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Environmental Assessment

Barrick Gold Exploration, Inc.
Horse Canyon/Cortez Unified Exploration Project Plan of Operations (NVN-066621 [13-1A]) and Reclamation Permit No. 0159
Plan Modification, Addendum, and Amendment

File Number: NVN-066621 (13-1A, 14-1A, 14-2A)

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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

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
µhos/cm	micromhos per centimeter
AAQS	Ambient Air Quality Standards
ACEC	Areas of Critical Environmental Concern
amsl	above mean sea level
AUM	animal unit month
BAPC	Bureau of Air Pollution Control
Barrick	Barrick Gold Exploration Inc.
BCC	Birds of Conservation Concern
BCI	Barrick Cortez, Inc.
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
BMD	Battle Mountain District
BLM	Bureau of Land Management
BMPs	Best Management Practices
BWPC	Bureau of Water Pollution Control
CDP	Census Designated Place
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGM	Cortez Gold Mine

CO	carbon monoxide
CRAs	Common Resource Areas
CWA	Clean Water Act
dBA	A-weighted decibels
Dhc	Devonian Horse Canyon Siltstone
DR	Decision Record
Dw	Devonian Wenban Limestone
E	East
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESDs	Ecological Site Descriptions
ESCO	ESCO Associates, Inc.
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act of 1976
FONSI	Finding of No Significant Impact
GBBDC	Game Birds Below Desired Condition
GHGs	Greenhouse gases
GIS	Geographic Information System
gpm	gallons per minute
HAP	hazardous air pollutant
HC/CUEP	Horse Canyon/Cortez Unified Exploration Project
HDR	HDR Engineering, Inc.

HFRA	Healthy Forest Restoration Act
IM	Instruction Memorandum
IPAC	Information, Planning, and Conservation System
Jqm	Jurassic quartz monzonite
K	hydraulic conductivity
LRR	Land Resource Region
LRUs	Land Resource Units
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
Mining Law	General Mining Law of May 10, 1872
MLRAs	Major Land Resource Areas
mV	millivolts
N	North
NAC	Nevada Administrative Code
NAIP	National Agriculture Imagery Program
NDA	Nevada Department of Agriculture
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NNHP	Nevada Natural Heritage Program
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service

NRHP	National Register of Historic Places
NRS	Nevada Revised Statute
Ohc	Ordovician Hanson Creek Formation
OHV	off-highway vehicle
Ovi	Ordovician Vinini Formation
PA	Programmatic Agreement
PCRI	Properties of Cultural and Religious Importance
PGH	Preliminary General Habitat
Plan	Plan of Operations
PM	particulate matter
PPH	Preliminary Priority Habitat
Qa	Tertiary-Quaternary alluviums
R	Range
RC	reverse circulation
RCE	Reclamation Cost Estimate
RDPCs	reclaimed desired plant communities
REA	Rapid Ecoregional Assessment
RFFA	reasonably foreseeable future action
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
S	South
SAD	surface area disturbance
SRCE	Standardized Reclamation Cost Estimator
SHPO	State Historic Preservation Office

SO_2	sulfur dioxide
SR	State Route
Srm	Silurian Roberts Mountains Formation
SSURGO	Soil Survey Geographic Database
s.u.	standard units
SWPPP	Stormwater Pollution Prevention Plan
T	Township
Tb	Tertiary basalt
TDS	total dissolved solids
Tg	Tertiary gravels
TMDL	Total Maximum Daily Load
Ttf	Tertiary tuffs
U.S.	United States
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VRM	Visual Resource Management
WAD	weak acid dissociable
WAP	Wildlife Action Plan
WRCC	Western Regional Climate Center

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1.0 Introduction

Barrick Gold Exploration Inc. (Barrick) is the operator of the Horse Canyon/Cortez Unified Exploration Project (HC/CUEP). Exploration activities are conducted under Plan of Operations (Plan) NVN-066621 and Reclamation Permit No. 0159 (2004, as amended). The United States (U.S.) Department of the Interior Bureau of Land Management (BLM) has previously authorized Barrick to conduct mineral exploration activities disturbing up to 250 acres within the boundaries of the HC/CUEP. The HC/CUEP area consists of approximately 22,307 acres (**Figure 1-1**).

