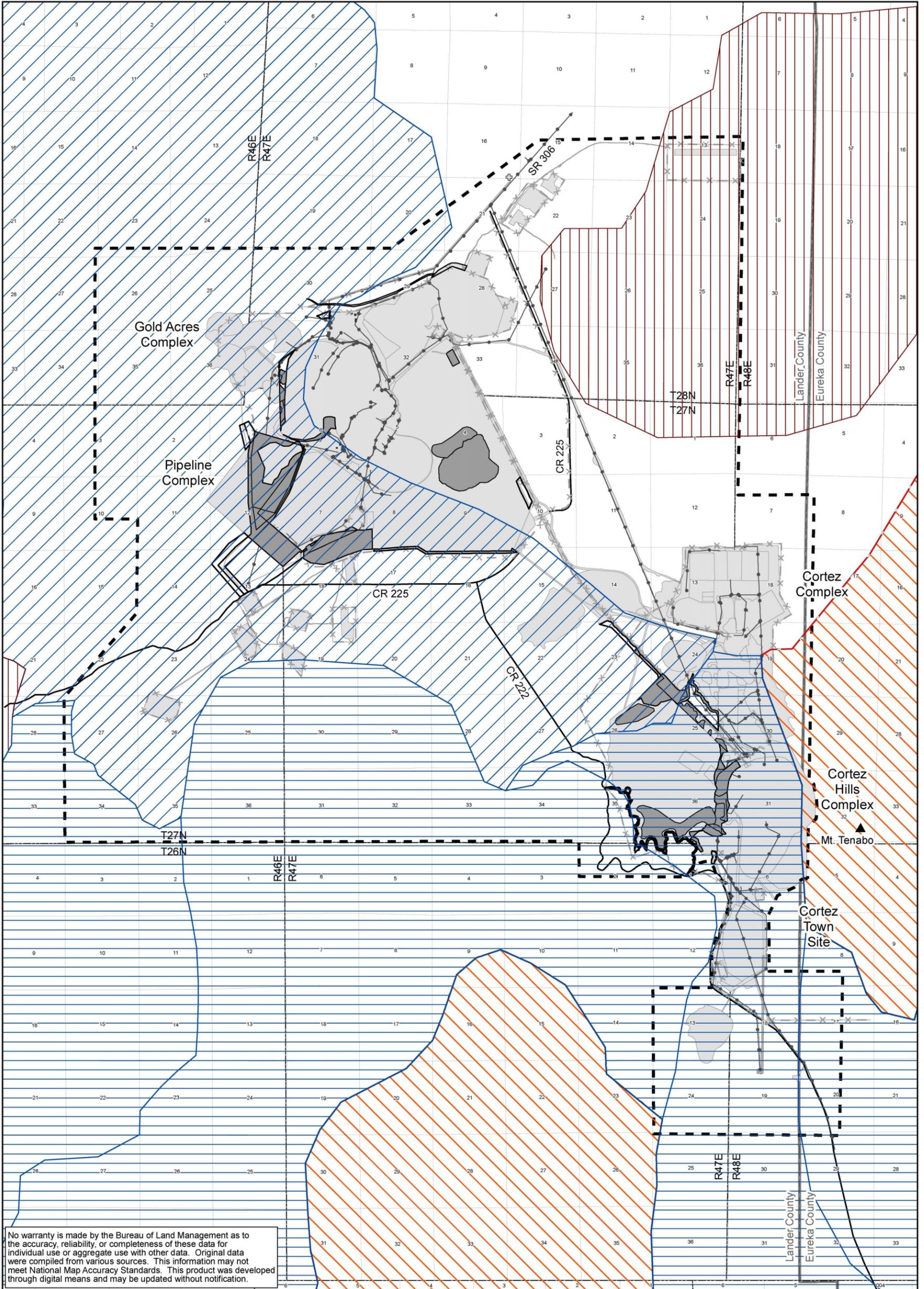
Big Game Species

Mountain lion (*Felis concolor*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocarpa americana*) are known to occur within the CGM Operations Area. In total, approximately 526 acres of NDOW-mapped mule deer range overlap with the project study area (**Figure 3-5**). This includes approximately 86 acres of crucial winter range and 440 acres of winter range. Overall, the limiting factor for mule deer within the region is the quantity and quality of available summer range; however, water is the primary limiting factor in the vicinity of the CGM Operations Area (Podborny 2002). Mountain lion tend to occur in close association with mule deer, their primary prey species. Crescent Valley, with its salt desert scrub vegetation and general lack of freshwater resources (outside of irrigated agricultural lands), provides marginal habitat for mule deer and, by association, mountain lion.

Pronghorn are more prevalent in valley habitats, and NDOW has mapped Crescent Valley, including the majority of the project study area, as pronghorn range (**Figure 3-6**). In total, approximately 109 acres of winter range and 457 acres of year-long range overlap with the project study area. Pronghorn year-long range also is present on valley benches to the west and south of the project study area. Pronghorn is the primary big game species likely to occur in the project study area. NDOW's 2013-2014 Big Game Status Book (NDOW 2014a) states that for Hunt Units 141, 143, and 151 through 156 that surround the project study area, pronghorn population growth has been high over the last several years, likely due to high fawn recruitment and the prevalence of annual and perennial grasses and forbs following the large-scale wildfires in 1999. Surveys conducted from October 2013 to February 2014 documented 1,591 pronghorn in Crescent Valley, Grass Valley, Antelope Valley, Reese River Valley, and the Simpson Park Mountains. It is anticipated that the total amount and timing of precipitation ultimately will regulate this population's growth and distribution, and if drought conditions persist across the management area, the population will start to decline (NDOW 2014a).

Small Game Species

Upland game birds known to occur within the CGM Operations Area include greater sage-grouse (*Centrocercus urophasianus*), chukar (*Alectoris chukar*), mourning dove (*Zenaida macroura*), and gray partridge (*Perdix perdix*). The greater sage-grouse, a federal candidate species for listing under the ESA and a BLM sensitive species, is discussed further in Section 3.5.1.3, Special Status Species. Chukars



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Legend

- CGM Operations Area Boundary
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- Proposed Facilities
- Powerline
- Rangeland Fence
- Road
- Mule Deer Agricultural Range
- Mule Deer Crucial Winter Range
- Mule Deer Winter Range
- Mule Deer Year-long Range

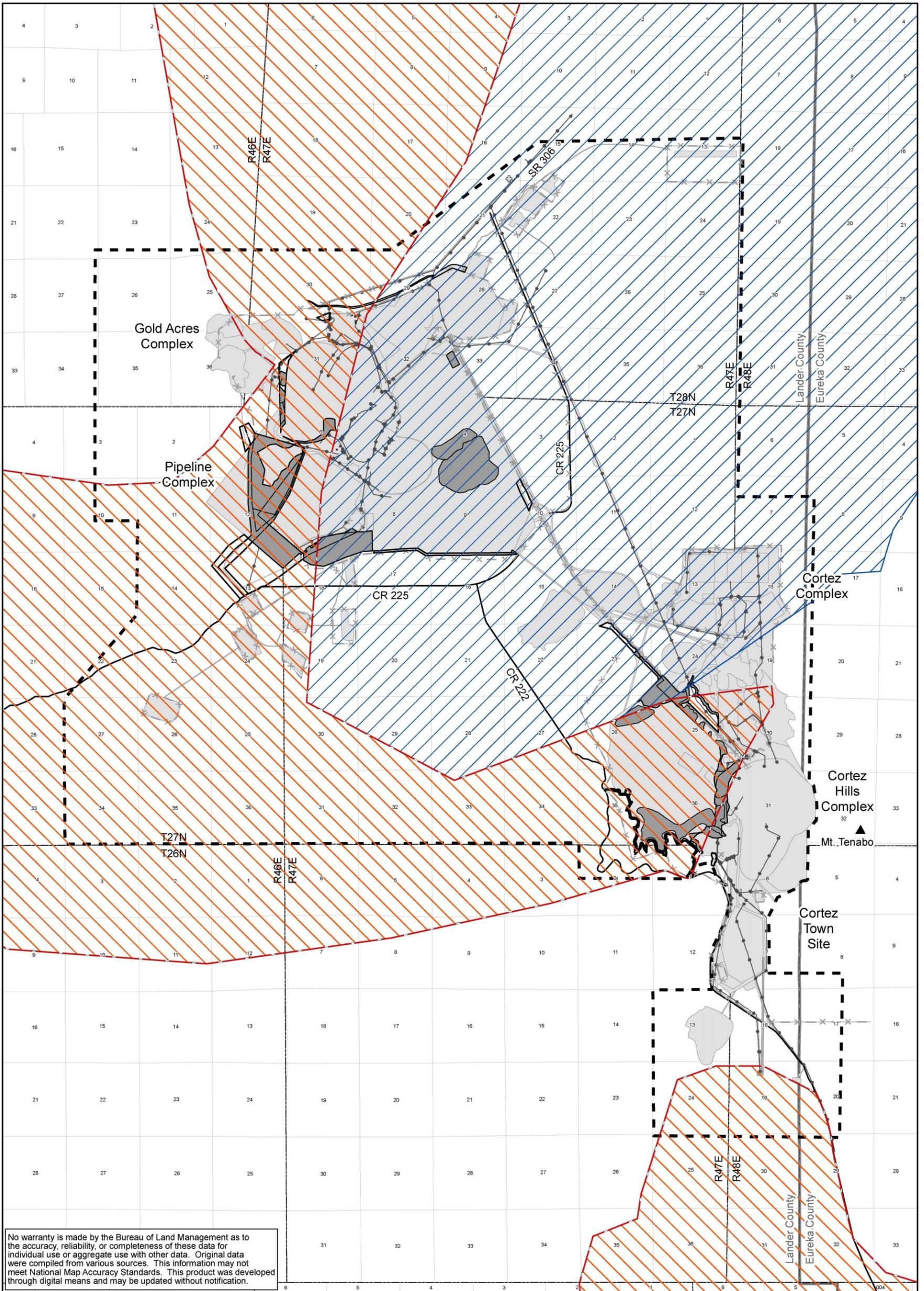


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Figure 3-5
 Designated Mule Deer Range





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Legend

- CGM Operations Area Boundary
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- Proposed Facilities
- Powerline
- Rangeland Fence
- Road
- Pronghorn Winter Range
- Pronghorn Year-long Range



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Figure 3-6
 Designated Pronghorn Range



and mourning doves inhabit desert scrub habitats in proximity to open water. Based on the limited amount of open water in the CGM Operations Area, these species are not likely to be prevalent in the project study area. Gray partridge tend to be associated with agricultural fields and grasslands during the breeding season and crop stubble (particularly cereal grains) and wooded cover in the winter.

Other small game species with potential to occur in the vicinity of the project study area include cottontail rabbits (*Sylvilagus* sp.) and white-tailed jackrabbits (*Lepus townsendii*), as well as furbearers including kit fox (*Vulpes macrotis*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), badger (*Taxidea taxus*), weasels (*Mustela* spp.), and striped skunk (*Mephitis mephitis*).

Nongame Species

A diversity of nongame species including small mammals, songbirds, raptors, and reptiles occupy the habitats in the vicinity of the project study area. A number of raptors were observed in the vicinity of the project study area during 2013 surveys including golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), northern harrier (*Circus cyaneus*), and an unidentified falcon (GBE 2013). To the extent that rabbits, jackrabbits, and other small mammals such as Townsend's ground squirrel (*Urocitellus townsendii*) are common in the vicinity of the project study area, foraging raptors also are likely to be common.

Songbirds such as horned lark (*Eremophila alpestris*) and western meadowlark (*Sturnella neglecta*) are likely to occur within the project study area. A number of bat species potentially occur in the project study area as foraging individuals. Most of these bat species are considered sensitive by the BLM and are discussed further in Section 3.5.1.3, Special Status Species. Other nongame species likely to occur in the project study area include common reptiles such as the western fence lizard (*Sceloporus occidentalis*), collared lizard (*Crotophytus collaris*), and gopher snake (*Pituophis melanoleucus*). A comprehensive list of nongame species observed within the CGM Operations Area is provided in Table C-1 in Appendix C of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

Migratory Birds

The Migratory Bird Treaty Act and EO 13186 provide for the protection of migratory birds. Pursuant to EO 13186, a Memorandum of Understanding was drafted among the BLM, U.S. Forest Service, and USFWS to promote conservation and protection of migratory birds. The BLM Nevada State Office prepared Migratory Bird BMPs for the Sagebrush Biome in order to assist BLM field offices in considering the effects of land management activities on migratory birds.

Raptor species observed by GBE (2014, 2013) in the project vicinity are identified in the Nonnative Game Species section above. GBE (2014, 2013) also documented seven raptor nests within 1 mile of the project study area, including one active golden eagle nest, one inactive golden eagle nest, and five inactive nests for which the species was unknown. Migratory bird surveys were conducted in the project study area in 2013 (ARCADIS 2014). Two passerines were observed, including sage sparrow (*Artemisiospiza belli*) and horned lark. Breeding bird surveys previously were conducted in the CGM Operations Area in May and June 2005 (JBR 2005). Bird species observed during these survey efforts are listed in Tables C-1 (general wildlife) and Table C-2 (special status species) of Appendix C in the Cortez Hills Expansion Project Final EIS (BLM 2008a). A number of species identified by the USFWS (2008) as birds of conservation concern in the Great Basin Bird Conservation Region (BCR 9) are identified in these tables. Those known to occur in the CGM Operations Area include the golden eagle, pinyon jay (*Gymnorhinus cyanocephalus*), sage thrasher (*Oreoscoptes montanus*), and Brewer's sparrow (*Spizella breweri*). Additional birds of conservation concern identified in Table C-2 of the Final EIS (BLM 2008a) as having potential to occur in the CGM Operations Area include the bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk, and loggerhead shrike (*Lanius ludovicianus*). Of these

species, only the Brewer's sparrow and loggerhead shrike have the potential to nest within the project study area.

3.5.1.2 Fisheries

The closest intermittent stream to the project study area is Cooks Creek, which is located approximately 0.5 mile south of the Pipeline Complex. Based on the absence of perennial waterbodies within the project study area (see Section 3.2, Water Resources), there is no known or potential habitat for fish or aquatic species. As a result, these species have been eliminated from further analysis.

3.5.1.3 Special Status Species

Special status species include species that are protected under the ESA, species that are proposed or candidates for listing under the ESA, and species that are designated as sensitive by the BLM. These species are afforded an additional level of protection by law, regulation, or policy by state or federal agencies.

No federally listed wildlife species, federal candidate species, or species proposed for federal listing with potential to occur in or near the project study area were identified in the Cortez Hills Expansion Project Final EIS (BLM 2008a). Since that time, listing of the greater sage-grouse as threatened or endangered was found to be warranted but precluded by higher priority listing actions (Federal Register, March 5, 2010). As a result, the greater sage-grouse is now considered a federal candidate species. The greater sage-grouse also is considered a BLM sensitive species and is discussed further below. Based on the USFWS (2015) species list for the proposed project, one federally listed species (Lahontan cutthroat trout [*Oncorhynchus clarkii henshawi*]) and one additional federal candidate species (Columbia spotted frog [*Rana luteiventris*]) potentially occur in the vicinity of the project study area. However, based on the absence of perennial waterbodies within the project study area (see Section 3.2), there is no known or potential habitat for other either of these aquatic species. Therefore, they have been eliminated from further analysis.

There are a number of BLM Battle Mountain District sensitive species that have the potential to occur in the project study area. Most of these species are described in detail in the Cortez Hills Expansion Project Final EIS (BLM 2008a); however, there have been changes in the BLM sensitive species list since 2008. Some of the sensitive species analyzed in the 2008 EIS (BLM 2008a) have been dropped and others have been added. Current BLM sensitive species that have been documented or have the potential to occur in the project study area are listed in **Table 3-9**. Those species with moderate or high potential to occur in the project study area are addressed in the impact analysis in Section 3.5.2. Habitat within the project study area generally is considered unsuitable for species identified as having a low potential for occurrence. Bird and bat species with low occurrence potential may occur within the project study area on a transitory basis during migration or during daily flights among patches of suitable habitat outside of the project study area; however, the study area does not provide substantive food, cover, or shelter for these species. Therefore, project-related impacts to this habitat would have no discernible effects on these species, and they are not addressed in the impact analysis. Although the occurrence potential for the pygmy rabbit is considered low, this species is addressed in the impact analysis as the habitat in the project study area is considered marginal rather than unsuitable. Based on the absence of perennial waterbodies within the project study area (see Section 3.2), there is no known or potential habitat for fish or aquatic species. As a result, BLM sensitive aquatic species (i.e., Columbia spotted frog and Amargosa toad [*Anaxyrus nelsoni*]) have been eliminated from further analysis.

Table 3-9 BLM Sensitive Species with Potential to Occur in the Project Study Area

Common Name	Scientific Name	Documented in CGM Operations Area ¹	Potential to Occur in Project Study Area ^{2,3}
Mammals			
Pallid bat	<i>Antrozous pallidus</i>	Yes	Moderate
Big brown bat	<i>Eptesicus fuscus</i>	Yes	Moderate
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	Yes	Moderate
Silver-haired bat	<i>Lasionycteris notivagans</i>	No	Low
Western small-footed myotis	<i>Myotis ciliolabrum</i>	No	Moderate
Long-eared myotis	<i>Myotis evotis</i>	Yes	Moderate
Fringed myotis	<i>Myotis thysanodes</i>	No	Low
Long-legged myotis	<i>Myotis volans</i>	No	Low
Spotted bat	<i>Euderma maculatum</i>	No	Moderate
Western pipistrelle	<i>Pipistrellus hesperus</i>	Yes	Moderate
Little brown bat	<i>Myotis lucifugus</i>	Yes	Moderate
California myotis	<i>Myotis californicus</i>	Yes	Moderate
Yuma myotis	<i>Myotis yumanensis</i>	No	Low
Hoary bat ⁴	<i>Lasiurus cinereus</i>	Yes	Low
Pygmy rabbit	<i>Brachylagus idahoensis</i>	No	Low
Dark kangaroo mouse	<i>Microdipidops megacephalus</i>	No	Moderate
Birds			
Northern goshawk	<i>Accipiter gentilis</i>	No	Low
Bald eagle	<i>Haliaeetus leucocephalus</i>	No	Low
Golden eagle	<i>Aquila chrysaetos</i>	Yes	High
Ferruginous hawk	<i>Buteo regalis</i>	No	Moderate
Swainson's hawk	<i>Buteo swainsoni</i>	No	Low
Greater sage-grouse	<i>Centrocercus urophasianus</i>	Yes	Moderate
Western snowy plover ⁴	<i>Charadrius alexandrinus nivosus</i>	No	Low
Peregrine falcon ⁴	<i>Falco peregrinus</i>	No	Low
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	Yes	High
Pinyon jay	<i>Gymnorhinus cyanocephalus</i>	Yes	Low
Loggerhead shrike	<i>Lanius ludovicianus</i>	Yes	High
Black rosy finch ⁴	<i>Leucosticte atrata</i>	No	Low

Table 3-9 BLM Sensitive Species with Potential to Occur in the Project Study Area

Common Name	Scientific Name	Documented in CGM Operations Area ¹	Potential to Occur in Project Study Area ^{2,3}
Lewis's woodpecker	<i>Melanerpes lewis</i>	No	Low
Sage thrasher	<i>Oreoscoptes montanus</i>	No	Moderate
Brewer's sparrow	<i>Spizella breweri</i>	Yes	Moderate

¹ Based on Appendix C of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Pygmy rabbit and western burrowing owl also based on ARCADIS (2014).

² Based on ARCADIS (2014) report, GBE (2012) report, and Cortez Hills Expansion Project Final EIS (BLM 2008a) analysis.

³ Low = Little or no potentially suitable habitat (food, cover, or shelter) in study area and few or no records of occurrence in CGM Operations Area
Moderate = Potentially suitable food, cover, or shelter habitat in study area and record of species occurrence in CGM Operations Area.
High= Suitable food, cover, and shelter habitat in study area and multiple observations in CGM Operations Area.

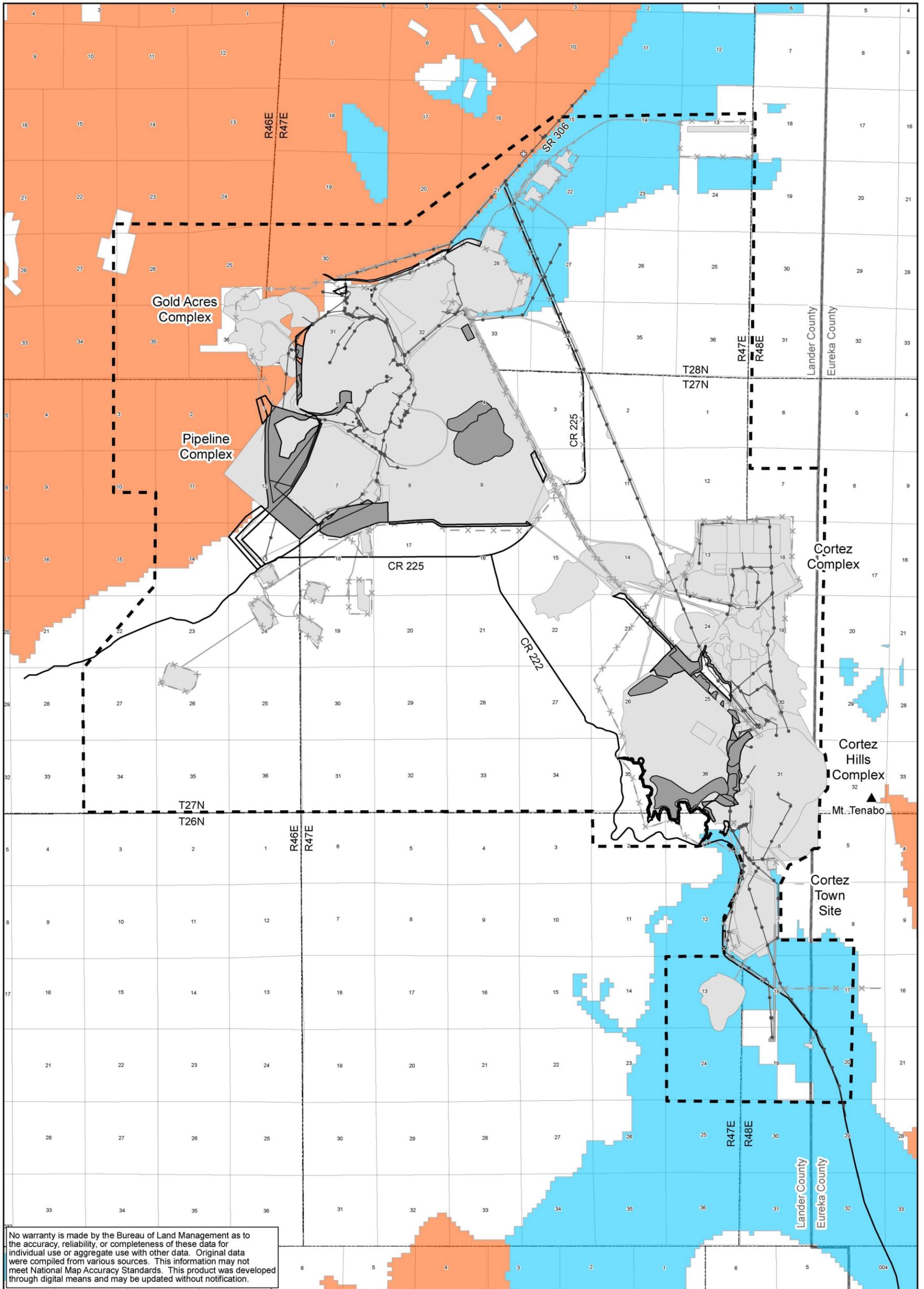
⁴ The life history attributes of these species were not described in the Cortez Hills Expansion Project Final EIS (BLM 2008a) or in the EA for Barrick Cortez Inc. (NVN-67575 [11-3A]) 2011 Amendment to PoO and Reclamation Permit Application (BLM 2014a). Because they have low potential to occur in the current project study area and are not being addressed in the impact analysis, no additional life history information is provided.