1.1 Background

Barrick submitted a Modification and Addendum to the Plan of Operations (File Number: NVN-066621 (13-1A, 14-1A)) in response to two Notice of Noncompliance Orders issued to Barrick by the BLM in 2012 and 2013. The Orders cited noncompliance with 43 Code of Federal Regulations (CFR) 3809 Surface Management Regulations.

The Modification to the Plan of Operations (Barrick 2013a) was submitted by Barrick as required by the 2012 Order. The submittal included a new accounting of surface disturbance, an updated Reclamation Cost Estimate (RCE), a revised reclamation plan, and a reclamation financial guarantee to cover disturbance contained in the Modified Plan.

The Addendum to the Plan of Operations Modification (Barrick 2013b) was submitted by Barrick as required by the 2013 Order. The Addendum included an inventory of communication devices, sites, and locations where surface disturbance associated with the communication equipment has occurred or where appurtenances or devices are temporarily or permanently affixed or located on the ground within the HC/CUEP boundary.

In conducting the new assessment of disturbance, Barrick discovered that there were not adequate management controls to identify and verify actual surface disturbance. As a result of the new assessment, Barrick identified that exploration-related disturbance had exceeded the level authorized by the Plan. The total exploration-related disturbance is currently 409 acres, which includes 72 acres of open and active roads, 86 acres of open and active drill pads and sumps, one acre of communication sites, and 250 acres of surface disturbance that has been recontoured and seeded. None of this acreage has been released from the reclamation assurance by BLM or the Nevada Division of Environmental Protection (NDEP).

Barrick has also submitted an Amendment to the Plan of Operations (File Number: NVN-066621 (14-2A)) (Barrick 2013c) to increase the acreage of allowable surface disturbance within the HC/CUEP area by 140 acres for a total of 549 acres.

The public land within the HC/CUEP is administered in part by the BLM Battle Mountain District (BMD), Mount Lewis Field Office and in part by the BLM Elko District, Tuscarora Field Office. The BLM has designated the Mount Lewis Field Office, BLM BMD as the agency decision-maker for this

HC/CUEP Plan of Operations Modification, Addendum, and Amendment Environmental Assessment (EA).

This EA was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and in compliance with applicable regulations and laws passed subsequently, including the President's Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), U.S. Department of the Interior requirements, and guidelines listed in the BLM NEPA Handbook H-1790-1 (BLM 2008a).

1.2 Other Relevant NEPA Decisions

Cortez Gold Mines began active exploration in the area in the early 1960's. Mineral exploration activities in the 1980s and early 1990s included 18 exploration plan amendments and notices for exploration drilling throughout the area now defined as the HC/CUEP. In November 1999, BLM approved 50 acres of phased disturbance within the Horse Canyon Exploration Plan of Operations project area. In August 2001, BLM approved an amendment to the HC/CUEP Plan, which combined the Horse Canyon and Cortez exploration plans into one Plan of Operations. The permitting history of the HC/CUEP Plan of Operations is shown in **Table 1-1**.