Pertinent life history information on the species with moderate or high potential to occur in the project study area, as well as the pygmy rabbit, is presented in Section 3.5.1.3 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Species added to the BLM Battle Mountain District sensitive species list since the Final EIS that have moderate or high potential to occur in the project study area include the dark kangaroo mouse, sage thrasher, and Brewer's sparrow. Species accounts are provided for these species in Section 3.5.1.3 of the EA for Barrick Cortez Inc. 2011 Amendment to PoO and Reclamation Permit Application (BLM 2014a). Because of its status as a candidate for federal listing, additional information on the greater sage-grouse is presented below.

Greater Sage-grouse

Greater sage-grouse are known to occur in the eastern and southern portions of the CGM Operations Area on the northern end of Grass Valley. Based on mapping by NDOW (2012a) and the BLM and U.S. Forest Service (2012), there is some preliminary priority habitat (PPH) for greater sage-grouse in the northwest portion of the study area (**Figure 3-7**). PPH consists of breeding habitat (lek and nesting habitat), brood-rearing habitat, winter range, and important movement corridors. PPH typically consists of sagebrush shrubland habitats; however, it also may include riparian communities, perennial grasslands, agriculturally-developed land, and restored habitat including burned areas (BLM and U.S. Forest Service 2012).

Leks, or strutting grounds, are the sites of greater sage-grouse reproductive activities and tend to be located in flat, open, sparsely vegetated sites in or adjacent to sagebrush-dominated vegetation types. Most greater sage-grouse nests are located within a few miles of a lek. Based on NDOW (2013) data, there are eight greater sage-grouse leks located outside of the CGM Operation Area but within 6 miles of project study area. These leks and their status are present in **Table 3-10**.



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Legend

- CGM Operations Area Boundary
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- Proposed Facilities
- Powerline
- Rangeland Fence
- Road
- Preliminary Priority Habitat (PPH)
- Preliminary General Habitat (PGH)

Note: BLM recommended and NDOW concurred that: 1) the proposed disturbance area to the west of the existing Gap Pit does not meet the criteria for preliminary priority habitat or preliminary general habitat due to the level of existing disturbance, and 2) the proposed disturbance areas to the west of the existing Pipeline South Area Heap Leach Facility should be reclassified as preliminary general habitat (BLM 2014d).
 Source: BLM and U.S. Forest Service 2012; NDOW 2012a.



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Figure 3-7
 Designated Greater Sage-grouse Habitat



Table 3-10 Greater Sage-grouse Leks near the Project Study Area

Lek Name	Status	Last Survey	Distance from Project Study Area (miles)
Tenabo	Unknown	1947	2.8
Elder Creek	Unknown	2004	3.4
Clipper Mine	Unknown	2007	3.5
Utah Mine Camp 2	Pending	2008	5.1
Utah Mine Camp 3	Pending	2008	5.3
Utah Mine Camp	Unknown	2012	5.5
Indian Creek	Unknown	2012	5.6
Cortez-Grass Valley	Unknown	2000	5.7

Source: NDOW 2013.

The closest greater sage-grouse lek to the study area is a historic lek (the Tenabo lek) located outside of the CGM Operations Area, approximately 2.8 miles from the project study area. The status of this lek is unknown (NDOW 2013). However, given that the last survey was in 1947 and that the lek site is surrounded by historic mine workings; it is highly unlikely that this lek is still active. Based on recommendations from NDOW (2012b), surveys of the Tenabo lek are not warranted based on the current disturbance in the area (BLM 2012).

Big sagebrush is a key component of greater sage-grouse habitat providing forage as well as nesting, security, and thermal cover on a year-round basis. Plant communities that provide succulent herbaceous vegetation, have relatively high insect concentrations, and occur in the general vicinity of nesting areas are important foraging areas for chicks and are used as brood-rearing habitat during the summer months. During the winter, greater sage-grouse are found exclusively in sagebrush communities where sagebrush is tall enough to extend above the snow, generally on south- or west-facing slopes and wind-blown ridges where snow depths tend to be lower.

A habitat evaluation for greater sage-grouse was conducted in the project study area in 2013 by ARCADIS (2014). Suitable habitat was not observed in the portion of the study area at the Pipeline Complex; rather, the habitat was reported as patchy and included sparse stands of sagebrush intermixed with saltbrush, as well as invasive grasses and invasive forbs throughout. BLM subsequently conducted a greater sage-grouse habitat evaluation in this portion of the study area that previously was designated as PPH (**Figure 3-7**). Based on this evaluation, BLM recommended and NDOW concurred that: 1) the area to the west of the existing Gap Pit does not meet the criteria for PPH or PGH due to the level of existing disturbance, and 2) the area to the west of the existing Pipeline South Area Heap Leach Facility should be reclassified as PGH (BLM 2014d). Marginal quality greater sage-grouse habitat was observed in the portion of the study area just north of the Cortez Hills Complex where greasewood, saltbrush, and invasive forbs were dominant. No greater sage-grouse, leks, or secondary signs were observed during biological surveys in the project study area (ARCADIS 2014).

3.5.2 Environmental Consequences

3.5.2.1 Proposed Action

Terrestrial Wildlife

Under the Proposed Action, direct impacts to terrestrial wildlife would result from the temporary (short-term and long-term) and permanent reduction or loss of habitat. Indirect impacts to wildlife species

could result from increased human presence and noise. The most common wildlife responses to human presence and noise are avoidance or accommodation. As the proposed facilities modifications primarily would be located adjacent to existing operations in the CGM Operations Area, potential impacts to wildlife species as a result of human presence and noise are anticipated to be low.

The Proposed Action would result in the reduction of approximately 581 acres of terrestrial wildlife habitat including approximately 54 acres of low sagebrush, 16 acres of mixed sagebrush, 5 acres of piñon/juniper, 37 acres of sagebrush/grassland, 444 acres of shadscale/budsage, and 3 acres of Wyoming sagebrush habitat, as well as 22 acres of disturbed land. Because the proposed disturbance areas would be located immediately adjacent to currently authorized disturbance areas and mine facilities, it is assumed that habitat fragmentation-related effects would be minimal. The 149 acres of proposed disturbance associated with the Gap Pit modification, new storm water diversions at the Pipeline Complex, and other post-mining water management features (currently occupied by approximately 144 acres of shrubland habitat and 5 acres of piñon/juniper habitat) would not be reclaimed, resulting in a permanent loss of habitat in these areas. Habitat-related impacts on the remaining 432 acres of the proposed disturbance would be minimized with implementation of BCI's current Reclamation Plan for the CGM Operations Area (see Section 2.2.8); however, the Proposed Action would result in the long-term conversion of sagebrush and shadscale/budsage shrubland habitats to a grassland habitat until woody species have re-established and reach maturity (approximate 25 years). It is anticipated that the temporary reduction in these shrubland habitats as a result of the Proposed Action would have a minor effect on the overall quality and abundance of these habitat types in the CGM Operations Area and a minimal effect in relation to the overall availability in the region.

Potential direct impacts to mule deer would include the incremental long-term reduction of available habitat, including approximately 86 acres of crucial winter range and 440 acres of winter range, consisting primarily of shrubland habitats. No important mule deer movement corridors would be directly impacted by the Proposed Action. Based on the occurrence of these habitats in the surrounding area, and assuming successful reclamation of the temporary disturbance areas, impacts to mule deer are expected to be low.

Potential direct impacts to pronghorn would include the incremental long-term reduction of available habitat, including approximately 109 acres of winter range and 457 acres of year-long range. No important pronghorn movement corridors would be directly impacted by the Proposed Action. Based on the occurrence of these habitats in the surrounding area, and assuming successful reclamation of the temporary disturbance areas, impacts to pronghorn are expected to be low.

The Proposed Action would result in an approximately 581-acre reduction in bird foraging and nesting habitat until revegetation has been completed and vegetation re-established. To minimize construction-related impacts to breeding birds, BCI has committed to conducting breeding bird (including raptor) surveys and implementing appropriate mitigation measures, as needed, in the event that project construction should occur during the breeding season (see Section 2.2.7.4). Based on the mobility of avian species, the applicant committed environmental protection measure, and the overall availability of other suitable habitats in the CGM Operations Area and Crescent Valley as a whole, it is unlikely that this reduction in habitat would have a discernible impact on these species.

Proposed rerouted and new power line segments (i.e., life-of-mine power line and distribution lines) could pose an electrocution hazard for raptor species attempting to perch on the structures. To minimize this potential impact, BCI has committed to using APLIC (2006) and APLIC and USFWS (2005) standard safe designs as discussed in Section 2.2.7.4. The new power lines also would incrementally increase collision potential for migrating and foraging bird species, although this potential would be minimized to an extent based on the location of the power lines adjacent to existing mine facilities. To further minimize collision potential, BCI has committed to using APLIC (2012) design standards for these installations.

Small game mammals (e.g., mountain cottontail) and nongame mammals (e.g., Townsend's ground squirrel, western fence lizard, gopher snake) are somewhat less mobile, and if occupied burrows are present in the proposed disturbance areas during construction, there would be potential for direct loss of adults and young. It also is likely that increased vehicle activity during construction would result in increased direct mortality of these species due to vehicle collisions. Although construction and operations potentially would result in some direct mortality to small mammal species, these species generally are common, short-lived, and have high reproductive rates. Consequently, losses of individuals during construction and the long-term loss of 432 acres, and permanent loss of 149 acres, of potential small game and nongame mammal habitat during operations would be unlikely to have a measurable effect on local populations in the CGM Operations Area and surrounding region. Successful reclamation of temporary disturbance areas following mine closure would further minimize long-term impacts.

Special Status Species

There are no federally listed threatened or endangered species or species proposed for federal listing that would be affected by the Proposed Action. One federal candidate species, the greater sage-grouse (also considered a BLM sensitive species), potentially may occur in the study area.

Several BLM sensitive mammal species (i.e., bat species and dark kangaroo mouse) have moderate to high potential to occur on or adjacent to the proposed disturbance areas, and one additional species (pygmy rabbit) has low potential for occurrence in areas of marginally suitable habitat (**Table 3-9**). No suitable bat roosting or hibernating habitat is present within the project study area; therefore, occurrence would be limited to foraging or migrating bats. Given the lack of water in the area, it is unlikely that bats currently spend much time foraging over the study area. Consequently, it is anticipated that the reduction of approximately 581 acres of potential foraging habitat would have little or no effect on bat species.

Habitat quality for the dark kangaroo mouse in the proposed disturbance area is considered marginal due to a lack of native grasses and forbs (Back 2013). If this species occurs on the site, it is likely to be present in low numbers. However, if individuals are present, they likely would be lost during construction. BCI has committed to implementation of dark kangaroo mouse surveys in areas of potentially suitable habitat prior to ground disturbing activities, with survey results submitted to the BLM (see Section 2.2.7.7).

Marginally suitable habitat for the pygmy rabbit was identified in areas located in the proposed disturbance area to the west of the existing Pipeline South Area Heap Leach Facility (ARCADIS 2014). As reported by ARCADIS (2014), there were very few areas that contained loamy soils and large, dense stands of big sagebrush, and no pygmy rabbits or secondary evidence (i.e., scat, tracks) were observed during the field surveys. Based on the ecological site descriptions in **Table 3-8**, no potentially suitable habitat for this species is anticipated in the remainder of the proposed disturbance area. Therefore, potential impacts to this species are not anticipated as a result of the Proposed Action.

Potential project-related impacts to BLM sensitive bird species with moderate to high potential to occur in the project study area (**Table 3-9**) would be similar to those described above for other avian species. Suitable burrowing owl habitat is present in the vicinity of the Cortez Hills Complex, and individuals have been documented breeding in this area (ARCADIS 2014). Potential impacts to the burrowing owl would be similar to those described above for small game mammals. Implementation of the applicant-committed environmental protection measure to protect nesting birds, as discussed above for other avian species, would avoid or minimize potential impacts to any BLM sensitive bird species, including burrowing owls that may nest within or near the proposed disturbance area.

Greater Sage-grouse

Based on the reclassification of greater sage-grouse habitat in proposed new disturbance areas to the west of the Pipeline Complex (BLM 2014d), no disturbance of PPH would occur under the Proposed Action. The Proposed Action would result in approximately 56 acres of disturbance of PGH for this species. Available habitat in the proposed disturbance areas is considered marginal for greater sage-grouse with patchy, sparse stands of sagebrush intermixed with saltbush, or habitats dominated by greasewood, saltbush, and/or invasive grasses and forbs (ARCADIS 2014). In addition, no greater sage-grouse or secondary signs were observed during field surveys (ARCADIS 2014). However, to minimize impacts to PGH for this species, off site restoration/enhancement at a 2:1 ratio would be considered as described in Section 2.2.7.4.

The Elder Creek and the Clipper Mine leks are located within 4 miles of the proposed project disturbance areas; their status is currently unknown (see **Table 3-10**). If these leks are active, greater sage-grouse could be impacted by project-related noise if proposed activities were to occur during the breeding season for the species (March 1 through May 15). However, based on the location of these lek sites in relation to existing operations in the CGM Operation Area, the proposed locations of the facilities modifications adjacent to existing operations areas, and the distance (3.4 and 3.5 miles, respectively) and substantial topographic features between the lek sites and the proposed facilities modifications, it is anticipated that noise impacts to greater sage-grouse as a result of the Proposed Action would be negligible.

3.5.2.2 No Action Alternative

Under the No Action Alternative, existing operations and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. Proposed modifications as described for the Proposed Action would not be implemented, and associated impacts to wildlife would not occur.

3.5.3 Cumulative Impacts

The cumulative effects study area for terrestrial wildlife and fisheries resources is shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The past and present actions and RFFAs presented in **Table 2-7** have resulted, or would result, in approximately 139,497 acres of disturbance to wildlife habitat, with associated impacts to wildlife species (including special status species). Of this total, approximately 90,099 acres of disturbance have been related to wildland fires and approximately 6,541 acres have been related to BLM fuel reduction programs. The Proposed Action incrementally would increase surface disturbance and related impacts to terrestrial wildlife habitat in the cumulative effects study area by 581 additional acres, resulting in an overall cumulative disturbance of approximately 140,078 acres. A portion of the cumulative disturbance area has been, or would be, reclaimed or has recovered materially (i.e., wildfire areas). The reclaimed areas and areas associated with habitat conversion within the cumulative effects study area would be capable of supporting wildlife use; however, species composition and densities likely would change from pre-disturbance conditions.

3.5.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No additional monitoring or mitigation measures are recommended for wildlife.

Residual adverse effects to wildlife resources would include the permanent loss of approximately 144 acres of shrubland habitat and approximately 5 acres of piñon/juniper habitat associated with the Gap Pit modification, new storm water diversions at the Pipeline Complex, and other post-mining water management features. Residual adverse effects also would include long-term habitat conversion (i.e., sagebrush and shadscale/budsage shrubland habitats to grassland habitat) as a result of project construction and operations. Over time, this effect would diminish as shrubs become re-established.

3.6 Range Resources

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the element of the Proposed Action that potentially would result in new impacts to range resources is the construction of the proposed facilities modifications (see **Figure 2-2**).

The project study area for direct and indirect impacts to range resources includes the proposed 581-acre disturbance area within the Carico Lake Allotment. The cumulative effects study area encompasses the Carico Lake Allotment, which is shown in **Figure 3-8**.

3.6.1 Affected Environment

Livestock grazing is one of the predominant land uses within the project study area. Three grazing allotments (Carico Lake, Grass Valley, and South Buckhorn) encompass portions of the CGM Operations Area as shown in Figure 3.6-1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Of these three allotments, the project study area falls entirely within the Carico Lake Allotment. The portion of this allotment that occurs within the CGM Operations Area predominantly is used for cattle grazing. The current authorized animal unit months (AUMs) present within the use area coinciding with the CGM Operations Area includes 1,742 AUMs for the Carico Lake Allotment. An AUM is the amount of forage required for a cow/calf pair for 1 month. Livestock movement corridors are not known to occur within any of these grazing allotments. All of these allotments include in-holdings of private property, which commonly include fences that have been constructed along the boundaries of these properties.

The project study area occurs within the northeastern portion of the Carico Lake Allotment (**Figure 3-8**). The Carico Lake Allotment encompasses approximately 53,098 acres of public land within the CGM Operations Area. The stocking rate in the CGM Operations Area of the Carico Lake Allotment is approximately 54 acres per AUM (BLM 2008a). The Carico Lake Allotment has been categorized as an "I" (improve the current unsatisfactory condition) allotment.

An allotment evaluation was completed for the Carico Lake Allotment in 2005. Through the evaluation and decision processes, modified stocking rates and grazing schedules for the allotment were implemented to improve rangeland health. As discussed in the Cortez Hills Expansion Project Final EIS (BLM 2008a), rangeland in mine-related disturbance areas temporarily would be degraded during mine development and operation; however, successful reclamation of surface disturbance likely would result in enhanced rangeland condition relative to the pre-mining rangeland condition.

Information regarding the operator, number and kind of livestock, use dates, and AUMs associated with the Carico Lake Allotment are provided in **Table 3-11**. The Cortez Joint Venture Use Area, which encompasses the project study area, is one of 19 active use areas in the allotment and accounts for approximately 7 percent of the total Carico Lake Allotment AUMs. Five ecological sites occur within the project study area; their site numbers and descriptions are presented in **Table 3-8**. The portion of the Carico Lake Allotment that occurs within the project study area does not include water-related range improvements.

Vegetation types within the project study area that provide forage for livestock grazing, are described in Section 3.4, Vegetation. In addition, information regarding soil types present within the study area is described in Section 3.3, Soils and Reclamation.

Table 3-11 Livestock Grazing Permits for the Carico Lake Allotment

Permittee Name/Authorization Number	Use Area	Livestock Number	Kind	Dates	AUMs
C Ranches/ 2702908 (leased from Cortez)	Cortez Joint Venture	898	Cattle	2/1 – 3/31	1,741
C Ranches/ 2706032	Toiyabe Mountain	600	Cattle	4/1-6/30	1,795
C Ranches/ 2706032	Toiyabe Flat	600	Cattle	7/1-11/15	2,722
Ellison Ranching Co./ 2700168	Shoshone Mountain	6,545	Sheep	3/1-6/30	5,250
C Ranches/ 2706032		600	Cattle	4/1-6/30	1,795
C Ranches/ 2706032	Carico Lake Valley	189	Cattle	11/16-3/31	845
		600	Cattle	7/1-11/15	2,722
ELLC Grazing Membership, LLC/ 2703974	Doby George	493	Sheep	4/1-6/30	295
Ellison Ranching Co./ 2700168	Fish Creek Mountains	1,218	Sheep	3/1-4/30	489
		1,218	Sheep	11/1-2/28	961
		1,218	Sheep	2/15-2/28	112
Ellison Ranching Co./ 2700168	Harry Canyon	1,507	Sheep	11/1-2/28	1,153
Filippini Ranching Co./ 2706031	Filippini Ranching	111	Cattle	10/1-4/30	777
Julian Tomera Ranches, Inc./ 2706005	Julian Tomera	1,511	Sheep	3/1-5/31	914
Silver Creek Ranch, Inc./ 2706023	Silver Creek Ranch	1,477	Sheep	4/1-6/30	884

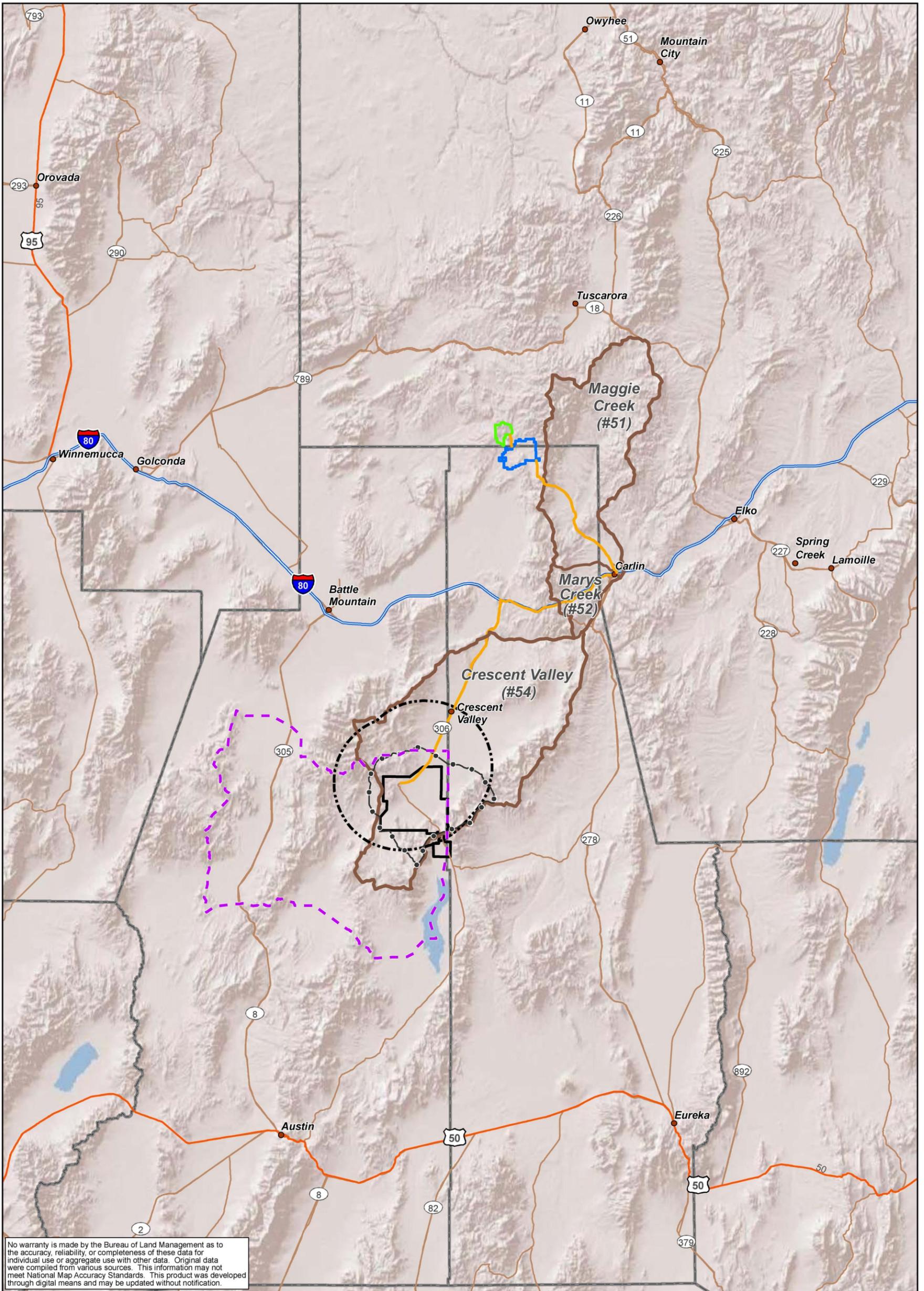
¹ Grazing in the Carico Lake Allotment also occurs on private land for which livestock use information is not available.