Table 1-1 HC/CUEP Plan of Operations Permit History

Date	Title/ NEPA Reference	File Number	Proposed Action	Citation
Approved August 2001	HC/CUEP EA and Decision Record (DR)/Finding of No Significant Impact (FONSI) (NV063-EA00-35); Plan of Operations No. N64-87-010P (97-1A)	NVN-066621	Amendment 1 combined two previously approved exploration areas. Approval created HC/CUEP and allowed exploration on up to 50 acres.	BLM 2001
Approved September 2004; October 2004	HC/CUEP II EA; DR/FONSI (NV063-EA04-61)	NVN-066621	Exploration on up to 250 acres within HC/CUEP boundary.	BLM 2004a BLM 2004b
Approved April 2005	HC/CUEP Decision	NVN-066621	Amendment 2 Decision affirmed up to 250 acres allowed as modified with revised stipulations.	BLM 2005
Approved November 2008	Cortez Hills Expansion Project Record of Decision (ROD) and Plan of Operations Amendment Approval	NVN-067575	ROD modified the HC/CUEP boundary to consolidate and remove overlapping mine plan and exploration plan boundaries.	BLM 2008b
Approved November 2010; May 2011	Addendum to the HC/CUEP II EA (NV063-EA04-61); DR/FONSI	NVN-066621 EA Addendum	Replaced/superseded the 2004 EA, as modified by 2005 DR; supplemented the analysis of cumulative impacts; 250 acres of surface disturbance.	BLM 2010 BLM 2011a
Approved	HC/CUEP Decision	NVN-	Addendum to EA removed 50-acre	BLM

Table 1-1 HC/CUEP Plan of Operations Permit History

Date	Title/ NEPA Reference	File Number	Proposed Action	Citation
August 2012		066621 (11-1A)	disturbance limit on up to 250 acres.	2012a
Approved January 2013	HC/CUEP Decision	NVN-066621	Authorized Plan boundary change (reduction of 35 acres).	BLM 2013a
Proposed Sept 2013	HC/CUEP Plan Modification	NVN-066621 (13-1A)	Agency-directed actions to account for surface disturbance in excess of 250 acres.	Barrick 2013a
Proposed October 2013	HC/CUEP Addendum to Plan Modification	NVN-066621 (13-1A, 14-1A)	Agency-directed actions to account for communication sites. Total disturbance is 409 acres.	Barrick 2013b
Proposed October 2013	HC/CUEP Plan Amendment	NVN-066621 (13-1A, 14-1A, 14-2A)	Proposed authorization of additional140 acres of surface disturbance, for a total of 549 acres.	Barrick 2013c

1.3 Purpose of and Need for Action

The General Mining Law of May 10, 1872 (Mining Law), as amended (30 U.S. Code (U.S.C.) §§ 22-54 and §§ 611-615) allows citizens of the U.S. the opportunity to explore for, discover, claim, and produce certain valuable mineral deposits on those federal lands that are open for mining claim location (open to mineral entry).

BLM's purpose is to analyze the environmental impacts of the 159 acres of surface disturbance that exceeds the authorized 250 acres.

Additionally, BLM's purpose is to provide Barrick with the opportunity to explore, locate, and delineate metal deposits on its mining claims on an additional 140 acres of public lands, as provided under the Mining Law.

The need for the action regarding the Plan of Operations Modification, Addendum, and Amendment 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 CFR 3809, which is 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.

1.4 Decisions to be Made

Barrick has submitted a Modification and Addendum to the Plan of Operations (NVN-066621 (13-1A, 14-1A)) and Reclamation Permit No. 0159. The BLM decision regarding the Plan Modification and Addendum includes the following options:

- Approve the Plan Modification and Addendum with no modifications;

- Approve the Plan Modification and Addendum with additional environmental protection measures needed to prevent unnecessary or undue degradation of public lands; or
- Deny the approval of the Plan Modification and Addendum.

Barrick has submitted an Amendment to the Plan of Operations (NVN-066621 (14-2A)) and Reclamation Permit No. 0159. The BLM decision regarding the Plan Amendment includes the following options:

- Approve the Plan Amendment with no modifications;
- Approve the Plan Amendment with additional environmental protection measures needed to prevent unnecessary or undue degradation of public lands; or
- Deny the approval of the Plan Amendment.