Source: GeoCommunicator 2015.

3.6.2 Environmental Consequences

3.6.2.1 Proposed Action

The Proposed Action would result in loss of 581 acres of rangeland during project construction and operation. Based on the stocking rate in the CGM Operations Area of the Carico Lake Allotment (approximately 54 acres per AUM), this would result in the short-term loss of approximately 11 AUMs on BLM-administered land. However, approximately 231 acres of the proposed disturbance (4 AUMs) would be within the existing mine perimeter fences and, therefore, are currently excluded from grazing. The loss of the remaining 7 AUMs would be entirely within the Cortez Joint Venture Use Area of the Carico Lake Allotment. This loss would represent approximately 0.4 percent of the total available AUMs within this use area.



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Legend

- CGM Operations Area Boundary
- Goldstrike Mine Operations Boundary
- Arturo Mine Operations Boundary
- Air Quality Cumulative Effects Study Area (Based on hydrographic basins)
- Noise Cumulative Effects Study Area
- Recreation Cumulative Effects Study Area
- Range Resources Cumulative Effects Study Area (Carico Lake Allotment)
- Ore Transportation Route

Note: The CESA for noise also includes a 2-mile-wide corridor centered on the proposed ore transportation route. The CESA for recreation resources also includes a 5-mile-wide corridor centered on the ore transportation route.
 Source: NDWR 2012.



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Figure 3-8
 Cumulative Effects Study Area
 for Various Resources



Of the 581 acres of proposed disturbance, 432 acres would be reclaimed in accordance with the site's reclamation plan (Section 2.8.8) and the applicant-committed environmental protection measures identified in Section 2.2.7. Following successful reclamation and removal of the perimeter fences, approximately 8 AUMs would be recovered. As authorized by BLM in the future, livestock grazing may be resumed after re-established vegetation is capable of supporting grazing (i.e., approximately 3 to 5 growing seasons after final revegetation). Implementation of the site's Noxious Weed Management Plan (SRK 2014) would further minimize impacts to available forage. The remaining 149 acres of proposed disturbance, associated with the Gap Pit modification and post-mining water management features, would result in the permanent loss of approximately 3 AUMs on BLM-administered land, as these areas would not be reclaimed. This loss would represent approximately 0.2 percent of the permitted use in the Cortez Joint Venture Use Area of the Carico Lake Allotment.

Portions of the proposed facilities modifications would extend beyond the existing perimeter fence. Potential impacts to livestock in these areas could include injury or mortality as a result of physical hazards or livestock/vehicle collision. As discussed in Section 2.2.7.12, the existing perimeter fence would be extended to encompass the proposed facility modifications, thereby minimizing potential impacts to livestock.

3.6.2.2 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. Proposed modifications as described for the Proposed Action would not be implemented, and associated impacts to range resources would not occur.

3.6.3 Cumulative Impacts

The Proposed Action incrementally would contribute to cumulative impacts in the Carico Lake Allotment. Surface disturbance related to past and present actions and RFFAs within the Carico Lake Allotment have affected, or would affect, a total of approximately 21,701 acres of rangeland. Based on an average stocking rate of 38 acres per AUM, this disturbance has or would result in the loss of approximately 571 AUMs, an unquantifiable portion of which has been, or would be, reclaimed. The Proposed Action incrementally would increase surface disturbance in the allotment by 581 acres, resulting in the incremental temporary loss of approximately 8 AUMs (pending completion of mining, successful reclamation, and removal or perimeter fences) and the permanent loss of approximately 3 AUMs.

3.6.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No monitoring or mitigation measures are recommended for range resources.

Residual adverse effects to range resources would include the permanent loss and exclusion of forage from approximately 149 acres of BLM-administered land, resulting in the permanent loss of approximately 3 AUMs from the Carico Lake Allotment. Residual adverse impacts to range resources on approximately 432 acres of BLM-administered land are not anticipated assuming successful reclamation following the completion of mining.

3.7 Paleontological Resources

As discussed in the introduction of Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the element of the Proposed Action that potentially would result in new or previously unauthorized disturbance to paleontological resources is the proposed construction of the facilities modifications (see **Figure 2-2**).

The project study area for direct and indirect impacts to paleontological resources encompasses the proposed 581 acres of new disturbance. The cumulative effects study area, as shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), encompasses the project study area and includes surface disturbance associated with past and present actions and RFFAs within a 30-mile radius.

3.7.1 Affected Environment

Paleontological resources identified on public lands are considered by the BLM as a fragile and nonrenewable scientific record of the history of life on earth and, therefore, are considered to represent an important and critical component of America's natural history. Once damaged, destroyed, or improperly collected, their scientific and educational value may be reduced or lost forever. In addition to their scientific, educational, and recreational values, paleontological resources can be used to inform land managers about interrelationships between the biological and geological components of ecosystems over long periods of time.

3.7.1.1 Regulatory Framework

The Paleontological Resources Preservation Act of 2009 (Public Law 111-011) authorizes the BLM to manage and provide protection to fossil resources using scientific principles and expertise. The act defines paleontological resource as "any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth."

The BLM manages paleontological resources under a number of federal laws including FLPMA Sections 310 and 302(b), which directs the BLM to manage public lands to protect the quality of scientific and other values; 43 CFR 8365.1-5, which prohibits the willful disturbance, removal, and destruction of scientific resources or natural objects; and 43 CFR 3622, which regulates the amount of petrified wood that can be collected for personal, non-commercial purposes without a permit.

In addition to the statutes and regulations identified above, fossils on public lands are managed through the use of internal BLM guidance manuals. BLM Manual 8270 (BLM 1998a) and BLM Handbook H-8270-1 (BLM 1998b) contain the BLM's policy and guidance for the management of paleontological resources on public lands. Guidance for the protection of paleontological resources also is contained in IM 2009-011, which provides guidelines for the assessment and mitigation of impacts to paleontological resources (BLM 2008d).

The BLM has adopted the Potential Fossil Yield Classification (PFYC) system to identify and classify fossil resources on federal lands (BLM 2007). Paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources.

The PFYC system provides for classification of geologic units based on the relative abundance of vertebrate fossils or scientifically important fossils (plants, vertebrates, and invertebrates) and their sensitivity to adverse impacts. A higher class number indicates higher potential. The PFYC system is not

intended to be applied to specific paleontological localities or small areas within units. Although important localities occasionally may occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; rather, the relative abundance of significant localities is intended to be the major determinant for the class assignment. The PFYC system provides baseline guidance for predicting, assessing, and mitigating paleontological resources. Descriptions of the potential fossil yield classes are summarized below.

- Class 1 – Igneous and metamorphic geologic units (excluding tuffs) that are not likely to contain recognizable fossil remains.
- Class 2 – Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically important non-vertebrate fossils.
- Class 3 – Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence.
- Class 4 – Geologic units are Class 5 units that have lower risks of human-caused adverse impacts or lower risk of natural degradation. Proposed ground-disturbing activities would require assessment to determine whether significant paleontological resources occur in an area of proposed disturbance.
- Class 5 – Highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils or scientifically important non-vertebrate fossils and are at high risk of natural degradation or human-caused adverse impacts.

3.7.1.2 Paleontological Resources

The Paleozoic rocks in the upper plate of the Roberts Mountain Thrust that are host rocks for the ore bodies also contain invertebrate fossils. Formations that have fossils include Eureka Quartzite, Hansen Creek Formation, Roberts Mountain Formation, and the Wenban Formation (Gilluly and Masursky 1965). Based on Gilluly and Masursky (1965), the most abundant fossils occur in the middle limestone member of the Hansen Creek Formation and included trilobites, brachiopods, corals, and graptolites. The other formations contain lesser degrees of abundance and states of preservation. The survival of useful fossil specimens in and near the ore bodies depends on the degree of alteration associated with the mineralization.

The paleontological resources analysis conducted for the Cortez Hills Expansion Project Final EIS (BLM 2008a) identified exposures of Tertiary age (2 to 24 million years ago) alluvial gravel and sand deposits, and Quaternary (present to 2 million years ago) deposits of valley alluvium, alluvial fans flanking the mountains, playa, talus, and landslide deposits within the CGM Operations Area. In addition, a 1991 paleontological resources report that addresses vertebrate and invertebrate fossils in the CGM Operations Area indicated that no fossil vertebrate localities have been confirmed within the area through literature searches, BLM paleontological inventories, or queries to other paleontologists (BLM 2008a; Firby 1991). The report states that the potential for the occurrence of vertebrate fossils is considered low.

3.7.2 Environmental Consequences

3.7.2.1 Proposed Action

Under the Proposed Action, modification of the Gap Pit potentially could result in direct impacts to paleontological resources through exposure and destruction of fossil resources during operations. However, the host rock formations that have the potential to contain fossils are not likely to contain scientifically useful specimens because of the alteration associated with emplacement of mineralization. Due to the altered state of these host rocks, they would have a PFYC class of no more than 2. Therefore, it is unlikely that important paleontological resources would be impacted.

The Tertiary-age alluvial gravel and sand deposits and Quaternary deposits of alluvium, valley fill, and alluvial fan deposits within the remainder of the proposed disturbance area are considered as PFYC Class 2 for paleontological sensitivity and are unlikely to produce vertebrate or invertebrate fossils. In addition, an assessment of paleontological resources through the examination of inventories prepared by the BLM and review of the literature found no known vertebrate or invertebrate localities within the CGM Operations Area.

Since fossils usually are buried, their locations cannot be confirmed until excavation associated with project construction and operations occur. As discussed in Section 2.2.7.5, if vertebrate fossils are discovered during construction, operation, or reclamation, activities would be halted in the area of the discovery. BCI would contact the BLM Authorized Officer and, if requested, also may contact a qualified paleontologist. The BLM Authorized Officer and/or qualified paleontologist would evaluate the discovery within 5 working days of being notified. If the discovered paleontological resource is determined to be scientifically significant, appropriate measures would be developed to mitigate potential adverse effects. Construction activities would not resume until a notice to proceed is granted by the BLM Authorized Officer.

3.7.2.2 No Action Alternative

Under the No Action Alternative, existing mining and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. Proposed modifications as described for the Proposed Action would not be implemented, and associated impacts would not occur.

No new ground-disturbing activities beyond those previously authorized would occur under this alternative. As a result, direct impacts to paleontological resources are not expected to occur beyond those analyzed in previous NEPA documents for existing operations within the CGM Operations Area (BLM 2008a, 2004, 2000). Indirect impacts (e.g., erosional effects and potential collecting) would continue to occur at a rate similar to that currently occurring in the project study area.

3.7.3 Cumulative Impacts

The potential for the occurrence of vertebrate fossils is low (PFYC Class 2) in the geologic deposits that would be affected by the Proposed Action. Therefore, the Proposed Action is not anticipated to substantially contribute to cumulative paleontological resources impacts in the cumulative effects study area.

3.7.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No additional monitoring or mitigation measures are recommended for paleontological resources.

No residual adverse effects to paleontological resources are expected to occur.

3.8 Cultural Resources

3.8.1 Regulatory Framework

Federal law and regulation provide the framework by which historic properties are identified, evaluated for their significance, and protected. NEPA mandates that “federal or federally-assisted projects (federal undertakings) must take into account effects on historic and cultural resources” (40 CFR 1500-1508). The National Historic Preservation Act, 1966 and as amended (NHPA), requires that federal agencies consider an undertaking’s effects on historic properties, which are defined as prehistoric or historic sites, districts, buildings, structures, or objects that are included in or eligible for inclusion in the NRHP. A property does not need to be formally listed on the NRHP to warrant consideration; consideration is granted if the property meets the National Register criteria (see Section 3.8.2). NHPA’s implementing regulations (36 CFR 800) define the procedures by which historic properties are identified, documented, and evaluated for the NRHP, and how the effects to historic properties posed by federal undertakings are mitigated.

While regulations for implementing Section 106 of NHPA are outlined in 36 CFR 800, program alternatives can be adopted to better fit agency procedures (36 CFR 800.14). A common program alternative is a PA negotiated between the federal agency and the Advisory Council on Historic Preservation. A project-specific PA for the Cortez Hills Expansion Project was signed in October 2005 by the Elko and Battle Mountain District Offices of BLM, Nevada SHPO, and CGM (now BCI) (BLM, SHPO, and CGM 2005). This document applies to the current Proposed Action and outlines how resources are identified and evaluated for the NRHP, how adverse effects to resources are identified and minimized or mitigated, and how inadvertent discoveries are addressed. The 2005 PA, which automatically will terminate in October 2015 unless BLM, SHPO, and BCI agree to extend it or enter into a revised PA, currently is in the process of being updated.

3.8.2 Eligibility Criteria for the National Register of Historic Places

The NRHP is maintained by the National Park Service, which has established the criteria necessary for a property to be listed or eligible for listing on the NRHP. Properties must be at least 50 years old, they must adhere to at least one of the four criteria of significance, and they must retain integrity. “The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- That are associated with events that have made a significant contribution to the broad patterns of our history (Criterion A); or
- That are associated with the lives of significant persons in our past (Criterion B); or
- That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C); or
- That have yielded or may be likely to yield, information important in history or prehistory (Criterion D)” (National Park Service 1997).

3.8.3 Study Area

The project study area for cultural resources is the Area of Potential Effect (APE). The APE is defined as “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties. The APE is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking”

(36 CFR 800.16[d]). As discussed in the introduction of Chapter 3.0 and indicated in **Tables 3-3 and 3-4**, the APE for direct impacts includes those elements of the Proposed Action that would result in new or previously unauthorized ground disturbance, which total 581 acres (**Figure 2-2**). The cumulative effects study area for cultural resources is identical to that defined in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and shown in Figure 3.8-1 of that document. It includes the area within the CGM Operations Area boundary and surrounding lands from approximately 1 to 6 miles from the boundary, including portions of the Cortez Mountains and portions of the Shoshone and Toiyabe Ranges as shown in Figure 3.8-1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). For the purposes of assessing indirect effects resulting from the Proposed Action, the indirect effects APE is identical to the CESA defined above.

3.8.4 Affected Environment

All 581 acres of proposed new ground disturbance have been inventoried to Class III standards. Five cultural resources were identified within the boundaries of the APE. All five known cultural resources have been determined not eligible for the NRHP. Additionally, the APE is located within the boundaries of the Cortez Mining District, a property eligible to the NRHP under Criteria A, B, C, and D. The Cortez Mining District encompasses Mount Tenabo, the pediment west of Mount Tenabo, Mill Canyon, the south extension of the Cortez Mountains, and a portion of the CGM Operations Area (BLM 2008a).

3.8.5 Environmental Consequences

36 CFR 800.5(a)(1) details the process by which adverse effects to historic properties are assessed. “An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.” Examples of adverse effects to historic properties include, but are not limited to:

- Physical destruction or damage to all or part of the property;
- Alteration of a property that is not consistent with the Secretary of Interior’s Standards for the Treatment of Historic Properties;
- Removal of the property from its historic location;
- Change of the character of the property’s use or of physical features within the property’s setting that contribute to its historic significance;
- Neglect that causes deterioration; and
- Transfer, lease, or sale of a property out of federal ownership or control.

A finding of “no adverse effect” may be determined when the effects of the undertaking do not meet the criteria set forth in 36 CFR 800.5(a)(1).

3.8.5.1 Proposed Action

A total of five previously recorded cultural resources were identified within the proposed new disturbance area. All five sites have been determined not eligible for the NRHP. Consequently, no further cultural resource consideration is required for these resources.

Treatment protocols for mitigation of adverse effects to the Cortez Mining District posed by the currently authorized Cortez Hills Expansion Project previously were developed (Summit Envirosolutions, Inc. 2008). With the exception of the construction of a kiosk for the historic Town of Cortez, these mitigation protocols already have been completed. With implementation of the previously identified treatment

measures, potential impacts to the Cortez Mining District that may result from the Proposed Action would be sufficiently mitigated.

The Proposed Action has the potential to directly impact currently unknown subsurface cultural resources during construction activities related to the proposed facility modifications. As provided in the 2005 PA and per the applicant-committed environmental protection measures (Section 2.2.7.6), if previously undocumented cultural resources are discovered during construction activities, all ground-disturbing activities would be halted in the area of the discovery, and the BLM Authorized Officer would be contacted to evaluate the finding. If the site is eligible to the NRHP, impacts would be mitigated through avoidance or an appropriate treatment plan developed pursuant to the 2005 PA. Construction would not resume in the area of the discovery until the BLM Authorized Officer has issued a notice to proceed.

Per the 2005 PA, if construction or other project personnel discover what may be human remains, funerary objects, or items of cultural patrimony, construction would cease within 300 feet of the discovery, and the BLM Authorized Officer would be notified of the find. Any discovered Native American human remains, funerary objects, or items of cultural patrimony would be handled in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA) and procedures detailed in the PA. Non-Native American human remains would be handled in accordance with Nevada law and the PA. Construction would not resume in the area of the discovery until the BLM Authorized Officer has issued a notice to proceed.

The Proposed Action has the potential to adversely affect the viewshed of NRHP-eligible resources within the indirect APE (as defined in Section 3.8.3) for which integrity of feeling, setting, and association are integral to the resource's eligibility for inclusion on the NRHP. Two historic properties within the indirect APE potentially adversely affected by the Proposed Action were identified. These include Shoshone Wells and Mount Tenabo. Mount Tenabo is part of the Cortez Mining District, which also encompasses the pediment west of Mount Tenabo, Mill Canyon, the south extension of the Cortez Mountains, and a portion of the CGM Operations Area (BLM 2008a).

The crest of the Cortez Mountains and Toiyabe Range forms a visual barrier to the east and south of the proposed modifications in the CGM Operations Area, and currently authorized facilities in the CGM Operations Area either would hinder or obstruct visibility of proposed project facilities from Crescent Valley. As discussed in Section 3.15.2.1, views from Shoshone Wells are dominated by currently authorized project facilities, and it is unlikely that any of the elements of the Proposed Action would be visible from this viewpoint because of screening by existing terrain. Also as discussed in Section 3.15.2.1, the visual character of the proposed facility modifications would be very similar to existing project facilities, and the scale of the proposed modifications would be relatively small in the context of existing authorized facilities. Consequently, the visual effects of the Proposed Action as viewed from Mount Tenabo (which is encompassed by the NRHP-eligible Cortez Mining District) would be minor and likely would not be noticed by the casual observer. As discussed above, potential impacts to the Cortez Mining District that may result from the Proposed Action would be sufficiently mitigated with implementation of the previously identified treatment measures. Therefore, the Proposed Action would not appreciably contribute to changes in the viewshed of historic properties in the indirect APE that are eligible for inclusion on the NRHP through integrity of feeling, setting, and association.

3.8.5.2 No Action Alternative

Under the No Action Alternative, existing operations and reclamation activities within the CGM Operations Area would continue under the terms of existing permits and approvals as authorized by the BLM and State of Nevada. The proposed facilities modifications as described for the Proposed Action would not be constructed, and the associated potential impacts would not occur. Consequently, there would be no direct adverse effects to historic properties beyond those that may currently exist.

3.8.6 Cumulative Impacts

Under the Proposed Action, potential effects to historic properties would be handled in accordance with the procedures for treatment of historic properties as outlined in the 2005 PA. Therefore, it is not anticipated that the Proposed Action would substantially contribute to cumulative impacts to historic properties.

The proposed facilities modifications would be located in an area heavily impacted by past and currently authorized mining and exploration. The assessment of effects to historic properties eligible for inclusion on the NRHP for their integrity of setting, feeling, and association concluded that the Proposed Action would not appreciably contribute to changes to the viewshed of applicable properties (see Section 3.8.5.1). Consequently, the Proposed Action would not substantially contribute to cumulative adverse effects to historic properties within the cumulative effects study area that are eligible for inclusion on the NRHP for their integrity of setting, feeling, and association.

3.8.7 Monitoring and Mitigation Measures and Residual Adverse Effects

No additional monitoring or mitigation measures are recommended for cultural resources.

Adverse effects to known historic properties previously have been mitigated, and adverse effects to unknown historic properties that may be discovered during construction activities would be handled in accordance with the 2005 PA. Consequently, no residual adverse effects to historic properties are anticipated.

3.9 Native American Cultural Concerns

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new or previously unauthorized disturbance are the proposed construction of the facilities modifications (see **Figure 2-2**).

The 581 acres of proposed new disturbance comprise the project study area for direct and indirect effects to Native American cultural concerns. The cumulative effects study area encompasses recent hard-rock mines in north-central Nevada plus other industrial developments (e.g., large transmission lines), activities, and events (e.g., wildfires) within the Western Shoshone's traditional homeland in relative proximity to the CGM Operations Area boundary as shown in Figure 3.9-2 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

3.9.1 Affected Environment

3.9.1.1 Regulatory Framework

Federal law and agency guidance requires that BLM consult with Native American tribes to identify cultural values and traditional practices of Native American people that may be affected by federal undertakings on BLM-administered lands. This consultation includes the identification of physical locations on the landscape of traditional cultural importance to Native American tribes. Such places include, but are not limited to, locations associated with traditional beliefs concerning tribal origins, cultural history, or the nature of the world; locations where religious practitioners perform ceremonial activities, either in the past or the present; ancestral habitation sites; trails; burial sites; and places from which plants, animals, minerals, or waters possessing healing powers or sustaining properties may be obtained.

3.9.1.2 Government-to-Government Consultation

The Advisory Council on Historic Preservation regulations for implementing Section 106 of the NHPA require federal agencies to consult with Native American tribes to make a reasonable and good faith effort to identify historic properties of religious or cultural significance that may be affected by a federal undertaking. In accordance with this requirement, the BLM Mount Lewis Field Office initiated government-to-government consultation for the Proposed Action on December 18, 2014, by sending letters that included a summary of the Proposed Action, with an accompanying map, to the following tribes and bands:

- Battle Mountain Band of Western Shoshone
- Duckwater Shoshone Tribe
- Te-Moak Tribe of the Western Shoshone
- Elko Band of Western Shoshone
- Yomba Shoshone Tribe

The letters were sent to inform the tribes and bands of the proposed undertaking and to solicit their participation in identifying potential areas of concern that may be associated with the project area. In a letter dated December 29, 2014, the Duckwater Shoshone Tribe requested a field visit to the location of the Proposed Action, to see the possible affect to cultural, sacred, or biological sites. That field visit was conducted on February 3, 2015. The Duckwater Shoshone Tribe had no concerns at that time. However, a member of the South Fork Band attending the tour expressed concerns regarding how reclamation of the mine's ground disturbance would be conducted upon the mine's closure.

3.9.2 Environmental Consequences

Effects of federal undertakings on properties of religious, traditional, or cultural significance to contemporary Native American groups are given consideration under the provisions of EO 13007, the American Indian Religious Freedom Act, and the NHPA. NHPA allows that “properties of traditional, religious, and cultural importance to an Indian tribe or Native Hawaiian organization may be determined eligible for inclusion on the NRHP.” Section 106 of NHPA requires that federal agencies take into account the effects to historic properties (including those with religious, traditional, or cultural significance) posed by federal undertakings. In addition, under NAGPRA, culturally affiliated Indian tribes and the BLM jointly may develop procedures to be undertaken when Native American human remains are discovered on federal lands.

Standard regulations for implementing Section 106 of NHPA are outlined in 36 CFR 800; however, alternative regulations may be adopted to better fit agency priorities (36 CFR 800.14). One common program alternative is a PA, as discussed in Section 3.8, Cultural Resources.

3.9.2.1 Proposed Action

The Proposed Action would result in new surface disturbance totaling 581 acres. No known cultural resources or places of religious, traditional, or cultural importance have been identified in the proposed disturbance area. However, as discussed in Section 3.9 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), the spiritual and religious experience of certain tribal individuals who visit the top of Mount Tenabo for ceremonial or personal use may be diminished as a result of the increased visual effects on the landscape associated with the development and expansion of mining facilities under the Proposed Action. As noted in the Final EIS, the level of this impact cannot be quantified because the number of people who visit the mountain for spiritual or religious use and the frequency and specific locations of their visits to the area has not been disclosed. The Proposed Action would not result in restrictions on access to the top of Mount Tenabo.

The Proposed Action also includes the potential for discovery of subsurface cultural resources (including sites of tribal importance). Therefore, direct impacts to unanticipated resources of traditional, cultural, or religious importance could occur if encountered during project construction. Per the PA (BLM, SHPO, and CGM 2005), which is currently in the process of being updated as discussed in Section 3.8.1, and applicant-committed environmental protection measures (Section 2.2.7.6), all ground-disturbing activities would be halted in the area of an unanticipated discovery, and the BLM Authorized Officer would be contacted to evaluate the finding. If the resource is eligible for the NRHP, impacts would be mitigated through avoidance or an appropriate data recovery plan developed pursuant to the 2005 PA. Construction would not resume in the area of the discovery until the BLM Authorized Officer has issued a notice to proceed.

Per the 2005 PA, if construction or other project personnel discover what may be human remains, funerary objects, or items of cultural patrimony, construction would cease within 300 feet of the discovery, and the BLM Authorized Officer would be notified of the find. Any discovered Native American human remains, funerary objects, or items of cultural patrimony would be handled in accordance with NAGPRA and the procedures detailed in the 2005 PA. Non-Native American human remains would be handled in accordance with Nevada law and the PA. Construction would not resume in the area of the discovery until the BLM Authorized Officer has issued a notice to proceed.

Formally trained Western Shoshone observers would be provided the opportunity to be present during project-related construction activities (i.e., new surface disturbance) to provide information and/or recommendations to the BLM, and during any data recovery (i.e., archaeological excavations). BCI would select a Native American observer from a list of previously used observers. If the selected Native American observer is not available upon 2 days’ notice, a different observer may be selected. If none are

available within a reasonable period, BCI would document that a reasonable attempt was made to contact the Tribes and obtain an observer (see Section 2.2.7.7).

Implementation of reclamation activities as described in Section 2.2.8 would help reduce the visual effects of the Proposed Action. Additional details regarding visual effects following the completion of mining are presented in Section 3.15, Visual Resources.

3.9.2.2 No Action Alternative

Under the No Action Alternative, existing mining and reclamation activities within the CGM Operations Area would continue under the terms of existing permits and approvals as authorized by the BLM and the State of Nevada. The facilities modifications as described for the Proposed Action would not be constructed, and associated potential impacts would not occur.

No new ground disturbance beyond that previously authorized would occur under this alternative. As a result, there would be no potential impacts to Native American cultural concerns beyond those analyzed in previous NEPA documents for existing operations within the CGM Operations Area.

3.9.3 Cumulative Impacts

The cumulative effects study area for Native American cultural concerns is shown in Figure 3.9-2 in the Cortez Hills Expansion Project Final EIS (BLM 2008a) and encompasses mines and other major actions within the Carlin Trend, Ivanhoe, Crescent Valley, and Tonkin areas. This regional cumulative effects study area and the associated analysis previously were developed by the BLM in response to concerns expressed by Te-Moak Council representatives relative to the effects of historic and ongoing mining activities on tribal resources in the region as discussed in the Final EIS. The list of past and present actions and RFFAs within the Native American cultural concerns regional cumulative effects study area is presented in **Table 3-12**.

No known cultural resources or places of religious or traditional importance to Native American tribes or bands would be directly affected as a result of the Proposed Action. Potential impacts to unanticipated discoveries, including human remains, would be handled in accordance with the 2005 PA. Consequently, the Proposed Action is not expected to substantially contribute to cumulative effects to Native American cultural concerns. However, as discussed in Section 3.9 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), the Western Shoshone believe that areas once unaffected by development and encompassing the Puha (supernatural power) and spirit of their ancestors, have been diminished. The Western Shoshone aboriginal lands in the regional cumulative effects study area, and the resources within, have been, or would be, cumulatively affected by past, present, and reasonably foreseeable development. Tribal relations and coordination does not terminate with the land use decision itself, but rather continues to engage Tribes regarding treatments, mitigation, reclamation, and disposition of artifacts and deposits. The BLM continues to solicit input from local tribal entities. The BLM is continuing to coordinate with the Tribes to identify any other sites or artifacts, or cultural, traditional, and spiritual use resources and activities, that might experience an impact.

Implementation of reclamation activities as described in Section 2.2.8 would help minimize the Proposed Action's contribution to cumulative visual effects. Additional details regarding cumulative visual effects are presented in Section 3.15, Visual Resources.

3.9.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No additional monitoring or mitigation measures are recommended for Native American cultural concerns beyond those identified in the Cortez Hills Expansion Project Final EIS (BLM 2008) and the 2005 PA.

To date, no properties of traditional religious and cultural importance to the tribes or bands have been identified within the study area through previous cultural resources inventory or Native American consultation. Unknown sites of tribal importance that may be discovered during construction activities would be handled in accordance with the 2005 PA. Therefore, no residual adverse effects to Native American cultural concerns are anticipated.

Table 3-12 Past, Present, and Reasonably Foreseeable Actions for Native American Cultural Concerns Cumulative Effects Study Area

Action	Past and Present Total Approved Disturbance (acres)	RFFA Projected Disturbance (acres)	Total Approved/ Projected Disturbance (acres)
Mining Projects			
Atlas Gold Bar	1,320	0	1,320
Black Rock Canyon Mine	117	0	117
Bootstrap Project	1,505	0	1,505
Buckhorn Mine	820	0	820
Carlin Mine	1,385	0	1,385
Clipper Mine	400	0	400
BCI CGM Operations Area	16,119	0	16,119
BCI Horse Canyon	698	0	698
BCI Robertson Mine	285	0	285
Cortez Silver Mining District ¹	92	0	92
Elder Creek Mine	143	0	143
Fox Mine	4	0	4
Gold Quarry Mine/South Operations Area Project	5,750	0	5,750
Goldstrike/Betze Project	4,379		4,379
Greystone Mine	242	0	242
Grey Eagle Project	5	0	5
Hot Springs Sulfur Mine	5	0	5
Ivanhoe Project	342	0	342
Leeville Project	486	0	486
May Mine	1	0	1
Meikle Mine	92	0	92
Mill Canyon	18	0	18
Mud Spring Gulch	10	0	10
Mule Canyon Mine	2,931	0	2,931
Rain/Emigrant Project	383	0	383
South Silicified Project	31	0	31
Utah Mine and Camp	6	0	6
Other Mining Projects ²	104	228	332
Subtotal	37,673	228	37,901
Exploration			
Notices BLM-Battle Mountain Field Office: 118 expired, 8	265	0	265
Plans (7) BLM-Battle Mountain Field Office ³	306	0	306
Notices (10) BLM-Ely Field Office ³	50	0	50

Table 3-12 Past, Present, and Reasonably Foreseeable Actions for Native American Cultural Concerns Cumulative Effects Study Area

Action	Past and Present Total Approved Disturbance (acres)	RFFA Projected Disturbance (acres)	Total Approved/ Projected Disturbance (acres)
Carlin Exploration Project	255	0	255
BCI Cortez Underground Project	5	0	5
BCI HC/CUEP	549	0	549
BCI West Pine Valley	150	0	150
BCI Joint Venture Area	0	600	600
BCI Hilltop Exploration/ Mine	92	0	92
BCI Pipeline/South Pipeline/Gold Acres Exploration Project	50	0	50
BCI Robertson Project	12	0	12
Coral Resources Robertson Mine	22	0	22
Dean Mine	67	0	67
Fire Creek Exploration/Underground Project	50	0	50
Mill Canyon Exploration ⁴	250	0	250
Mud Springs	0	10	10
Robertson Exploration Project ⁵	194	100	294
South Roberts	0	3	3
Toiyabe Mine	20	0	20
Tonkin Springs	21	0	21
Uhalde Lease	100	0	100
Other Mining Exploration ⁶	1,496	6,645	8,141
Subtotal	3,954	7,358	11,312
Utilities/Communities			
SR 306 (100 feet wide)	327	0	327
Gravel Roads (50 feet wide)	1,370	0	1,370
Dirt Roads (30 feet wide)	644	64	708
Power lines in Crescent Valley (30 feet wide)	364	0	364
BCI Fiber Optic Cable (60 feet wide) ⁷	0	53	53
BCI Jeremy's Knob Communications Tower and ROW ⁸	0	0.5	0.5
Falcon to Gonder Transmission Line	2,105	0	2,105
Geothermal Leasing ⁹	0	0	0
Powerlines (60 feet wide)	364	0	364
Towns of Crescent Valley and Beowawe ¹⁰	900	0	900
Other ROWs (Roads, Mining)	134	294	428
Other Utilities (Electric, Communications, Federal Aviation Administration)	10,225	0	10,225
Subtotal	16,433	412	16,845
Other Development and Actions			
BLM Fuels Reduction Projects ¹¹	5,641	0	5,641
Wildfires ¹²	622,311	0	622,311
Recreation ¹³	0	0	0

Table 3-12 Past, Present, and Reasonably Foreseeable Actions for Native American Cultural Concerns Cumulative Effects Study Area

Action	Past and Present Total Approved Disturbance (acres)	RFFA Projected Disturbance (acres)	Total Approved/ Projected Disturbance (acres)
Livestock ¹⁴	10	4,313	4,323
Wildlife	0	0	0
Agriculture Development ¹⁵	9,750	0	9,750
BCI Additional Irrigation Pivots at Dean Ranch	0	640	640
Lodge at Pine Valley ¹⁶	30	0	30
Crescent Valley Water Supply	2	0	2
BCI Cottonwood Infiltration Basins ¹⁷	0	104	104
Subtotal	637,744	5,057	642,801
Total	695,804	13,055	708,859

¹ Historic mining- and exploration-related disturbance first began in 1862, prior to the promulgation of surface land management laws and regulations governing mining activities on public lands (e.g., FLPMA and 40 CFR 3809). Since there were no laws or regulatory programs in place at that time, there were no regulatory or administrative approvals granted. Therefore, the identified disturbance acreage does not include all historic mining-related disturbance in the area.

² Includes projects by McEwen Mining Inc. and Pyramid Lake/Rye Patch Gold Corp.

³ Plans and notices outside of the general Crescent Valley area have not been quantified.

⁴ Barrick has submitted a plan amendment to the Mill Canyon Exploration Project for construction of underground exploration declines, ancillary facilities, and continued surface exploration. There would be no net increase in surface disturbance beyond 250 acres of disturbance authorized in 1993.

⁵ Coral Resources' Robertson Exploration Project boundary is located immediately north of, and partially within, the CGM Operations Area as shown in **Figure 2-7**.

⁶ Includes projects by Barrick Cortez Exploration, NuLegacy Gold, and 777 Minerals Inc.

⁷ ROW would run from the Lodge at Pine Valley to the southeast boundary of the CGM Operations Area. Projected ROW length of approximately 21.8 miles.

⁸ BCI facility located in T28N, R47E, Section 18 SESE just north of the CGM Operations Area; ROW N-092170.

⁹ A programmatic EA was prepared by the BLM in 2002 to facilitate geothermal leasing and exploration in the Shoshone-Eureka Planning Area. The EA provides a framework for the processing of geothermal lease and exploration applications. Any proposed surface disturbing activity would be required to undergo a separate site-specific NEPA analysis before authorization could be granted.

¹⁰ Surface disturbance associated with the towns of Crescent Valley and Beowawe is assumed to be 640 and 160 acres, respectively, with approximately 100 acres of private developed land peripheral to the towns.

¹¹ Inclusive of acreage associated with the Crescent Valley Wildland Urban Interface Fire Defense System, Tonkin Hazardous Fuels Reduction Project, and Red Hills Hazardous Fuels Reduction Project. Of the total acreage, planned prescribed burns would affect up to 2,537 acres of piñon-juniper woodland, and 800 acres of piñon-juniper woodland would be thinned. Also includes future treatment of 900 acres of encroaching piñon-juniper woodland for enhancement of greater sage-grouse habitat in the HC/CUEP PoO (BLM 2014c).

¹² Reflects acreage of vegetation affected by wildland fires from 1998 through 2006 within the vegetation cumulative effects study area. The acreage is inclusive of approximately 27,804 acres of fire-affected piñon-juniper woodland.

¹³ Surface disturbance associated with recreation activities has occurred; however, the acreages have not been quantified.

¹⁴ Surface disturbance associated with existing and proposed livestock water use is assumed to be 0.5 acre per water right. The surface disturbance associated with the livestock RFFAs is based on projected seeding activities (change in vegetation and habitat), 0.5 acre per water development activity, and 43 acres for fencing and cattle guards. Livestock-related activities outside of the Carico Lake Allotment have not been quantified.

¹⁵ Surface disturbance associated with agricultural development is based on the acreage under irrigation and assumes that a change in vegetation and habitat equates to surface disturbance. Acreage values were based on a February 15, 1998, special hydrographic abstract for Hydrographic Basin No. 054 from the NDWR. These values are based on permitted or authorized use of water and may not reflect actual use in a given year.

¹⁶ This facility is located on the JD Ranch Road approximately 4 miles west of SR 278 at the BCI-owned JD Ranch.

¹⁷ Surface disturbance located on private (Barrick owned) land outside of the CGM Operations Area.

Sources: BCI 2014a; BLM 2015, 2014a,c, 2008a.

3.10 Air Quality

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new impacts to air quality include: 1) construction and operation of proposed facilities modifications (**Figure 2-2**), and 2) the overall operations modifications including surface mining rate modifications, backhaul of Arturo Mine oxide (mill- and heap leach-grade) ore through the Goldstrike Mine to the Pipeline Complex for processing, and the lifting of on site location restrictions for refractory ore transport to Goldstrike.

The project study area for air quality encompasses the proposed facilities modifications, the area within 10 kilometers (6.2 miles) of the CGM Operations Area, the proposed transportation route for the backhaul of Arturo Mine oxide ore through the Goldstrike Mine to the Pipeline Complex, and the Goldstrike Mill (relative to emissions associated with the proposed modification to refractory ore shipments). The cumulative effects study area (**Figure 3-8**) encompasses the Crescent Valley, Marys Creek, and Maggie Creek hydrographic basins as defined by the NDWR (2012).

3.10.1 Affected Environment

3.10.1.1 Air Quality

Air quality is defined by the concentration of various pollutants and their interactions in the atmosphere. The relative importance of pollutant concentrations can be determined by comparison with appropriate national and/or state Ambient Air Quality Standards (AAQS). Air pollutant concentrations within the standards generally are not considered to be detrimental to public health and welfare.

National and state AAQS are presented in **Table 3-13**. An area is designated by the U.S. Environmental Protection Agency (USEPA) as being in attainment for a pollutant if ambient concentrations of that pollutant are below the National Ambient Air Quality Standards (NAAQS). An area is not in attainment if violations of NAAQS for that pollutant occur. Areas where insufficient data are available to make an attainment status designation are listed as unclassifiable and are treated as being in attainment for regulatory purposes.

The existing air quality of the project study area is typical of the largely undeveloped regions of the western U.S. For the purposes of statewide regulatory planning, this area has been designated as in attainment for all pollutants that have an AAQS. Current sources of air pollutants in the region include several precious metals mines that are sources for particulate matter with an aerodynamic diameter of 10 microns or less (PM₁₀) and particulate matter with an aerodynamic diameter of 2.5 microns or less (PM_{2.5}).

Mercury and Mercury Emissions

Mercury emissions to the atmosphere come from both background and man-made or anthropogenic sources. Background sources of mercury include natural sources such as naturally enriched soils and volcanoes. There are both global and local anthropogenic sources of mercury. Mercury speciation, deposition, and bioaccumulation are discussed in the Cortez Hills Expansion Project Final EIS (BLM 2008a).

When bound in mineral forms that typically appear in ore (e.g., cinnabar), mercury is a stable compound that remains in solid form. Ore processing has the potential to liberate mercury from these stable minerals by dissolving it in process solutions. Because it has a boiling point of 675 degrees (°) Fahrenheit (F), mercury has the potential to volatilize into a gaseous form when subjected to thermal processes in a recovery and refining circuit.

Table 3-13 National and State of Nevada Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada Standards	National Standards	
		Concentration (µg/m ³)	Primary (µg/m ³)	Secondary (µg/m ³)
Ozone	1-hour	235	NA	NA
	8-hour	157	157	157
Carbon monoxide (CO)	1-hour	40,000	40,000	40,000
CO less than 5,000 feet amsl	8-hour	10,000	10,000	10,000
CO at or greater than 5,000 feet amsl	8-hour	6,670		
Sulfur dioxide (SO ₂)	1-hour	196	196	None
	3-hour	1,300	None	1,300
Nitrogen dioxide (NO ₂)	1-hour	188	188	None
	Annual average	100	100	100
PM ₁₀	24-hour	150	150	150
	Annual average	50	NA	NA
PM _{2.5}	24-hour	35	35	35
	Annual average	15	12	15
Lead	Rolling 3-month average	0.15	0.15	0.15
	Quarterly arithmetic mean	1.5	1.5	1.5
Hydrogen sulfide	1-hour	112	--	--

Note: µg/m³ = micrograms per cubic meter.

Source: NDEP 2014b.

Mercury is not considered a criteria pollutant, and no NAAQS have been established under the Clean Air Act Amendments for mercury. Mercury is included on the federal list of hazardous air pollutants (HAPs), which has been adopted by reference in the Nevada air quality regulations. Nevada air quality regulations (NAC 445B.349) prohibit the “discharge into the atmosphere from any stationary source of any hazardous air pollutant or toxic regulated air pollutant that threatens the health and safety of the general public, as determined by the director.” The USEPA has issued a final rule on National Emissions Standard for HAPs (NESHAPs) for gold mines and gold processing facilities (40 CFR 63 Subpart EEEEEEE). The rule establishes NESHAPs for mercury emissions from gold ore processing facilities. For existing ore pretreatment processes, the emissions limit is no more than 127 pounds of mercury per million tons of ore processed. HAPs are controlled through emissions limits at the source rather than ambient air concentrations. Mercury emissions associated with precious metals operations are regulated and controlled pursuant to the Nevada Mercury Control Program (NAC 445B.3611-3689).