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

The BLM has the responsibility and authority to manage the surface and subsurface resources on public lands and has designated lands within the HC/CUEP as open for mineral exploration. In the BMD Record of Decision (ROD) for the Shoshone-Eureka Resource Management Plan (RMP) (BLM 1986a), the BLM states in objectives 1 and 2 under Minerals that BLM will:

- "Make available and encourage development of mineral resources to meet national, regional, and local needs consistent with national objectives for an adequate supply of minerals," and
- "Assure that mineral exploration, development, and extraction are carried out in such a way as to minimize environmental and other resource damage and to provide, where legally possible, for the rehabilitation of lands."

The management decisions applicable to these objectives are as follows (BLM 1986a):

- Locatable minerals: "All public lands in the planning areas will be open for mining and prospecting unless withdrawn or restricted from mineral entry."
- Current mineral production areas: "Recognize these areas as having a highest and best use for mineral production and encourage mining and minimum environmental disturbance. Make thorough examinations of all sites proposed for other Bureau programs in these areas."

The Elko District ROD for the Elko RMP (BLM 1987) states in Objective 1 under Minerals that BLM will:

- "Maintain public lands open for exploration, development, and production of mineral resources while mitigating conflicts with wildlife, wild horses, recreation, and wilderness resources."

The short and long-term management action applicable to this objective is as follows (BLM 1987):

- "Designate the resource area open to mineral entry for locatable minerals, except for the district's 11-acre administrative site."

The management decisions and actions in the Battle Mountain District, Shoshone-Eureka RMP (BLM 1986a) and the Elko District, Elko RMP (BLM 1987) have been reviewed and the HC/CUEP Plan Modification, Addendum, and Amendment are in conformance with the RMPs.

Lander County's Policy 13-8 states that the Secretary of the Interior should use all means to encourage the exploration and development of the mineral resource (Lander County 2005).

The Eureka County Master Plan (Eureka County 2010) goal for minerals is to "facilitate environmentally responsible exploration, development and reclamation of oil, gas, geothermal, locatable minerals, aggregate and similar resources on federal lands."

1.6 Scoping

Internal scoping included two interdisciplinary team meetings held at the BLM BMD office on January 30, 2014 and March 13, 2014. Resource specialists discussed the Plan of Operations Modification, Addendum, and Amendment. Environmental issues and the environmental baseline resources were identified.