3.10.1.2 Climate and Meteorology

Proposed modifications in the CGM Operations Area would be located on the northern slope of the saddle between Mount Tenabo and the north end of the Toiyabe Range, and in southern Crescent Valley. Elevations in the CGM Operations Area generally range from 5,500 to 6,000 feet amsl. According to the Western Regional Climate Center, the average maximum temperature at the Beowawe University of Nevada Ranch (located approximately 40 miles south of the CGM Operations Area at an elevation of

approximately 6,100 feet amsl), is approximately 87°F in July, and the average minimum temperature is approximately 13°F in January. The average annual precipitation is approximately 10 inches and tends to peak in May (Western Regional Climate Center 2015a).

A wind rose from the Elko Airport is presented in **Figure 3-9**. This station is located approximately 55 miles northeast of the CGM Operations Area at an elevation of approximately 5,200 feet amsl. Wind characteristics in the vicinity of topographic features are often dependent on location of the measurement site relative to high terrain features. Due to the variety of terrain near the CGM Operations Area (i.e., Mount Tenebo with an elevation over 9,000 feet amsl less than a mile to the east), the wind rose in **Figure 3-9** may not be representative of some locations in the vicinity of the CGM Operations Area. It is likely the vicinity is prone to downslope winds off the nearby mountains and has episodes of winds higher than what the Elko wind rose suggest.

3.10.1.3 Greenhouse Gas Emissions and Climate Change

Climate represents the long-term statistical characterization of daily, seasonal, and annual weather conditions such as temperature, relative humidity, precipitation, cloud cover, solar radiation, and wind speed and direction. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. A region's climate is affected by latitude, terrain, and altitude, as well as nearby waterbodies and their currents.

BLM published the final Rapid Ecoregional Assessment (REA) for the Central Basin and Range in June 2013 (Comer et al. 2013). REAs examine climate change and other widespread environmental influences that are affecting western landscapes. REAs look across an ecoregion to more fully understand ecological conditions and trends; natural and human influences; and opportunities for resource conservation, restoration, and development. The REAs provide regional information that can inform local management efforts.

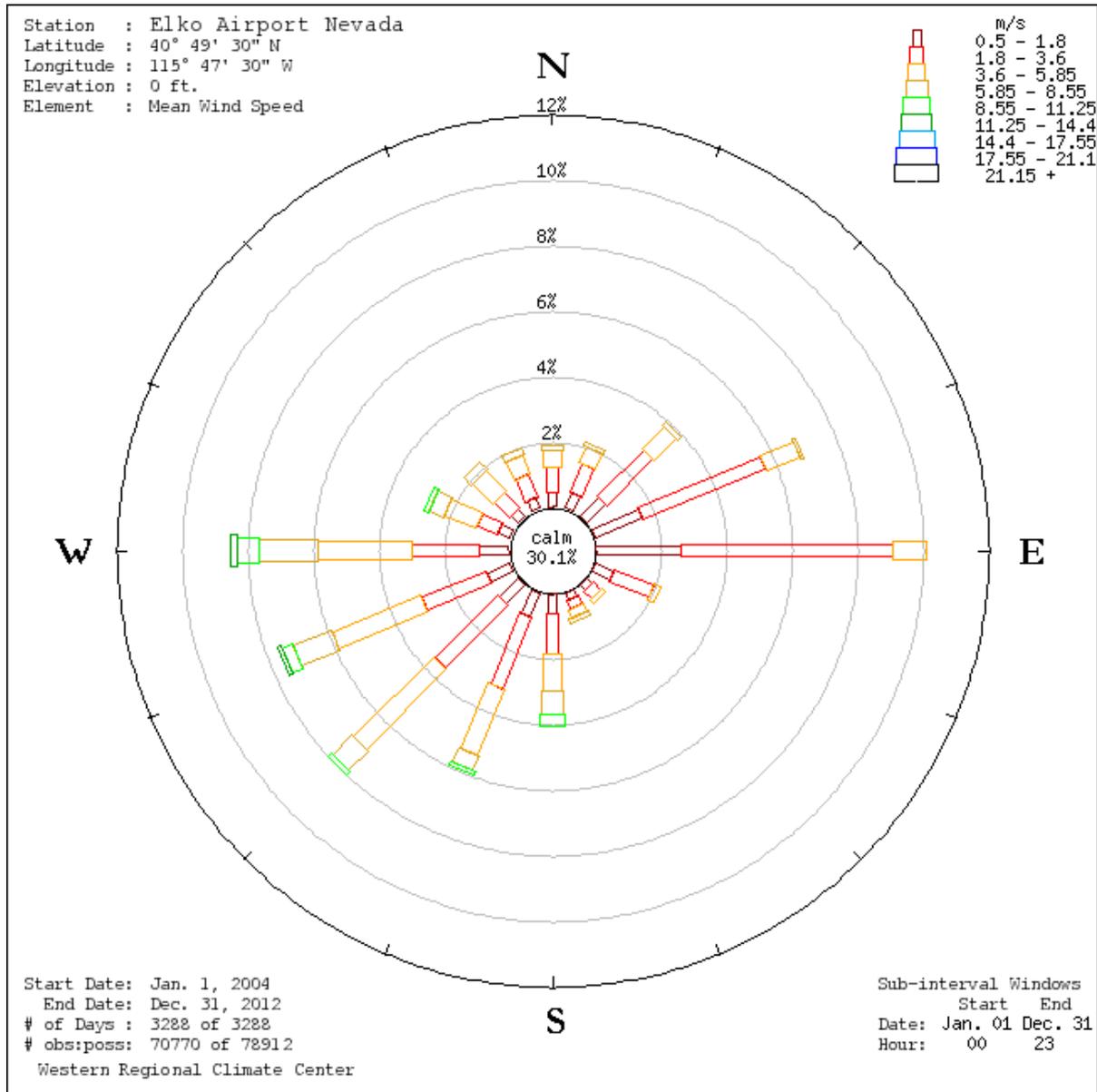
Greenhouse Gases

Greenhouse gases (GHGs) allow short-wave solar radiation to enter the earth's atmosphere but absorb long-wave infrared radiation re-emitted from the earth's surface. GHGs can affect climate patterns, which in turn can affect resource management.

Gases exhibiting GHG properties come from both natural and human sources. Water vapor, carbon dioxide, methane, and nitrous oxide are examples of GHGs that have both natural and man-made sources, while other GHGs (e.g., chlorofluorocarbons) are exclusively man-made.

Sources of GHG emissions in the project study area include wildfires and prescribed burns; vehicles (including off-highway vehicles); construction and operation equipment for mineral, energy, and communications development; and grazing livestock. To the extent that these activities increase, GHGs also are likely to increase and contribute to forecast climate change scenarios which include warmer, more arid conditions across Nevada.

It is difficult to assess the impact on climate due to a particular action with confidence, as downscaled modeling associated with localized climate-changing pollutant emissions and climate change is still in a formative phase. The lack of scientific tools designed to predict climate change on a regional or local scale limits the ability to quantify potential future impacts; therefore, an established methodology does not yet exist to accurately predict the effect of local and regional activities on global climate change.



Source: Western Regional Climate Center 2015b.

Figure 3-9 Wind Rose for Elko Airport, Nevada (2004 – 2012)

Climate Change Trends

Over the past 100 years, the weather, vegetation cover, and wildfire regimes of the Central Basin and Range ecoregion have changed, suggesting a change in the ecoregion's climate. Changes in temperature and precipitation have resulted in changes to vegetation cover and wildfire regimes.

Changes are expressed in species composition, changes in vegetation communities, and increasing quantities of invasive species. Many areas once dominated by sagebrush have piñon-juniper encroachment as well as downy brome (cheatgrass).

Warmer and more arid conditions, coupled with a shorter snow season, have led to limited water supplies and severe drought in parts of Nevada. By 2100, the average temperature in Nevada is predicted to increase by 3 to 4°F in the spring and fall and by 5 to 6°F in the summer and winter. El Niño events are predicted to increase in frequency and duration as a result of global climate change. These temperature changes would affect evaporation and precipitation in the state, likely resulting in the decreased availability of water (National Conference of State Legislatures 2008).

In the Nevada Central Basin and Range ecoregion, climate models suggest there is no strong trend toward either wetter or drier conditions either in the near future (through the 2020s) or in the long term (through the 2050s) (Comer et al. 2013). However, models show substantial increases in maximum monthly temperatures by 2020, primarily in the summer months (July, August, and September). The highest maximum temperature increase projected is 6°F. These increases are predicted to occur mostly in the southern and northeastern edges of the ecoregion. Forecasts for 2060 predict substantial increases in maximum temperature for all months. Similar to forecasts for 2020, the greatest increases are predicted during the summer months and along the southern and northeastern edges of the ecoregion (Comer et al. 2013). Model forecasts for minimum temperatures show a considerable change in both rate and magnitude over most of the study area. July through September showed the greatest degree of change over most of the region.

Data for precipitation suggest no strong trend toward either wetter or drier conditions in any month for the ecoregion. With the exception of a slight increase in summer monsoon rains toward the south and east, there were no significant forecasted trends in precipitation for any other months in either the near-term (2020s) or midcentury (2050s) projections (Comer et al. 2013).

Potential effects of these forecasts on the landscape could include increased fuel loads in higher elevations, increased frequency and duration of droughts, expansion of invasive species in higher elevations, increased wind erosion, and changes in wildfire regimes (Comer et al. 2013). However, the potential effects of the proposed project on climate change are beyond the scope of this EA and are not analyzed further in this EA.

3.10.2 Environmental Consequences

3.10.2.1 Proposed Action

Under the Proposed Action, the proposed facilities modifications within the CGM Operations Area would result in potential emissions of air pollutants during construction, operations, and reclamation. There also would be potential air quality impacts associated with the proposed modification to refractory ore shipments from the CGM Operations Area to the Goldstrike Mill for processing and the backhaul of Arturo Mine oxide ore to the Pipeline Complex for processing. In addition, the proposed modification to the mining rate between the Pipeline and Cortez Hills complexes would result in potential changes to emissions levels. No change in the current life of the operations within the CGM Operations Area or throughput at the Pipeline Mill would occur. Also, no increase in the currently authorized shipping rate, shipping route, or duration of refractory ore shipment to Goldstrike would occur.

Facilities and Overall Operations Modifications in the CGM Operations Area

Dispersion modeling of potential air quality impacts associated with the proposed facilities modifications and overall operations modifications (including the proposed modification to the surface mining rate) within the CGM Operations Area was conducted by Air Sciences Inc. (2014a). Fugitive emission sources, process emission sources, and other emissions sources (e.g., backup generators) were included in the analysis. Modeling was conducted for two scenarios that reflect the proposed total surface mining rate of 580,000 tpd (**Table 2-2**), including: 1) a mining rate of 540,000 tpd from the Cortez Hills Pit and 2) 540,000 tpd from the Pipeline pit complex. Both scenarios also included a mining rate of 40,000 tpd from the Cortez Pit and 8,600 tpd from existing underground operations. **Table 3-14** presents a comparison of the maximum modeled impacts from Air Sciences Inc. (2014a) to the national and state AAQS. Based on the model results, it is not anticipated that the proposed modifications in the CGM Operations Area would cause or contribute to a violation of the national or state AAQS for CO, SO₂, NO₂, PM₁₀, or PM_{2.5}.

Table 3-14 Modeled Impacts Associated with Modifications in the CGM Operations Area

Pollutant	Averaging Period	Modeled Impact (µg/m ³)	Background Concentration (µg/m ³)	Total Impact (µg/m ³)	NAAQS (µg/m ³)	Nevada AAQS (µg/m ³)
CO	1-hour	4,606 ¹	0 ²	4,606	40,000	40,000
CO (less than 5,000 feet amsl)	8-hour	810.1 ¹	0 ²	810.1	10,000	10,000
CO (greater than 5,000 feet amsl)	8-hour	810.1 ¹	0 ²	810.1		6,670
SO ₂	1-hour	2.5 ³	0	2.5	196	196
	3-hour	1.4 ¹	0	1.4	1,300	1,300
NO ₂	1-hour	170.8 ⁴	0 ²	170.8	188	188
	Annual	34.7	0 ²	34.7	100	100
PM ₁₀	24-hour	69.2 ¹	10.2	79.4	150	150
PM _{2.5}	24-hour	14.6 ⁵	7	21.6	35	35
	Annual	3.5	2.4	5.9	12	15

¹ Highest-second-high modeled concentration.

² NDEP, Bureau of Air Pollution Control recommends assuming zero background for CO, SO₂, and NO₂.

³ Highest-fourth-high modeled concentration.

⁴ Highest-eighth-high daily maximum 1-hour modeled concentration.

⁵ Highest-first modeled concentrations.

Source: Air Sciences Inc. 2014a.

HAPs emissions (including mercury) for operations in the CGM Operations Area previously were analyzed in the Cortez Hills Expansion Project Final EIS (BLM 2008a). Based on that analysis, total HAP emissions for operations in the CGM Operations Area was calculated to be 15.8 tpy, which is less than the major source limit of 25 tpy. Based on the proposed reduction in the surface mining rate, HAPs emissions associated with mine operations are not expected to increase. Potential additional emissions

associated with the proposed 581-acre increase in disturbance area would not be likely to cause HAPs emissions to increase above the major source limit of 25 tpy.

Under the Proposed Action, GHG emissions are not expected to increase over existing levels for the same reasons discussed above for HAPs.

Under the Proposed Action, oxide ore from the Arturo mine would displace a portion of the currently authorized throughput at the Pipeline Mill. Mercury emissions (particulate, gaseous elemental, and gaseous reactive) and potential impacts associated with mercury deposition as a result of currently authorized operations in the CGM Operations Area previously were analyzed in the Cortez Hills Expansion Project Final EIS (2008a). As discussed in that document, material handling; primary, secondary, and tertiary crushing; conveying; and stacking are potential emission sources of particulate mercury. Controls currently are, and would continue to be, applied to each of the processes to reduce overall particulate emissions (including mercury). Thermal sources of mercury emissions (gaseous elemental and gaseous reactive) associated with the refining process at the Pipeline Mill include the refining furnaces, carbon kilns, retort, and electrowinning cells (BLM 2008a). Mercury emissions from thermal sources currently are, and would continue to be, controlled as described in the Cortez Hills Expansion Project Final EIS (BLM 2008a). As discussed in Section 2.2.3.3 of this EA, Arturo Mine oxide ore would be sampled to ensure that only ore suitable for mill or heap leach processing would be backhauled to the Pipeline Complex. In addition, the average mercury content of Arturo oxide ore is approximately 2.3 ppm (BCI 2015c), which is lower than the average 14.0 ppm of mercury in the ore currently processed at the Pipeline Mill (CGM 2006a). Based on ongoing implementation of emission controls at the Pipeline Mill, the sampling of Arturo oxide ore prior to shipment to the site, and the average mercury content of the Arturo oxide ore, mercury emissions and potential impacts associated with mercury deposition as a result of the Proposed Action would not be anticipated to increase.

Backhaul of Arturo Oxide Ore

Following the currently authorized delivery of 1.2 million tpy of refractory ore from the CGM Operations Area to the Goldstrike Mill for processing, BCI proposes to backhaul oxide (mill- and heap leach-grade) ore from the Arturo Mine (located approximately 7 miles from the Goldstrike Mine) at a rate of up to 600,000 tpy through the Goldstrike Mine to the Pipeline Complex. Enviroscientists, Inc. (2014) analyzed the total potential truck emissions associated with the round-trip truck traffic. The estimated total annual emissions for applicable criteria pollutants are presented in **Table 3-15**. Due to the travel distance involved, and because the modeled concentrations for operations in the CGM Operations Area as shown in **Table 3-14** are well below the national and state AAQS (with the exception of NO₂), it would be unlikely that the addition of transport-related emissions from fugitive dust from paved and unpaved roads and haul truck tailpipe emissions would result in a violation of the national or state AAQS for CO, SO₂, or PM₁₀. As shown in **Table 3-14**, the estimated NO₂ impacts are approaching the national and state AAQS. The additional oxides of nitrogen emissions associated with the ore transport as shown in **Table 3-15** are estimated to be approximately 60 tpy. This is an increase of approximately 2.2 percent. These additional emissions would be spread over many miles; therefore, it is unlikely to notably increase the maximum NO₂ modeled impacts at the CGM Operations Area.

Table 3-15 Total Potential Truck Traffic Emissions

Pollutant Emissions (tpy)				
PM ₁₀	PM _{2.5}	CO	SO ₂	Oxides of Nitrogen
114.13	20.66	13.04	0.12	59.05

Source: Enviroscientists, Inc. 2014.

Annual GHG emissions associated with the round-trip truck traffic for ore transport as estimated by Enviroscientists, Inc. (2014) are presented in **Table 3-16**. Total CO₂ equivalent (CO₂e) emissions were estimated to be 17,479 metric tons, assuming global warming potentials of 25 and 298 for methane and nitrous oxides, respectively.

Table 3-16 Estimated Total Annual GHG Emissions Associated with Truck Transport

GHG	Global Warming Potential	Emissions (tpy)	CO ₂ e (metric tons)
CO ₂	1	17,470	17,479
Methane	25	0.24	
Nitrous oxide	298	0.012	

Source: Enviroscientists, Inc. 2014.

Refractory Ore Shipment Modification

Under the Proposed Action, refractory ore would continue to be shipped at a rate of up to 1.2 million tpy through 2031 for processing at the Goldstrike Mill as currently authorized; however, the on site restrictions would be eliminated to provide for transport and processing of up to 1.2 million tpy from any refractory ore stockpile in the CGM Operations Area. As per current operations, refractory ore from the CGM Operations Area would continue to temporarily displace a portion of the throughput at the Goldstrike Mill.

Air Sciences Inc. (2014b) analyzed the potential impacts of PM_{2.5}, PM₁₀, CO, NO₂, SO₂, HAPs (including mercury), and GHGs as a result of the proposed modification of the refractory ore shipment. The PM_{2.5} analysis conservatively estimated the emissions associated with the processing of approximately 1.8 million tpy (approximately 600,000 tons more than under the Proposed Action) of refractory ore through either the roasters (an assumed 993,000 tpy) or autoclaves (an assumed 801,000 tpy) at Goldstrike, with the ore from the CGM Operations Area displacing a portion of the roaster and autoclave throughput. A PM_{2.5} emissions inventory developed by Air Sciences Inc. (2014b) using USEPA AP-42 emission factors and site-specific operational data provided the basis for the evaluation, with the estimate of emissions and impacts made based on the amount of refractory ore from the CGM Operations Area processed at Goldstrike relative to the total ore processed. The estimated total 24-hour and annual PM_{2.5} impacts attributable to the CGM Operations Area refractory ore processing was 0.98 and 0.63 µg/m³, respectively (Air Sciences Inc. 2014b). Based on this conservative analysis, the proposed processing of up to 1.2 million tpy from any refractory ore stockpile in the CGM Operations Area would not be anticipated to cause or contribute to a violation of PM_{2.5} NAAQS.

Air Sciences Inc. (2014b) estimated the PM₁₀, CO, NO₂, and SO₂ emissions and impacts based on the processing of 1.2 million tpy of refractory ore from the CGM Operations Area at the Goldstrike Mill, which based on the total ore processed at Goldstrike would comprise approximately 14.5 percent of the throughput. The emissions analysis in the Betze Pit Expansion Project Draft SEIS (BLM 2008g) provided the estimated PM₁₀, CO, NO₂, and SO₂ and emissions from Goldstrike. As 1-hour NO₂ and SO₂ standards were not previously modeled, Air Sciences Inc. (2014b) estimated these impacts using conservative SCREEN3 ratios. Based on the analysis, the PM₁₀, CO, SO₂, and NO₂ NAAQS would continue to be met in the vicinity of the Goldstrike Mine under the Proposed Action.

As discussed in the Betze Pit Expansion Project Draft SEIS (BLM 2008g), total HAP emissions from mining and processing operations at Goldstrike per the 2006 emissions inventory were estimated at 7.96 tpy. Based on the processing of 1.2 million tpy of refractory ore from the CGM Operations Area at the Goldstrike Mill, Air Sciences Inc. (2014b) estimated that the processing of the ore conservatively

would contribute approximately 14.5 percent of the total HAP emissions (or 1.16 tpy). The combined HAP emissions at Goldstrike would continue to remain well below the major source limit of 25 tpy.

For the mercury analysis, the projected mercury emissions from processing of CGM Operations Area refractory ore at the Goldstrike Mill was estimated based on recent stack test results and the most recent hours of operations data. Consistent with the PM_{2.5} emissions analysis, Air Sciences Inc. (2014b) estimated the mercury emissions associated with the processing of approximately 1.8 million tpy of CGM Operations Area refractory ore (approximately 600,000 tons more than under the Proposed Action) through either the roasters or autoclaves. Of the 349 pounds per year of total mercury emissions at Goldstrike from roaster and autoclave processing, an estimated 63.1 pounds per year would be attributable to the processing of CGM Operations Area refractory ore (Air Sciences Inc. 2014b). Based on the NESHAPS rule (40 CFR 63 Subpart EEEEEEE), the mercury emissions limits associated with processing 1.2 million tons of ore (per the Proposed Action) would be approximately 152.4 pounds. Based on the conservative analysis by Air Sciences Inc., it is not anticipated that this mercury emissions limit would be exceeded.

For estimating potential annual GHG contributions, Air Sciences Inc. (2014b) conservatively estimated the emissions associated with the processing of approximately 1.8 million tpy (approximately 600,000 tons more than under the Proposed Action) of refractory ore. Based on the evaluation, the processing of refractory ore from the CGM Operations Area, which temporarily would displace a portion of the current Goldstrike throughput, would contribute an estimated 66,142 tpy of GHGs. As the evaluation conservatively assumed the processing of 1.8 million tpy of refractory ore from the CGM Operations Area, it is assumed the GHG emissions associated with processing of up to 1.2 million tpy from any refractory ore stockpile in the CGM Operations Area would be less than reported by Air Sciences Inc. (2014b).