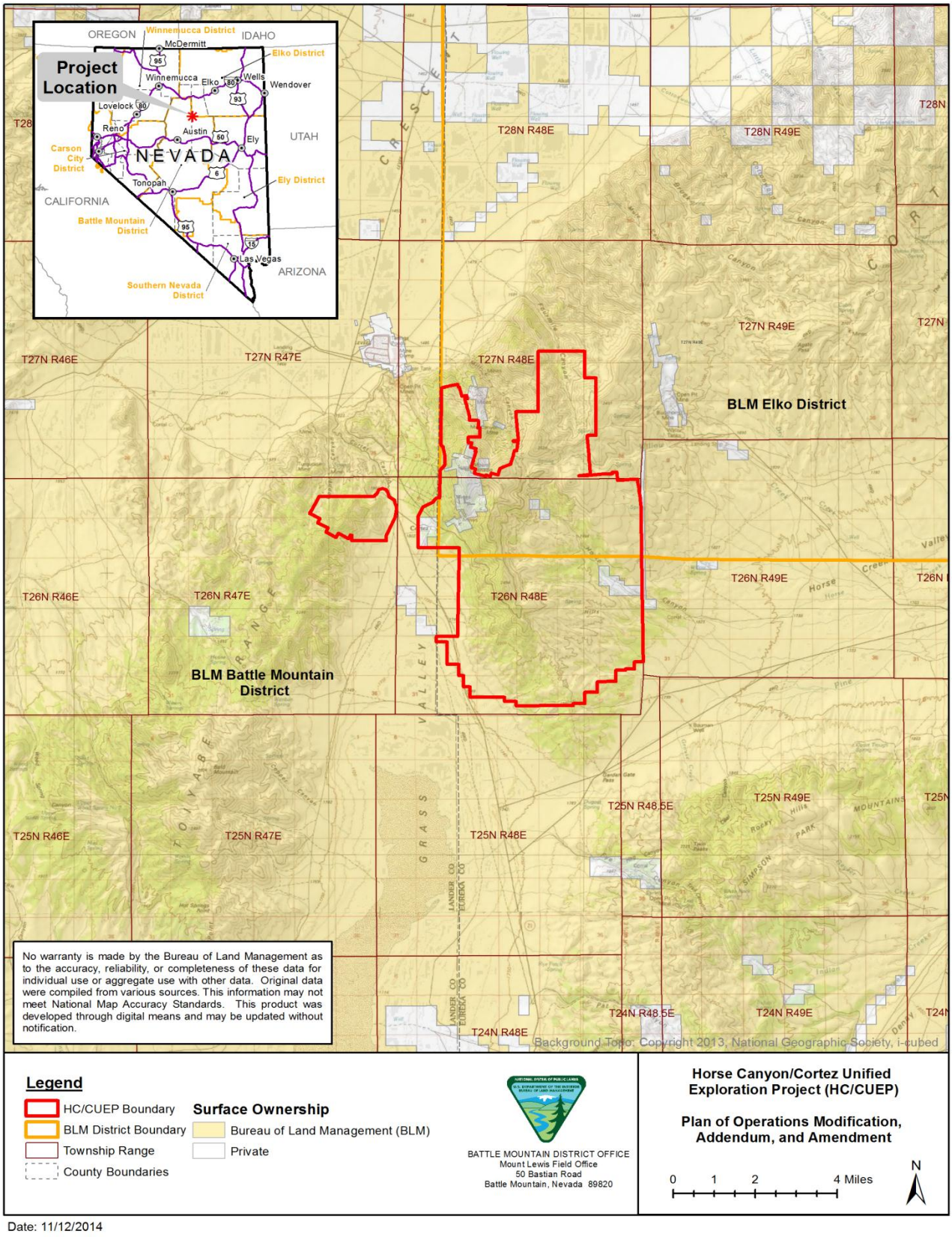
1.6.1 Issues

The internal interdisciplinary team determined that the following resource issues occur and therefore are analyzed in this EA:

- Air Quality – fugitive dust, equipment emissions
- Cultural Resources – potential impacts to existing sites/unanticipated discoveries
- Migratory Birds – disturbance, habitat loss/change
- Native American Religious Concerns – properties of cultural and religious importance
- Noxious Weeds, Invasive, and Non-native Species – establishment and/or spread, preventative and control measures
- Threatened, Endangered, and Candidate Species (Plants and Animals) – Greater sage-grouse (Candidate): disturbance (noise/human presence), habitat loss/change
- Wastes, Hazardous or Solid – handling and disposal
- Water Quality, Surface Water, and Groundwater – sedimentation, flow, potential for contamination
- Wetlands/Riparian Zones – potential change/loss and mitigation
- Grazing Management – change/loss of animal unit months (AUMs)
- Recreation – alter existing opportunities

- Soils – potential degradation or loss (erosion)
- Social and Economic Values – change in current situation
- Special Status Species (Plants and Animals) – potential mortality, disturbance, habitat loss/change
- Vegetation – change in community composition, reclamation
- Forestry and Woodland Resources - commercial and personal firewood collection, pine nut collection
- Visual Resources – compliance with existing visual classes
- Wildlife – disturbance (noise/human presence), habitat loss/change

Figure 1-1 Project Vicinity



2.0 Alternatives Including the Proposed Action

This chapter describes the alternatives analyzed in this EA. The Proposed Action is the Plan of Operations Modification and Addendum, as described by Barrick in the *Horse Canyon/Cortez Unified Exploration Project Plan of Operations Agency-Requested Modifications NVN-066621 (13-1A) and Reclamation Permit No. 0159* (*revised* September 2013) (Barrick 2013a), and in the *Horse Canyon/Cortez Unified Exploration Project Addendum to the Revised Plan of Operations Modification NVN-066621 (13-1A, 14-1A) and Reclamation Permit No. 0159* (October 2013) (Barrick 2013b).