The assessment of climate-changing pollutant emissions and climate change is in its formative phase; therefore, it is not yet possible to assess with confidence the net impact of GHG emissions to climate. The lack of scientific tools designed to predict climate change on a regional or local scale limits the ability to quantify potential future impacts; therefore, an established methodology does not yet exist to accurately predict the effect of these local and regional activities on global climate change and is beyond the scope of this analysis.

3.10.2.2 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities within the CGM Operations Area, as well as the ongoing refractory ore shipments to the Goldstrike Mill for processing, would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. Proposed modifications as described for the Proposed Action would not be implemented, and associated impacts would not occur.

3.10.3 Cumulative Impacts

Under the Proposed Action, cumulative air quality impacts in the vicinity of the proposed project modifications would be minimal as the proposed project sources would not be anticipated to cause the air quality in the region to degrade below national or state AAQS. Also, the Proposed Action is not anticipated to change current mercury emissions; therefore, it would not contribute to cumulative mercury emissions.

Past and present actions and RFFAs within the cumulative effects study area may generate GHGs, while other activities such as managing vegetation to favor perennial grasses and increased vegetative cover may sequester carbon, functioning as carbon sinks. It is anticipated that the contribution to cumulative GHG emissions as a result of the Proposed Action would be minor.

3.10.4 Monitoring and Mitigation Measures and Residual Adverse Effects

It is assumed that the current meteorological monitoring programs at the mine would continue. No additional monitoring or mitigation measures are recommended, since annual mercury emissions would not change, and the air quality analysis indicates that there would be no exceedance of the national or state AAQS as a result of the Proposed Action.

There would be no residual adverse impacts to air quality from the proposed project modifications since reclamation and revegetation would stabilize exposed soil and control fugitive dust emissions. As vegetation becomes established, particulate levels should return to what is typical for a dry desert environment. Once the disturbance ceases and wind erodible surfaces are reclaimed, the resource would return to approximately its premining condition. Also, emissions related to the processing operations and ore transport would cease following the completion of mining.

3.11 Land Use and Access

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new or extended land use or access impacts include: 1) construction and operation of proposed facility modifications (see **Figure 2-2**); 2) the increased transport of fuels, oils, lubricants, and other materials to the site; and 3) the backhaul of up to 600,000 tpy of oxide (mill- and heap leach-grade) ore from the Arturo Mine through the Goldstrike Mine to the Pipeline Complex for processing.

Land use and access effects for the study area and vicinity were analyzed for the currently approved facilities and operations in prior NEPA documents (BLM 2014a, 2008a, 2004, 2000) as discussed in the introduction of Chapter 3.0. The land use and access analyses from those documents are incorporated here by reference.

Analysis areas for land use and access are based on the anticipated potential extent of effects from the proposed project. For land use, the project study area includes the proposed modifications at the Pipeline and Cortez Hills complexes and the area within approximately 2 miles of the CGM Operations Area boundary. The project study area for access encompasses the CGM Operations Area boundary and the primary access roads between the project area and the Goldstrike Mine (SRs 306 and 766 and I-80). The cumulative effects study area for both land use and access encompasses the past and present actions and RFFAs within a 30-mile radius of the CGM Operations Area, as shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), and for access, the primary access roads between the project study area and the Goldstrike Mine.

3.11.1 Affected Environment

3.11.1.1 Land Use

The proposed facility modifications would be located on BLM-administered land under the jurisdiction of the BLM Shoshone-Eureka Resource Management Plan (BLM 1986c). The area also is covered by several Lander County plans and regulations, including the Policy Plan for Federally Administered Lands (Lander County 2005), the Lander County Master Plan (Lander County 2010), and Lander County Zoning Regulations (Lander County 2013).

The ROD for the Shoshone-Eureka Resource Management Plan (BLM 1986d) provides that the public lands will be open for mining and prospecting unless withdrawn or restricted from mineral entry (see Section 1.2, Relationship to BLM and Non-BLM Policies, Plans, and Programs in the Cortez Hills Expansion Project Final EIS [BLM 2008a]). No such withdrawals or restrictions occur within the CGM Operations Area.

The Lander County 2005 Policy Plan for Federally Administered Lands (Lander County 2005) emphasizes the county's support for, and dependence on, mineral resources development. Specifically, Policy 13-1 states: "Retain existing mining areas and promote the expansion of mining operations and areas". Policy 13-6 recommends that existing reclamation standards should be enforced and should be consistent with the "best possible post mine use for each specific area."

The CGM Operations Area is zoned A-3, Farm and Ranch District, under Lander County's zoning code (Lander County 2013). The A-3 zone requires the proponent of a mining project to obtain a Special Use Permit from the County Planning Commission (Little 2011; Teske 2006); however, county zoning is not controlling on public lands. The Lander County Master Plan (Lander County 2010) is policy-oriented and general in nature, focusing primarily on the areas in and around the county's three major communities. The plan is only generally applicable to the project study area.

Mining and ranching constitute the dominant land uses in the study area. Livestock grazing is an established use in the area surrounding the project study area, particularly in Grass Valley and in some foothills areas (see Section 3.6, Range Resources). The project study area crosses parts of the Carico Lake, Grass Valley, and South Buckhorn grazing allotments. No prime or unique farmlands occur in the project study area. There are no Indian Reservations in the project study area; Native American cultural concerns are discussed in Section 3.9.

Existing ROWs and other land use authorizations in the project study area were summarized in Table 3.11-1 and shown in Figure 3.11-1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

3.11.1.2 Access

The CGM Operations Area is served by a sparse network of roadways typical of rural Nevada. I-80 is the primary east-west traffic artery across northern Nevada, connecting northern Lander County with Reno, Nevada, to the west and Elko, Nevada, and Salt Lake City, Utah, to the east. I-80 is approximately 35 miles north of the CGM Operations Area and is a major segment on the transport route between the CGM area and the existing Goldstrike Mine.

SR 306 provides access from I-80 through Beowawe and the Town of Crescent Valley to the CGM Operations Area. SR 306 is a paved, two-lane highway designated by Nevada Department of Transportation (NDOT) as a “rural major collector” north of Crescent Valley and a “rural minor collector” south of Crescent Valley (NDOT 2003, 2014c). SR 306 ends in the northwest quadrant of the CGM Operations Area, at the existing CGM headquarters parking area. Traffic volumes on SR 306 in 2013 averaged 1,800 vehicles per day (vpd) just south of I-80 and 600 vpd south of Crescent Valley (NDOT 2014b). These volumes were 50.6 percent and 1.7 percent, respectively, above the 10-year averages for the two road sections, but at or below the peak year levels. Existing traffic conditions on SR 306 are at level of service (LOS) A. Peak hour traffic volumes are estimated at less than 10 percent of hourly roadway capacity.

SR 766 is the main access to the Goldstrike Mine, intersecting I-80 at exit 280 in Carlin. SR 766 is a paved, two-lane highway designated by NDOT as a “rural major collector” (NDOT 2004). Traffic averaged 2,300 vpd north of I-80, which was 6.1 percent below the 10-year average (NDOT 2014a). Existing traffic conditions on SR 766 are at LOS B, just slightly below LOS A. Peak hour traffic volumes are estimated at approximately 15 percent of hourly capacity.

I-80 is a high quality, interstate class, 4-lane divided freeway. Traffic volumes in 2013 averaged 7,000 vpd west of the Beowawe interchange (exit 261) and 7,600 vpd east of the west Carlin interchange (exit 279) (NDOT 2014d). The Beowawe volume was approximately 1.1 percent above the 10-year average for the location and the Carlin volume was approximately 6.2 percent above the 10-year average for that location. Both numbers were well below the capacity for I-80, which is rated LOS A throughout the project study area.

3.11.2 Environmental Consequences

3.11.2.1 Proposed Action

The proposed project modifications would occur within the CGM Operations Area boundary, except for proposed backhauling of Arturo oxide ore and increased truck traffic associated with transport of additional fuels, lubricants and related materials, both of which would occur in the same highway corridor as the previously authorized ongoing shipment of CGM refractory ore to Goldstrike and the ongoing delivery of fuel and supplies.

Most of the proposed facility modifications at the CGM Operations Area would occur within previously authorized disturbance areas and would involve currently authorized construction, operations, and

reclamation activities. The elements of the Proposed Action that potentially would result in new land use or access impacts are presented in Section 2.2, Proposed Action, and shown in **Table 2-1** and **Figure 2-2**.

Land Use

The Proposed Action would result in approximately 581 acres of new surface disturbance (see **Table 2-1** and **Figure 2-2**). All of the proposed new surface disturbance would occur within the existing CGM Operations Area boundary and within the perimeter of the Carico Lake grazing allotment. The proposed 581 acres of new disturbance would reduce the acreage of available rangeland within the 53,098-acre Carico Lake Allotment during the life of the mine by approximately 0.6 percent. Disturbance associated with the proposed Gap Pit modification and post-mining water management features (approximately 149 of the 581 acres of new disturbance) would result in the permanent reduction of rangeland in this allotment by approximately 0.2 percent, as these disturbance areas would not be reclaimed. See Section 3.6, Range Resources, for additional information on grazing effects.

The Proposed Action would be consistent with applicable land use plans for the area. The Proposed Action would not conflict with any existing ROWs, other land use authorizations, or other established land uses in the vicinity.

Access

The Proposed Action would have no measurable effect on public access in the vicinity of the CGM Operations Area. Backhaul trucking of approximately 600,000 tpy of oxide ore from Arturo Mine through the Goldstrike Mine to the Pipeline Complex would occur on SR 766, I-80, and SR 306 (see **Figure 2-5**). However, no new truck trips would occur on these roads as a result of the backhauling as the trucks are currently returning empty along the same route after hauling refractory ore to Goldstrike from the CGM Operations Area. Consequently, the backhauling of Arturo oxide ore would not affect access or transportation along the access route.

The Proposed Action would require delivery of additional fuels, lubricants, and other supplies to the CGM Operations Area as noted in **Table 2-3**. These deliveries would require an estimated 502 truckloads per month for the life of the mine, plus an estimated 42 additional truckloads during the approximately 3-year development of the RFDs. Accounting for return trips, the total traffic generated would average approximately 36 new truck trips per day in the short term and slightly over 33 new truck trips per day over the remaining life of the mine. At the 36 trips per day level, the increase in traffic would represent approximately 0.5 percent of 2013 traffic levels on I-80 and approximately 6.0 percent of 2013 traffic levels on SR 306. It is assumed that most of these deliveries would occur during the day, which would generate up to approximately 4 to 5 additional truck trips per hour.

Although additional heavy truck traffic would result in some delays for other traffic on the state highway segments where passing is prohibited, existing traffic is light enough that the adverse effects on traffic flows would likely be minor. The proposed project-related increase in traffic would not be sufficient to degrade traffic levels of service below the existing LOS A on SR 306 or I-80.

Highway safety is partially a function of traffic levels. It could be assumed that adding a small amount of additional traffic would increase the risk of accidents on the transport route, although the increased risk would likely be very small, as would any increase in the number of related vehicle accidents.

3.11.2.2 No Action Alternative

Under the No Action Alternative, the proposed activities would not occur, and existing mining and processing operations and reclamation activities within the CGM Operations would continue under the terms of current permit approvals as authorized by the BLM and State of Nevada. As a result, land use

and access considerations would continue in their current condition. No changes in use of lands or access and traffic conditions would be expected.

3.11.3 Cumulative Impacts

Land Use

Past and present actions and RFFAs have resulted, or would result, in approximately 139,497 acres of disturbance. The Proposed Action incrementally would increase surface disturbance in the cumulative effects study area by approximately 581 additional acres, resulting in an overall cumulative disturbance of approximately 140,078 acres. The total cumulative disturbance would be consistent with Lander County and BLM plans, policies, and ordinances.

Access

Traffic flows from past and present actions are included in the existing traffic counts noted in the affected environment discussion. Traffic from the Proposed Action and RFFAs would result in only modest increases in traffic on the highway segments, which would not be expected to reduce the levels of service below the existing LOS A and LOS B.

3.11.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No additional monitoring or mitigation measures are recommended for land use or access effects.

Residual adverse effects to land use would include the permanent loss of forage on approximately 149 acres of rangeland associated with the proposed Gap Pit modification, new storm water diversions at the Pipeline Complex, and other post-mining water management features that would not be reclaimed. No residual adverse effects to access have been identified as traffic would return to pre-mining conditions.

3.12 Recreation

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new or extended recreation impacts include:

1) construction and operation of the proposed facility modifications (see **Figure 2-2**); 2) the increased transport of fuels, oils, lubricants, and other materials to the site; and 3) the backhaul of up to 600,000 tpy of oxide (mill- and heap leach-grade) ore from the Arturo Mine through the Goldstrike Mine to the Pipeline Complex for processing.

Recreation effects for the broader area were analyzed in prior NEPA documents for the site (BLM 2014a, 2008a, 2004, 2000) as discussed in the introduction of Chapter 3.0. The recreation analysis from those documents are incorporated here by reference.

The analysis area for recreation is based on the anticipated potential extent of effects from the proposed project. For recreation, the project study area is limited to the proposed modifications at the Pipeline and Cortez Hills complexes and the area within approximately 2 miles of the CGM Operations Area, plus a 2-mile-wide corridor centered on the transport route from the Goldstrike Mine to the Pipeline Complex. The cumulative effects study area for recreation encompasses an area that generally includes the southern portions of Crescent Valley and the Cortez Mountains and portions of the Shoshone and Toiyabe ranges, plus a corridor within approximately 5 miles of the transport route from Goldstrike to the Pipeline Complex (**Figure 3-8**).

3.12.1 Affected Environment

There are no developed recreation facilities in the CGM Operations Area or its immediate surroundings. The nearest developed BLM facility is more than 30 miles away. Crescent Valley has a park with tennis and basketball courts, a ball field, picnic areas, and a playground. Many current BCI employees live in Elko, Carlin, and Battle Mountain, all of which provide park and recreation facilities for residents.

Dispersed outdoor recreation activities are the main recreation uses of the project study area and vicinity. Public lands in the study area are managed by the BLM and generally are open for dispersed public recreation use, except for mining areas that are fenced off for protection of the public and to prevent interference with mining activities. Uses in and near the CGM Operations Area likely are limited to photography and sightseeing at the nearby old Cortez townsite; hiking and camping; firewood collecting; rockhounding; off-highway-vehicle use; wildlife/wild horse/burro viewing; and hunting for chukar, sage-grouse, and mule deer.

3.12.2 Environmental Consequences

3.12.2.1 Proposed Action

Under the Proposed Action, facility modifications would result in new surface disturbance on 581 acres of land in the CGM Operations Area (see **Table 2-1**), an approximately 3.6 percent increase over the previously authorized disturbance of 16,119 acres. In the context of the large amount of public land available for such recreation in the project vicinity and the region, this amount of disturbance located adjacent to existing facilities and activities in the CGM Operations Area would have minimal, if any, effect on public recreation opportunities. Further, the lands proposed for disturbance are not high quality recreation lands because of their proximity to the ongoing mining operations, and current use of the area for recreation is likely minimal because of the location and the lack of identifiable recreation resources.

No new truck trips would occur on SR 766, I-80, and SR 306 as a result of the proposed backhauling of Arturo oxide ore as the trucks are currently returning empty along the same route after hauling refractory ore to Goldstrike from the CGM Operations Area. Therefore, this activity would have no effect on recreation. The increased number of trucks transporting fuel and supplies to the CGM Operations Area

would represent a modest increase in traffic (see Section 3.11), which would not be expected to measurably affect recreational traffic or activities in the affected corridor.

3.12.2.2 No Action Alternative

Under the No Action Alternative, the proposed activities would not occur. Existing recreation opportunities would continue throughout the project vicinity, which primarily include dispersed recreation activities on the public lands.

3.12.3 Cumulative Impacts

Past and present actions and RFFAs have resulted, or would result, in nearly 23,786 acres of disturbance. The Proposed Action incrementally would increase surface disturbance in the cumulative effects study area by 581 acres (approximately 2 percent increase), resulting in an overall cumulative disturbance of approximately 24,367 acres. The total cumulative acreage is a fraction of the acreage of public land available for recreation in the cumulative effects study area. The assumed reclamation of portions of the past and present actions and RFFAs, and the reclamation of most of the Proposed Action disturbance areas, would reduce cumulative effects on recreation.

3.12.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No monitoring or mitigation measures are recommended for recreation.

Lands disturbed under the Proposed Action would revert to previous open public access and uses upon completion of the proposed project and reclamation of the disturbed areas. Therefore, there would be no residual adverse effects to recreation.

3.13 Social and Economic Values

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new or adjusted social and economic impacts include: 1) construction of proposed new mine infrastructure, water treatment plant, RFDs and associated facilities, and additional surface support facilities to support currently authorized underground operations (see **Figure 2-2**); 2) construction and operation of proposed facility modifications; and 3) the other overall operations modifications (i.e., mining rate modifications for surfacing mining operations, lifting of the on site restriction for refractory ore shipments, and backhaul of Arturo oxide ore) that may change the rate of production of gold. These elements would include purchases of material and supplies, some of which are itemized in **Table 2-3**, and employment of 60 contract workers for a 3-year RFD development period.

Social and economic effects for the study area and vicinity previously were analyzed for the currently approved facilities and operations in prior NEPA documents (BLM 2014a, 2008a, 2004, 2000) as discussed in the introduction of Chapter 3.0. The social and economic values analyses from those documents are incorporated here by reference.

The project study area and cumulative effects study area for social and economic values include portions of Elko, Eureka, and Lander counties, as shown in Figure 3.12-2 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The rationale for the study area is that a majority of the workers employed by BCI at operations in the CGM Operations Area live in the three-county area.

3.13.1 Affected Environment

3.13.1.1 Population

Elko County is the largest of the three counties in the project and cumulative effects study area, and a sizable majority of the workers employed by BCI at the CGM Operations Area live in Elko County, particularly in the Elko-Spring Creek area. **Table 3-17** presents population levels and growth rates for study area counties and major communities from 1980 through 2013. More recent U.S. Census Bureau population estimates are available only at the county level and above. Estimated population levels and annual percent change for 2014 are: 52,766 in Elko County (0.7 percent increase), 2,018 in Eureka County (2.8 percent decrease), 6,009 in Lander County (0.4 percent decrease), and 2,839,099 for the state (1.8 percent increase) (U.S. Census Bureau 2015b).

Table 3-17 Population Characteristics

Area	Population by Year					Average Annual Percent Change			
	1980	1990	2000	2010	2013	1980-1990	1990-2000	2000-2010	2010-2013
Elko City	8,771	14,736	16,708	18,297	20,074	5.3	1.3	0.9	3.1
Spring Creek CDP ¹	2,002	5,866	10,548	12,361	13,607	11.3	6	1.6	3.3
Carlin	1,233	2,220	2,161	2,368	2,411	6.1	-0.3	0.9	0.6
Elko County	17,269	33,530	45,291	48,818	52,384	6.9	3.1	0.8	2.4
Eureka County	1,198	1,550	1,651	1,987	2,076	2.6	0.6	1.9	1.5
Battle Mountain CDP ¹	2,749	3,542	2,871	3,635	3,241	2.6	-2.1	2.4	-3.8
Lander County	4,076	6,266	5,794	5,775	6,032	4.4	-0.8	0	1.5
Nevada	800,493	1,201,833	1,998,257	2,700,551	2,790,136	4.1	5.2	3.1	1.1

¹ CDP - Census Designated Place.

Source: U.S. Census Bureau 2014a, 2011, 2000, 1981.

Ethnically and racially, the project and cumulative effects study area counties are notably less diverse than the state as a whole with substantially fewer black and Asian residents, and somewhat lower percentages of people of Hispanic origin. Eureka County, in particular, is nearly 93 percent non-Hispanic white. The counties do have higher percentages of Native Americans than the state, with Native American populations in Elko, Eureka, and Lander counties of 5.0, 2.3, and 2.0 percent, respectively, compared with 0.9 percent for the entire state. Additional information relative to minority or low income populations is presented in Section 3.14, Environmental Justice.

3.13.1.2 Employment

Employment in the project and cumulative effects study area demonstrates a distinct difference between Elko County and Eureka and Lander counties. Elko County's economy is much more diverse, befitting its role as a trade center for northeast Nevada. Elko County has substantial numbers of workers in services, trade, and government employment. When workers are tabulated by county of residence (rather than county of workplace), Elko County has 13.3 percent working in the natural resources and mining sector, Lander County has 56.1 percent working in the sector, and Eureka County has fully 90.5 percent of its employment coming from natural resources and mining (Nevada Department of Employment, Training, and Rehabilitation [NDETR] 2014a).

As shown in **Table 3-18**, the 2013 average annual unemployment rates for Elko, Eureka, and Lander counties were 5.9, 6.4, and 5.2 percent, respectively, compared with 9.8 percent for the state as a whole (NDETR 2014b). One year later, the rates for Elko and Eureka counties had fallen to 5.2 and 5.6 percent, respectively, but Lander County's rate had risen to 8.3 percent (NDETR 2014c). Total unemployment in the study area averaged 1,882 for 2014. At 5.3 percent of the labor force, this was substantially above historical lows, but much lower than the statewide average (**Table 3-18**). Notably, although the unemployment rate had declined from 2013 to 2014, total employment also was lower, as was the total labor force.

Table 3-18 2013 and 2014 Labor Force, Employment, and Unemployment

Location / Year	Labor Force	Employment	Unemployment	Unemployment Rate (percent)
Elko County				
2013	30,269	28,469	1,800	5.9
2014	29,662	28,111	1,552	5.2
Eureka County				
2013	1,086	1,017	69	6.4
2014	1,064	1,004	60	5.6
Lander County				
2013	4,891	4,636	255	5.2
2014	4,748	4,534	270	5.7
Three-county Total				
2013	36,246	34,122	2,124	5.9
2014	35,474	33,649	1,882	5.3
Nevada				
2013	1,372,996	1,237,860	135,136	9.8
2014	1,394,599	1,286,474	108,125	7.8

Source: NDETR 2014b,c.

3.13.1.3 Other Social and Economic Considerations

Based on the proposed employment of 60 contract workers for a 3-year period, it is unlikely that the proposed project would result in measurable changes to housing demand, public facilities and services, emergency and health care services, or public education. Therefore, these social and economic considerations have been eliminated from further analysis in this EA.

3.13.2 Environmental Consequences

3.13.2.1 Proposed Action

Under the Proposed Action, the construction and operation of the proposed facility modifications, with the exception of the RFDs and associated ancillary facilities, would be conducted using BCI's existing work force. Construction of the proposed RFDs and associated ancillary facilities would entail use of specialty contractors, employing 60 workers for approximately 3 years. To the extent the requisite skill sets are available in the local work force, the Proposed Action likely would utilize existing contractors from within the three-county study area, primarily from Elko County. The required 60 workers would represent just over 3 percent of the 1,882 workers currently unemployed in the three-county study area, so there is an ample supply of workers available if they are qualified for the positions. If most of the new workers currently are residents of the three-county area, they would not measurably affect the population or the demand for housing and community services. In the event most of the required contract workers must be imported in order to obtain the needed skills, 60 workers would represent an increase of less than 0.2 percent of the study area labor force, and it is likely that the resulting population increase would be a slightly smaller percentage of the total study area population. This level of increase in population would have minimal effect on the local housing market or the demand for local public facilities and services.

Under the Proposed Action, payment of wages and benefits to the contract workers and purchase of materials and supplies would total an estimated \$108 million during the 3-year construction period for the proposed RFDs. A substantial portion of the labor expenditures would be spent on rents and goods and services in the local area. The expenditures would be a benefit to the local economy, but would represent a very small percentage of the total economic activity in the local study area during the 3-year construction period. There would be a commensurately small benefit to local public revenues from taxes paid in association with the construction.

Production of an additional 300,000 tons of ore from deepening the Gap Pit and processing 133 million tons of low-grade ore at the Pipeline South Heap Leach Facility likely would increase the public revenue from net proceeds of mine taxes by an estimated \$14.3 million. Increased purchases of fuels, lubricants, Portland cement, and numerous other materials (see **Table 2-3**) would be expected to increase local and state sales tax revenues by approximately \$7.8 million. There also would be an increase in ad valorem property taxes of approximately \$4.7 million over the life of the Proposed Action. The increased public revenues from these sources would total approximately \$26.8 million and would be a beneficial effect of the Proposed Action, primarily for Elko and Lander counties but also more generally for the three-county study area.

Modifications to overall operations likely would have minimal, if any, effect on social and economic issues. These modifications would utilize existing workers. There may be minor economic tradeoffs such as increased efficiencies from increased operational flexibility and slightly higher fuel costs from trucks loaded on the backhaul from the Arturo Mine rather than returning empty. None of these changes would be expected to substantially affect social or economic conditions.

3.13.2.2 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as

authorized by the BLM and State of Nevada. Proposed modifications to facilities and existing operations in the CGM Operations Area, as described for the Proposed Action, would not be implemented, and the associated social and economic effects would not occur.

3.13.3 Cumulative Impacts

The social and economic effects of past and present actions are reflected in the affected environment description in Section 3.13.1. Consequently, any potential cumulative effects are addressed in the discussion of environmental consequences in Section 3.13.2. Anticipated schedules for increases or decreases in employment for the RFFA projects in the cumulative effects study area are not known. However, the anticipated use of existing local workers for the additional employment needed for the Proposed Action indicates a modest positive contribution to economic effects, with minimal to no measurable additional demand for housing or public facilities and services, and minimal effect on cumulative employment and associated impacts. If non-local contract workers are required for the Proposed Action, the 60 workers would represent a minimal short-term incremental increase in the cumulative demand for housing and public facilities and services. Therefore, the Proposed Action would not induce substantial growth or concentration of population, displace a large number of people, cause a substantial reduction in employment, reduce wage and salary earnings, cause a substantial net increase in county expenditures, or create a substantial demand for public services. Whether the contract works are local or non-local, the incremental social and economic effects would be minor in the context of the economy of the three study area counties.

3.13.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No monitoring or mitigation measures are recommended for social and economic values.

There would be no residual adverse effects for social and economic values as a result of the Proposed Action.

3.14 Environmental Justice

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new or extended environmental justice impacts include: 1) construction and operation of the proposed facility modifications (see **Figure 2-2**); 2) the associated increased transport of fuels, oils, lubricants, and other materials to the site; and 3) the proposed other overall operations modifications.

The environmental justice analysis addresses the potential for the proposed project or the no action alternative to adversely affect minority or low income populations to a disproportionate degree, relative to their representation in the larger population. The project study area and cumulative effects study area for environmental justice include portions of Elko, Eureka, and Lander counties, as shown in Figure 3.12-2 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The rationale for the project study area is that a majority of the workers employed by BCI for operations in the CGM Operations Area reside in the three-county area.

3.14.1 Affected Environment

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was issued February 11, 1994 (59 Federal Register 7629). EO 12898 “is intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities’ access to public information on, and an opportunity for participation in, matters relating to human health and the environment.” It requires each federal agency to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, potential disproportionately high and adverse human health or environmental effects, including social and economic effects, of its programs, policies, and activities on minority and low-income populations.

Pursuant to EO 12898, in 1997 the President’s CEQ prepared Environmental Justice: Guidance Under the Environmental Policy Act to assist federal agencies with their NEPA procedures “... so that environmental justice concerns are effectively identified and addressed.” This analysis was conducted with the assistance of the CEQ guidance document.

EO 12898 states that population groups defined as minorities include: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic/Latino origin; or Hispanic/Latino. CEQ guidelines for evaluating potential adverse environmental justice effects indicate minority populations should be identified when either: 1) a minority population exceeds 50 percent of the population of the affected area, or 2) a minority population represents a “meaningfully greater increment” of the affected area population than the population of some appropriate larger geographic unit, as a whole.

Low-income populations are those communities or sets of individuals whose median income is below the current poverty level of the general population. According to the guidance, low-income populations in an affected area should be identified using the annual statistical poverty thresholds from the Bureau of the Census’ Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, federal agencies may consider as a community either a group of individuals living in geographic proximity to one another or a set of individuals (such as migrant workers or Native Americans) where either type of group experiences common conditions of environmental exposure or effect.

3.14.1.1 Minority Population

All three of the study area counties have notably higher percentages of white non-Hispanic residents than the state as a whole. Eureka County is nearly 93 percent white non-Hispanic compared to

53 percent for the state (**Table 3-19**). All three counties have fewer than 1 percent blacks and 1.1 percent or fewer Asians compared to nearly 8 percent for each group statewide. All three counties also have lower percentages of Hispanics than the state. All three counties have higher percentages of American Indian, Eskimo, or Aleut populations than the state; Lander County is the closest with slightly more than double the statewide percentage.

Table 3-19 2013 Race and Ethnicity by County

Race/Ethnicity	Percent of Population			
	Elko County	Eureka County	Lander County	State of Nevada
White Not of Hispanic Origin	68.5	92.9	68.9	53.4
Black Not of Hispanic Origin	0.9	0.6	0.1	7.9
American Indian, Eskimo, or Aleut	5.0	2.3	2.0	0.9
Asian or Pacific Islander Non-Hispanic	1.1	0.3	0.5	7.9
Other and Two or More Races	1.2	0.0	2.7	3.1
Hispanic Origin of Any Race	23.3	3.9	25.8	26.9

Source: U.S. Census Bureau 2015a.

With reference to the CEQ guidance, no racial or ethnic group exceeds 50 percent of the population of any of the project and cumulative effects study area counties. However, the population percentages of American Indians, Eskimo, or Aleut in all three counties would be considered “meaningfully greater” than for the state as a whole, ranging from 2.2 times greater for Lander County to 5.6 times greater for Elko County. Therefore, for the purpose of identifying environmental justice concerns, a minority population, as defined by the guidance, exists in the project study area.

3.14.1.2 Low-income Population

Poverty status is determined by comparing annual household income to poverty thresholds, which vary by family size, number of children, and age of the householder, although not geographically. Poverty thresholds are updated annually, based on changes in the Consumer Price Index. Weighted average poverty thresholds for 2013 ranged from \$11,173 for a single individual 65 years and over to \$48,065 for a household of nine or more people. Census estimates indicate that 15.8 percent of the people in Nevada were in a household with incomes below the poverty level in 2013 (U.S. Census Bureau 2014b).

Mining is the dominant industry in much of the project study area, and mining wages and salaries typically are higher than average for the economy as a whole. As shown in **Table 3-20**, the result of this differential is substantially higher median household incomes in project study area counties than statewide. Nevertheless, there are households in all counties with incomes well below the median. The poverty threshold noted in **Table 3-20** is the weighted average for a 3-person household, which is approximately the average size for the project study area. Official model-based census estimates for 2013 indicate the percentages of both total population and of persons under age 18 in poverty were well below the comparable statewide averages (U.S. Census Bureau 2014b). Consequently, county populations in the project study area are not considered to be low-income according to CEQ guidance for the purposes of EO 12898.

Table 3-20 2013 Household Income and Poverty Levels

State/County	Median Household Income	Poverty Threshold 3-person Household	Population in Poverty (%)	
			Total	Under Age 18
Elko County	\$71,354	\$18,552	9.1	12.2
Eureka County	\$66,592	\$18,552	8.1	9.8
Lander County	\$69,658	\$18,552	9.8	13.2
Nevada	\$51,250	\$18,552	15.8	22.7

Source: U.S. Census Bureau 2014b.

3.14.2 Environmental Consequences

3.14.2.1 Proposed Action

The potential effects of the Proposed Action would not be expected to disproportionately affect any particular population. The area in the immediate vicinity of the proposed facility and operational modifications in the CGM Operations Area is very sparsely populated and does not have an unusually high minority population. Additionally, environmental effects that would occur at a greater distance, such as visual or air quality impacts, would be minor and would affect the population equally, without regard to race or ethnicity. Because there are no identified environmental justice impacts, no monitoring or mitigation is recommended, no residual adverse impacts would occur, and this resource is not carried forward for further analysis.

3.14.2.2 No Action Alternative

Under the No Action Alternative, existing mining-related activities would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. There would be no measurable change to environmental or socioeconomic effects that would be expected to disproportionately affect a particular population.

3.15 Visual Resources

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new or intensified visual impacts include construction and operation of proposed facility modifications at both the Pipeline Complex and the Cortez Hills Complex (see **Figure 2-2**). Features of particular interest for visual effects include expansion of the Pipeline South Area Heap Leach Facility and Gap Waste Rock Facility; reconfiguration and increased heights of the Pipeline/South Pipeline and Canyon waste rock facilities; relocation and expansion of refractory ore and oxide (mill-grade) ore stockpiles, and construction of new surface facilities and infrastructure.

As discussed in Section 2.2, Proposed Action, most of the proposed modifications at the CGM Operations Area would occur within currently authorized disturbance areas and would involve currently authorized construction, operations, and reclamation activities. The associated visual effects were analyzed in prior NEPA documents (BLM 2014a, 2008a, 2004, 2000) as discussed in the introduction of Chapter 3.0. The visual analyses from those documents are incorporated here by reference.

The project study area for direct and indirect visual resources impacts encompasses the proposed modifications in the CGM Operations area as seen from the three key observation points (KOPs) identified for the project. The cumulative effects study area encompasses the viewshed of the proposed project or, generally, the area within 20 miles of the proposed project modifications from which the project modifications would be visible as shown in Figure 3.15-4 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

3.15.1 Affected Environment

The BLM is responsible for identifying and protecting scenic values on public lands under several provisions of FLPMA and NEPA. The BLM Visual Resource Management (VRM) system was developed to facilitate the effective discharge of that responsibility in a systematic, interdisciplinary manner. The VRM system includes an inventory process based on a matrix of scenic quality, viewer sensitivity to visual change, and viewing distances, which leads to classification of public lands and assignment of visual management objectives (BLM 1986a). Four VRM classes have been established that serve two purposes: 1) as an inventory tool portraying relative value of existing visual resources and 2) as a management tool portraying visual management objectives for the respective classified lands. The VRM system also includes a “contrast rating” procedure for evaluating the potential visual effects of a proposed project or management activity. The VRM system was used to evaluate the visual impact of the proposed project.

Under the VRM system, the affected environment for visual resources is characterized using an inventory and evaluation process that addresses scenic quality, viewer sensitivity, and distance between viewers and a proposed modification to the landscape. Landscape characteristics contributing to the inventory process for the project study area are described below, followed by VRM class designations for the visual area of influence.

The project study area is located in the Basin and Range physiographic province as defined by Fenneman (1931). The province is characterized by alternating valleys and low, north-south trending mountain ridges common to central Nevada. Topography of the vicinity of the CGM Operations Area is nearly flat in Crescent Valley, which has an elevation of approximately 4,950 feet amsl at its highest (southern) end where the CGM Operations Area is located. Topography of the Toiyabe Range, southwest of the project study area, is rounded and irregular, peaking at approximately 7,480 feet amsl. Proposed physical modifications in the CGM Operations Area would be located on the northern slope of the saddle between Mount Tenabo and the north end of the Toiyabe Range, and in southern Crescent Valley.

Vegetation in the vicinity of the project study area is sparse, primarily low sagebrush and grasses. Vegetation colors include medium greens in evidence for periods in the spring, with beige, tans, and muted gold during the drier and colder months.

Native soils are light beige to pale whitish gray with rock outcrops adding generally muted browns, oranges, and some mauve to purple hues.

Color differences, though generally not sharply contrasting, can be easily distinguished at ranges of a mile or more, especially with early morning or late afternoon sun at the viewer's back. Colors blend together and become very subtle or undistinguishable at greater distances and under other light conditions, such as high mid-day sun or the light haze often seen in this part of Nevada.

Current mining operations at the site exhibit strong color contrast with the natural surroundings and moderate to strong line, landform, and surface texture contrast. The light tans and grays of the waste rock facilities and tailings stand out strongly from the natural background on the west face of Mount Tenabo. They produce slightly less contrast under overcast sky conditions when the light angle or intensity does not emphasize the color differences between exposed rock materials and natural vegetation. The pit benches and other major features are predominantly horizontal in character. The individual surfaces of the bench faces generally are smooth textured, although from a distance of approximately 6,000 feet, the overall visual effect suggests a horizontal "corduroy" ribbed texture. Structures in the project study area are limited to mining structures; they are geometric in form and light gray to white in color. Road scars are prominent linear man-made features in the vicinity.

All proposed physical landscape modifications in the Pipeline Complex would be located in VRM Class IV areas (**Figure 3-10**). VRM Class IV is the least restrictive of the four management classes. The management objective of VRM Class IV is "...to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic (design) elements" (BLM 1986a).

Portions of proposed landscape modifications in the Cortez Hills Complex would be located in VRM Class IV areas; others would be located in VRM Class III areas, including part of the reconfiguration and height increase of the existing Canyon Waste Rock Facility and parts of the relocation and expansion of the refractory and mill-grade ore stockpiles (**Figure 3-10**). The management objective of VRM Class III is "... to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM 1986a).

3.15.2 Environmental Consequences

Potential visual impacts associated with the Proposed Action were analyzed using the procedures outlined in the BLM Visual Contrast Rating Handbook H-8431-1 (BLM 1986b). Visual impacts were determined by comparing visual contrast ratings for the proposed facilities modifications with the VRM class objectives for the project area, portions of which are designated VRM Class III and Class IV, as noted above. The process involves comparing the degree of visual contrast from the proposed facilities modifications and activities with the natural landscape character both during active mining and after reclamation is completed. The contrast rating process used three KOPs (**Figure 3-10**) as viewpoints for conducting the impact analysis. As per the analysis conducted for the Cortez Hills Expansion Project Final EIS (BLM 2008a), visual effects also are briefly addressed in this EA for two "sensitive" viewpoints: Shoshone Wells and the top of Mount Tenabo.

KOP #1 is located on SR 306 at the intersection with the relocated county road (**Figure 3-10**) approximately 1 mile north of the currently authorized tailings impoundment at the Pipeline Complex. This viewpoint represents the perspective of travelers approaching from the north in close proximity to project features at the Pipeline Complex; also it represents views from the Town of Crescent Valley approximately 10 miles farther to the north-northeast. KOP #2 is located at Rocky Pass on CR 225 and represents the view for travelers approaching from Carico Lake Valley. KOP #3 is located on CR 222 approximately 1 mile south-southeast of the Lander-Eureka county line and 4.5 miles north-northwest of the intersection with the road to Garden Pass. It represents the view for travelers approaching from Grass Valley or from Pine Valley to the east. All of these approach routes are lightly traveled, although they are the only improved roads to and through the project area. Most traffic in the area is generated by mineral development or local ranching; however, there also is some traffic generated by recreational activities including hunting, camping, rock hounding, and sightseeing.

3.15.2.1 Proposed Action

Under the Proposed Action, some of the facilities modifications proposed for the Pipeline and Cortez Hills complexes would be visible from the three KOPs established for the CGM Operations Area. Modifications proposed for the Pipeline Complex that would expand the scope of the visual contrast that currently exists include the proposed expansion of the Pipeline South Area Heap Leach Facility and the Gap Waste Rock Facility as well as the proposed reconfiguration and increased height of the Pipeline/South Pipeline Waste Rock Facility (including expansion of the refractory ore stockpile on top of the waste rock facility). Other elements of the Proposed Action at the Pipeline Complex would be screened from view by waste rock and heap leach facilities or, in the case of new drainage control facilities, would be visible but visually subordinate to more dominant features.

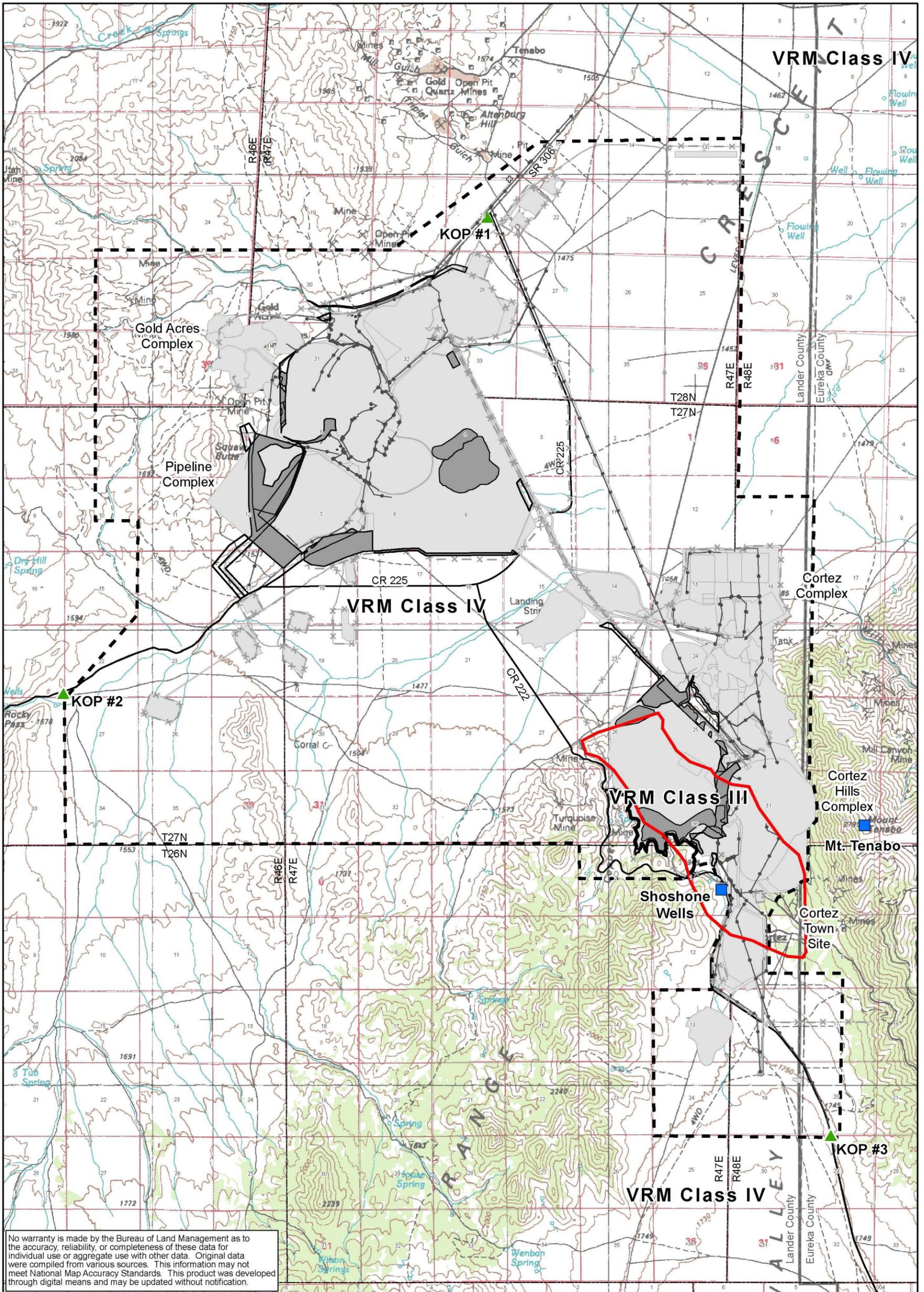
Construction and operation of the proposed modifications at the Pipeline Complex would expand the extent of the visual contrast that currently exists between the currently authorized facilities and the natural character of the landscape. The primary change in visual effects would result from the proposed expansion of the Pipeline South Area Heap Leach footprint and an increase in the height of the Gap and Pipeline/South Pipeline waste rock facilities (**Figure 2-2**). The proposed modifications at the Pipeline Complex would have similar, but expanded, visual effects to those already occurring from the existing permitted project, including strong color contrast, moderate to strong line and landform contrast, and moderate texture contrast. The degree of change in visual contrast would be considered minor to moderate compared with currently authorized facilities and operations. The visual contrast effects during height of mining gradually would become less prominent with completion of concurrent and final reclamation activities. (See **Figure 3-3** for examples of concurrent reclamation in the CGM Operations Area.) The key consideration is the degree of change in the visual impacts, compared with the amount of contrast permissible under the VRM Class IV objectives.