Included in the Proposed Action is the Plan of Operations Amendment, as described by Barrick in the *Horse Canyon/Cortez Unified Exploration Project Plan of Operations Amendment NVN-066621 (13-1A, 14-1A, 14-2A) and Reclamation Permit No. 0159* (October 2013) (Barrick 2013c).

This chapter also presents the No Action Alternative (Section 2.3) and a discussion of past, present, and reasonably foreseeable future actions (RFFAs) (Section 2.4).

The BLM has reviewed the Proposed Action to determine what impacts, if any, would occur, and if modifications are needed to mitigate potential impacts. The No Action Alternative was considered and analyzed to provide a baseline for comparison of the impacts of the Proposed Action. No other alternatives were identified.

HC/CUEP Plan of Operations

The HC/CUEP Plan of Operations (Plan) was approved in 2004 (BLM 2004b), and affirmed as modified in 2005 (BLM 2005). The 2004 Decision Record (DR)/Finding of No Significant Impact (FONSI) was replaced and superseded by the May 2011 DR/FONSI (BLM 2011a) and August 2012 DR (BLM 2012a). The HC/CUEP 2012 DR allowed for up to 250 acres of surface disturbance within the Plan boundary and eliminated the 50-acre incremental limit.

The HC/CUEP Plan relied on standard unit area measurements to calculate disturbance of roads, drill pads, and sumps. Over time, as exploration procedures and equipment changed, exploration disturbance exceeded the standard unit area measurements. In response to the 2012 Notice of Noncompliance Order, Barrick determined that there were not adequate management controls to identify and verify actual surface disturbance. Surveys to accurately document surface disturbance were conducted according to a revised protocol (**Appendix A**). The revised survey determined that current surface disturbance in the HC/CUEP area totals 409 acres. This includes 72 acres of open and active roads, 86 acres of open and active drill pads and sumps, one acre of communication sites, and 250 acres of surface disturbance that has been recontoured and seeded. None of this acreage has been released from the reclamation assurance by BLM or the NDEP.

The HC/CUEP is located approximately 70 miles southwest of Elko, Nevada, and is accessed via Nevada State Route 306 or Nevada State Route 278. The area covered by the approved

HC/CUEP Plan is located in Lander and Eureka counties, Nevada within portions of Township (T) 26 North (N), Range (R) 47 East (E) (sections 1, 2, 3, 11, and 12); T26N, R48E (sections 1-17, 20-29, and 32-36); and T27N, R48E (sections 14, 15, 20, 22, 23, 26-29, and 32-36) as shown on **Figure 1-1.**

2.1 Proposed Action

The two components of the Proposed Action are described below.

2.1.1 Plan of Operations Modification and Addendum

The BLM issued a Notice of Noncompliance Order to Barrick dated December 13, 2012 following BLM field inspections. Barrick was directed to account for all surface disturbance associated with the HC/CUEP Plan of Operations and to submit a Plan Modification. The inventory resulted in documentation of 405 acres of surface disturbance. Barrick submitted a Modification to the Plan to the BLM in May 2013 in response to the first Notice of Noncompliance Order. A revised Plan Modification was submitted in September 2013 to address BLM and NDEP comments on the May submittal.

A second Notice of Noncompliance Order was issued to Barrick dated September 19, 2013. The Order required Barrick to submit an inventory of surface disturbance associated with communication devices, sites, and locations where surface disturbance has occurred or where appurtenances or devices are temporarily or permanently affixed or located on the ground within the HC/CUEP boundary. During this inventory, an additional four acres of surface disturbance was accounted for, resulting in documentation of a total of 409 acres of disturbance. Barrick submitted an Addendum to the Plan of Operations Modification to the BLM in October 2013 in response to the second Notice of Noncompliance Order.