The Class IV objective provides for “major modification of the existing character of the landscape,” so the visual disturbance would be in conformance with the objective if “every effort” is made to minimize the visual impact. **Figures 3-11** and **3-12** present simulations of the visual effects of the proposed facilities modifications at the Pipeline Complex both at the height of mining and after reclamation as seen from KOP #1 and KOP #2, respectively. The effect as seen from KOP #1 appears particularly strong due to the close proximity of the KOP to existing, currently authorized, and proposed facilities. It is estimated that the degree of visual impact from the proposed Pipeline Complex modifications as observed from the two KOPs would be rated low to moderate largely due to the extent of currently authorized disturbance/facilities and the amount of change allowable under the VRM Class IV management objectives. Proposed modifications at the Pipeline Complex would not affect views from KOP #3 because the terrain of the Toiyabe Range effectively would screen views of the proposed facilities from that perspective.

At the Cortez Hills Complex, the primary change in visual effects would result from: 1) the proposed reconfiguration and increased height of the Canyon Waste Rock Facility, and 2) the proposed relocation and expansion of the refractory ore and mill-grade ore stockpiles on top of the Canyon Waste Rock Facility (**Figure 2-2**). Construction of new RFDs and additional support facilities for underground operations would be screened by other facilities at the Cortez Hills Complex and/or would be small enough in the context or overall complex that they would have minimal effect on visual character. The Proposed Action would expand the extent of the visual contrast that currently exists between the currently authorized facilities and the natural character of the landscape. The primary change in visual effects from the currently authorized facilities would result from the proposed increase in the height of the Canyon Waste Rock Facility. The proposed modifications at the Cortez Hills Complex would have similar, but expanded, visual effects to those already occurring from the existing permitted project, including strong color contrast, moderate to strong line and landform contrast, and moderate texture contrast. The degree of change would be considered moderate compared with the currently permitted visual disturbance. The visual contrast effects during height of mining gradually would become less prominent with completion of reclamation activities. The key consideration is the degree of change in the visual impacts, compared with the contrast permissible under the VRM class objectives; most of the proposed modifications at the Cortez Hills Complex would occur in a VRM Class III area with the remainder in a VRM Class IV area.

The VRM Class III designation is somewhat more restrictive than the Class IV designation. The objective for Class III states, "...the level of change to the characteristic landscape should be moderate." Due to the scale of the increase in height of the Canyon Waste Rock Facility, plus the expanded refractory ore and mill-grade ore stockpiles, it is expected that the proposed facility modifications would not achieve the requisite "moderate" level of landscape change, as viewed from KOP #3 (**Figure 3-13**) in the short term leading up to and including height of mining. However, prior to final reclamation, stockpiled refractory ore would be transported to Goldstrike for processing, and stockpiled mill-grade ore would be transported to and processed at the existing Pipeline Mill or alternately reclaimed as part of the waste rock facility (Section 2.2.8.6, Facilities Reclamation). Therefore, following final reclamation, the visual effects would be reduced to a moderate level and would comply with the Class III objective over the long term. The visual effects, as viewed from KOP #1 (**Figure 3-11**) would not be as strong and would not dominate the view because of the greater distance and the scale of the facility modifications relative to Mount Tenabo as the visual backdrop. It is expected that the proposed facilities would comply with the Class III objective as viewed from this perspective. As noted above, the Class IV objective provides for "major modification of the existing character of the landscape," so the visual effects in the Class IV portion of the proposed Cortez Hills Complex modifications would be in conformance with the objective, though "every effort" should be made to minimize the visual impact as required by the Class IV objective. Proposed modifications at the Cortez Hills Complex would not affect views from KOP #2 (**Figure 3-12**) because the terrain of the Toiyabe Range effectively would screen views of the proposed facilities modifications from that perspective.

The Shoshone Wells location is surrounded on three sides by currently authorized facilities, the nearest of which are the administration facilities directly across the road to the east, the Grass Valley Heap Leach facility approximately 0.5 mile to the southeast, and the Canyon Waste Rock Facility approximately 0.3 mile to the north-northwest. Views from Shoshone Wells are dominated by currently authorized project facilities, which rise above the viewpoint from a few hundred feet to over 1,000 feet at the top of the Cortez Hills Pit. It is unlikely that any of the elements of the Proposed Action would be visible from this viewpoint because of screening by existing terrain.



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- Legend**
- CGM Operations Area Boundary
 - Existing Facilities
 - Overlap of Existing and Proposed Facilities
 - Proposed Facilities
 - Key Observation Point
 - VRM Class III Boundary
 - Sensitive Viewpoints
 - Powerline
 - Rangeland Fence
 - Road



Amendment 3 to Plan of Operations EA

Figure 3-10
Visual Resources





Existing Conditions



Height-of-mining



Post-reclamation

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**Amendment 3 to
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Figure 3-11
 Visual Simulations for KOP #1





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**Amendment 3 to
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Figure 3-12
 Visual Simulations for KOP #2





Existing Conditions



Height-of-mining



Post-reclamation

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**Amendment 3 to
 Plan of Operations EA**

Figure 3-13
 Visual Simulations for KOP #3



Most, and perhaps all, of the aboveground elements of the Proposed Action would be visible from the sensitive viewpoint at the top of Mount Tenabo. Because the visual character of the proposed new and revised project elements would be very similar to existing project facilities, and because the scale of proposed facilities would be relatively small in the context of existing authorized facilities at both the Pipeline Complex and the Cortez Hills Complex, the visual effects of the Proposed Action as viewed from Mount Tenabo would be minor. It is unlikely that a casual observer would notice the visual changes.

3.15.2.2 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. Proposed modifications to existing operations in the CGM Operations Area, as described for the Proposed Action, would not be implemented, and associated impacts to visual resources would not occur.

3.15.3 Cumulative Impacts

The cumulative effects study area for visual resources is shown in Figure 3.15-4 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Past and present actions and RFFAs are identified in **Table 2-7** and shown in **Figure 2-7**.

Visual effects of past and present actions are included in the description of the affected environment (Section 3.15.1). The future actions that would create visual effects are predominantly mining-related activities, including both exploration and development projects; however, few of these would occur in the viewshed of the Proposed Action. There also would be a potential increase in dirt roads and agricultural developments, including primarily increased grazing activity. Among these actions, the mining projects would be the most likely to introduce strong visual contrast in the cumulative effects study area. However, all of the identified future actions would be located in VRM Class IV areas, so it is anticipated that the visual disturbance would be accommodated by the standards of the VRM Class IV objectives, which provide for “major modification” of the landscape.

Based on the project’s proposed reclamation plan and the assumption that standard reclamation requirements would be required for permitting of future projects, the cumulative visual effects would be minimized to the degree possible after completion of the projects.

3.15.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No monitoring or mitigation measures are recommended for visual resources beyond the reclamation activities proposed for the project.

Residual adverse visual effects would result from long-term changes in landform and color contrast associated with the Proposed Action. The color contrast would be minimized by reclamation activities, and the visual effects would diminish gradually over time as natural vegetation patterns would develop to help mask the landform and color contrasts. However, the landform modifications would result in permanent visual effects.

3.16 Noise

As discussed in the introduction to Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the elements of the Proposed Action that potentially would result in new or intensified noise impacts include: 1) construction and operation of proposed facility modifications (see **Figure 2-2**); 2) the increased transport of fuels, oils, lubricants, and other materials to the site; 3) the backhaul of up to 600,000 tpy of oxide (mill- and heap leach-grade) ore from the Arturo Mine through the Goldstrike Mine to the Pipeline Complex for processing; and 4) the other overall operations modifications (i.e., mining rate modifications for surfacing mining operations and lifting of the on site restriction for refractory ore shipments).

Noise effects for the study area and vicinity were previously analyzed for the currently approved facilities and operations in prior NEPA documents (BLM 2014a, 2008a, 2004, 2000) as discussed in the introduction of Chapter 3.0. The noise analyses from those documents are incorporated here by reference.

The project study area for noise effects encompass an area within a 10-mile buffer of the proposed new disturbance and modified activity areas within the CGM Operations Area. It also includes an approximately 2-mile-wide corridor centered on the ore transport route from the Arturo and Goldstrike mines to the CGM Operations Area. The cumulative effects study area (**Figure 3-8**) is the same as the project study area for noise.

3.16.1 Affected Environment

The proposed facility modifications would be located in a relatively remote area where there is minimal existing development. There are four occupied ranches in the vicinity, three of which are Barrick owned, including the Wintle and Dean ranches located in Crescent Valley on the northern edge of the CGM Operations Area, and the Filippini Ranch (C Ranch) located approximately 1.0 mile to the west of the CGM Operations Area boundary and approximately 3.5 miles from the nearest proposed facility modification. The privately owned Dann Ranch is located approximately 9.5 miles to the northeast of the CGM Operations Area. The community of Crescent Valley is approximately 7.5 miles north of the CGM Operations Area. The Arturo and Goldstrike mine properties are similarly located in a remote area dominated by existing mining operations. No other ranches or other potential noise sensitive land uses have been identified within 10 miles of the project site.

Natural sounds, including wind, insects, and birds, are the principal contributors to ambient noise in outlying portions of the project study area. Variations in wind speeds can have a dramatic effect on noise levels in the area. Ranching, dispersed recreation, and mining activities in the area generate occasional vehicular noise, although the traffic is light. The principal sources of noise in the vicinity of the mining activities are associated with heavy equipment noise and once daily blasting at the existing mine pits. Mill operations at Goldstrike are an additional point source of noise in that area. Military aircraft flyovers, which occur periodically, often at very low altitudes, produce noise at high levels relative to all other noise sources in the project vicinity when they occur.

Noise levels in the CGM Operations Area previously were determined from measurements taken at seven locations in the project vicinity for the Cortez Hills Expansion Project Final EIS (BLM 2008a). Noise levels generally were very low throughout the area. As would be expected in a rural area, levels were highest in high activity areas near the existing mine operations.

Based on these earlier measurements, background noise is very low in outlying portions of the project study area, ranging from 29.5 decibels, A-weighted (dBA) to 32.6 dBA, which is equivalent to a library reading room. Background levels nearer to existing mining activities were somewhat higher, ranging from 41.0 to 53.0 dBA, which would be similar to a quiet urban environment. Average equivalent continuous sound levels ranged from 37.3 to 45.6 dBA in outlying areas, influenced by low level aircraft

flyovers. With flyovers deleted, the range dropped to 34.2 to 41.1 dBA. The measured equivalent continuous sound levels for areas closer to existing mining activities ranged from 48.1 to 57.3 dBA. Noise from blasting and from the warning sirens that precede it were audible above background noise, although even at relatively close measurement locations, the measured maximum level was less than 70 dBA at the time of the measurements.

3.16.2 Environmental Consequences

3.16.2.1 Proposed Action

The Proposed Action would generate noise primarily from operation of mechanical equipment associated with the proposed facility modifications. It is expected that much of the activity associated with the project modifications would employ the same types and sizes of equipment – typically the same equipment – as currently in use at the CGM Operations Area. Transport of Arturo oxide ore on the backhaul from the Goldstrike Mine would use the same 35-ton trucks used for the currently authorized transport of refractory ore from the CGM Operations Area to Goldstrike. It is anticipated that the proposed mining rate modifications for surfacing mining operations and the proposed lifting of the on site restriction for refractory ore shipments as described in Section 2.2.3, Overall Operations Modifications, would have negligible effect on overall noise emissions during ongoing mine operations; therefore, these operational modifications are not considered further in this analysis.

Noise emissions under the Proposed Action would be highest during construction of new facilities such as the water treatment plant, new mine infrastructure, new storm water diversions, and expanded heap leach pad at the Pipeline Complex, as well as the proposed RFDs and associated surface facilities at the Cortez Hills Complex. Noise emissions after the completion of construction activities would essentially be the same as ongoing noise emissions associated with currently authorized operations and reclamation, which were analyzed in previous NEPA documents (BLM 2014a, 2008a, 2004, 2000). Maximum noise levels from construction activities are estimated at approximately 89 dBA at a reference distance of 50 feet (USEPA 1971). The nearest noise-sensitive receptor to any of the proposed facility modifications is the Barrick owned Filippini Ranch, which would be approximately 3.5 miles from the modified Pipeline South Area Heap Leach Facility. At this distance, the highest noise level from construction conservatively would be estimated at less than 38 dBA (USEPA 1971). Under most atmospheric conditions, this level of noise would be barely audible, if at all, at the Filippini Ranch, which also benefits from a topographic ridge at Rocky Pass that would further attenuate project-related noise. Construction noise levels at Crescent Valley would be below 31 dBA; at the privately owned Dann Ranch, noise levels would be below 29 dBA, based on spreading attenuation. At these levels, it is unlikely that project-related construction noise would be perceptible in Crescent Valley or at the Dann Ranch. Construction of facility modifications would be short-term in nature, and maximum noise emissions would not occur consistently during construction, as most equipment would only be operating at peak output for a portion of the time.

The 35-ton trucks that would be used to backhaul ore from the Arturo Mine to the Pipeline Complex generate maximum noise levels of approximately 80 dBA at the 50-foot reference distance (USEPA 1971). The nearest residences along the transportation route are in Crescent Valley, approximately 200 feet from the roadway. At 200 feet, maximum truck noise would be approximately 68 dBA (USEPA 1971). However, the proposed backhaul would not increase truck traffic or associated noise along the transport route because, following the delivery of refractory ore from the CGM Operations Area to Goldstrike, the trucks would be loaded with Arturo oxide ore for the return trip to the CGM Operations Area rather than returning empty.

Proposed deliveries of additional fuels, lubricants, and other supplies to the CGM Operations Area would result in an average of approximately 36 additional truck trips per day in the short term and 33 truck trips per day for the life of the mine. All of these trips would be expected to travel SR 306 from I-80 to the mine site. It is assumed that most of these deliveries would occur during the day, which would generate

up to approximately 4 to 5 additional truck trips per hour. Assuming most of the new deliveries would utilize large trucks, comparable to those used for ore hauling; noise emissions from this traffic would mimic that of the ore hauling traffic. Because of the nature of truck activity, this level of noise would be experienced only for a brief period for each truck, although as traffic increases, the noise would become more consistent throughout the day. A mitigating factor is the 35-mile-per-hour speed limit through Crescent Valley, suggesting that most trucks would not be operating at maximum levels near the residences. Similar truck movements currently occur in this area; therefore, it is anticipated that the Proposed Action would result in a minor incremental increase in noise during the day at residences along the route.

3.16.2.2 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities in the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. The proposed project modifications would not be implemented; therefore, noise emissions and noise levels at sensitive receptors would not change from current conditions.

3.16.3 Cumulative Impacts

Noise impacts associated with the Proposed Action are anticipated to be minor to negligible and, therefore, would not be expected to substantially contribute to cumulative noise impacts.

3.16.4 Monitoring and Mitigation Measures and Residual Adverse Effects

No monitoring or mitigation measures are recommended for noise.

Upon completion and reclamation of project-related activities, project-related noise emissions would cease; therefore, there would be no residual adverse noise effects.

3.17 Hazardous Materials and Solid Waste

As discussed in the introduction of Chapter 3.0 and indicated in **Tables 3-3** and **3-4**, the element of the Proposed Action that potentially would result in new or additional hazardous materials and solid waste impacts includes the proposed increase in the transport and on site storage and use of fuels, oils, lubricants, and other materials for construction and operation of the proposed facility modifications (see **Figure 2-2**).

The project study area for direct and indirect impacts and the cumulative effects study area for hazardous materials and solid waste encompasses: 1) the proposed new construction activities and associated facility operations within the CGM Operations Area, and 2) the main transportation routes to the site, including SR 306 to I-80 and the access roads to the mine facilities from SR 306 as shown in Figure 3.1-10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

3.17.1 Affected Environment

The affected environment for hazardous materials includes air, water, soil, and biological resources that potentially could be affected by an accidental release of hazardous materials during transportation to and from the mine, during storage and use at the Pipeline and Cortez complexes.

The construction and operation of the proposed facilities modifications would require the use of the following materials classified as hazardous. These materials would be handled in accordance with the existing procedures for transportation, storage, and waste management and the existing spill prevention and emergency response plans.

- Diesel fuel, gasoline, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance;
- Cement, shotcrete, and other similar materials for the proposed RFD development; and
- Reagents for the proposed water treatment plant.

As discussed in Section 2.2.4, Hazardous Materials and Waste Management, no increase in the currently authorized reagent consumption rate would be required for the proposed processing of Arturo mill- and heap leach-grade ore at the Pipeline Complex. Therefore, it is not considered further in this analysis.

The regulatory framework for hazardous materials and solid waste are described in the Cortez Hills Expansion Project Final EIS (BLM 2008a).

3.17.2 Environmental Consequences

3.17.2.1 Proposed Action

Under the Proposed Action, approximately 24 additional million gallons per year of diesel fuel, and lesser amounts of gasoline, oil, lubricants, and other materials (including reagents for the proposed water treatment facility) (**Table 2-3**), would be transported to and stored and used at the CGM Operations Area during the life of the mine. In addition, there would be a temporary increase in diesel fuel consumption of approximately 570,000 gallons per year during the 3-year construction period for the RFDs. No change in current reagent consumption rates would be required for the processing of Arturo oxide ore at the Pipeline Mill. Ongoing implementation of the Emergency Response Plan (Barrick Gold of North America 2013b) and Solid and Hazardous Waste Management Plan (JBR 2006) for the CGM Operations Area would minimize the potential for a spill and the associated environmental impacts in the event of a spill.

In Nevada from 1999 to 2015, there were 39 transportation incidents involving spills of diesel fuel including transit, loading, and unloading (Office of Hazardous Materials Safety 2015). Therefore, although there would be an increase in hazardous material deliveries (primarily diesel fuel) to the CGM Operations Area, it is assumed that the probability of a transportation-related release would be low. As discussed in the Cortez Hills Expansion Project Final EIS (BLM 2008a), hazardous materials would be transported by licensed commercial carriers or vendors in accordance with the requirements of Title 49 of the CFR. In the event of a release during transport to the site, the transportation company would be responsible for response and cleanup. Each transportation company is required to have an emergency response plan to address spills and accidental releases of hazardous materials. Local and regional law enforcement and fire protection agencies also may be involved initially to secure the site and protect public safety.

The procedures for storage, containment, transport, and handling of hazardous waste as outlined in BCI's Solid and Hazardous Waste Management Plan and discussed in the Cortez Hills Expansion Project Final EIS (BLM 2008a) would continue to be implemented. As with existing operations, non-hazardous solid waste would continue to be disposed of in the currently authorized Class III waived landfills.

3.17.2.2 No Action Alternative

Under the No Action Alternative, existing mining and processing operations and reclamation activities within the CGM Operations Area would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada. Proposed modifications as described for the Proposed Action would not be implemented, and associated potential impacts relative to hazardous materials transportation, use, and storage would not occur.

3.17.3 Cumulative Impacts

Past and present actions and RFFAs are described in Section 2.4 of this EA. Under the Proposed Action, there would be an incremental increase in the current transport and use of hazardous materials (primarily diesel fuel) in the cumulative effects area during the life of the mine. However, given the low probability of a spill or release, the increase in diesel fuel use or the transportation and use of other hazardous materials are not expected to cause a commensurate increase in cumulative impacts.

3.17.4 Monitoring and Mitigation Measures and Residual Adverse Effects

Because of the existing legal framework (and associated requirements) that regulates the transportation, storage, and use of hazardous materials and disposal of solid waste, no additional monitoring or mitigation measures are recommended.

Residual adverse effects from the use of hazardous materials under the Proposed Action would depend on the substance, quantity, timing, location, and response involved in the event of an accidental spill or release. Operation in accordance with the facilities' Emergency Response Plan (Barrick Gold of North America 2013b) and Solid and Hazardous Waste Management Plan (JBR 2006) and prompt cleanup of potential spills and releases would minimize the potential for residual adverse effects.

4.0 Public Coordination

4.1 Agencies Contacted

The agencies contacted during preparation of the Cortez Hills Expansion Project Final EIS (BLM 2008a), from which this EA tiers, are identified in Chapter 4.0 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Information also was obtained from agency websites (e.g., USFWS species list) during preparation of this EA, as documented in Chapter 6.0, References.

4.2 Native American Consultation

In compliance with federal mandates, the BLM initiated government-to-government consultation for the Proposed Action on December 18, 2014, by sending letters with an accompanying map to the following tribes and bands: Battle Mountain Band of Western Shoshone, Duckwater Shoshone Tribe, Te-Moak Tribe of the Western Shoshone, Elko Band of Western Shoshone, and Yomba Shoshone Tribe. The letters were sent to inform the tribes and bands of the proposed undertaking and to solicit their participation in identifying potential areas of concern that may be associated with the project area.

5.0 List of Preparers/Reviewers

5.1 Bureau of Land Management, Mount Lewis Field Office

Chris Worthington	Battle Mountain District Lead Environmental Coordinator - Recreation, Social and Economic Values, Environmental Justice, Visual Resources, Noise, Waste (hazardous or solid)
Jonathan Kramer	Realty Specialist – Land Use and Access
John Massey	Minerals
Alden Shallcross	Hydrology
Adam Cochran	Vegetation, Range, Soils
Kent Bloomer	Noxious Weeds, Invasive, Non-native Species
William O'Neill	Wildlife, Special Status Species, Migratory Birds
Craig Nicholls	Air Quality
John Kinsner	Cultural Resources, Paleontological Resources
Juan Martinez	Native American Cultural Concerns

5.2 AECOM

Dolora Koontz	Project Manager, NEPA Compliance
Evelyn Bingham	Assistant Project Manager
Molly Giere	Assistant Project Manager
Patrick Plumley (Plumley and Associates)	Geology and Minerals, Groundwater, Geochemistry, Surface Water
Terra Mascarenas	Soils and Reclamation
Erik Schmude	Vegetation, Wildlife
Dustin Rapp	Air Quality
Courtney Taylor	Air Quality
Bernhard Strom (Planera)	Land Use and Access, Recreation, Social and Economic Values, Environmental Justice, Visual Resources, Noise
William Berg	Hazardous Materials and Solid Waste, Paleontology
Barbi Malinky Harmon (Kautz Environmental Consultants, Inc.)	Cultural Resources, Native American Cultural Concerns
Rollin Daggett	Aquatic Biology
Christopher Dunne	Range Resources
Merlyn Paulson	Visual Simulations
Scott MacKinnon	GIS
Susan Coughenour	Word Processing

5.3 Barrick Cortez Inc.

Steve Schoen	Manager Permitting
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