The Modification and Addendum add the following elements, as required by the BLM, to the HC/CUEP Plan of Operations:

- A new methodology to accurately track and report surface disturbance associated with exploration activities (**Appendix A**);
- An inventory of current surface disturbance;
- A restriction on new surface disturbance under the Plan Modification and Addendum until acreage has been reclaimed and released;
- A reclamation plan for all surface disturbances associated with communication devices and sites;
- An updated RCE; and
- A reclamation financial guarantee to cover existing and future disturbances contained in the modified exploration plan.

Barrick applied the new survey protocol entitled *HC/CUEP Surface Disturbance and Reclamation Survey Protocol* (May 2013) (**Appendix A**) in the assessment of current

disturbance. Procedures for tracking surface disturbance were improved by implementing the use of survey-grade equipment and/or aerial photography. Barrick will no longer use the standardized pad, sump, and road dimensions to estimate disturbed acreage. In the future, annual totals will be submitted to the NDEP and the BLM. The new protocol addresses general survey procedures for disturbance activities conducted within the HC/CUEP Plan boundary related to construction and reclamation activities performed by Barrick.

As part of the agency-directed actions, a revised RCE for the current disturbance was submitted to the BLM and the State of Nevada as required by the Orders, and the reclamation bond has been increased to cover the cost of reclaiming the current disturbance (409 acres). The RCE total includes an additional five acres of surface disturbance to allow for implementation of additional sediment and erosion controls as directed by the BLM.

Approval of the Plan Modification and Addendum would allow exploration and reclamation activities within the HC/CUEP Plan area to continue under the terms of permits and approvals as authorized by the BLM and the State of Nevada. Barrick anticipates that the maximum number of drill rigs within the HC/CUEP area at any one time could be up to 15 drill rigs per day. Barrick would be authorized to conduct exploration on areas within the HC/CUEP Plan boundary that have been reclaimed but which have not yet been released from reclamation bonding. This EA discloses the current environmental conditions of the existing surface disturbance total of 409 acres.

2.1.1.1 Current Surface Disturbance Inventory

As of August 15, 2014, 986 drill holes were completed within the HC/CUEP area. The majority of the drill holes are core holes with a reverse circulation (RC) pre-collar. The acreage which has been previously recontoured and seeded is included in the total disturbance since none of that acreage has been released by the BLM and NDEP from reclamation bonding. Current surface disturbance totals 409 acres, as summarized in **Table 2-1**.

Table 2-1 Current Surface Disturbance in HC/CUEP Area

Disturbance Type	Private Acres	Public Acres	Total Acres
Drill Roads < 30 percent (%) Underlying Slope	10.1	46.2	56.3
Drill Roads > 30% Underlying Slope	1.4	14.4	15.8
Drill Pads and Sumps < 30% Underlying Slope	8.6	51.3	59.9
Drill Pads and Sumps > 30% Underlying Slope	0.1	25.7	25.8
Trenches < 30% Underlying Slope	0	0	0
Trenches > 30% Underlying Slope	0	0	0
Communications Sites < 30% Underlying Slope	0.1	0.9	1.0
Communications Sites > 30% Underlying Slope	0	0	0
Existing Sediment/Erosion Control < 30% Underlying Slope	0	0	0
Existing Sediment/Erosion Control > 30% Underlying Slope	0	0	0

Table 2-1 Current Surface Disturbance in HC/CUEP Area

Disturbance Type	Private Acres	Public Acres	Total Acres
Geophysical Activities < 30% Underlying Slope	0	0	0
Geophysical Activities > 30% Underlying Slope	0	0	0
Surface Disturbance Recontoured/Seeded < 30% Underlying Slope	18.6	141.8	160.4
Surface Disturbance Recontoured/Seeded > 30% Underlying Slope	17.8	71.3	89.1
Total	56.7	351.6	408.3

2.1.2 Plan of Operations Amendment

Barrick submitted a Plan of Operations Amendment to the BLM in October 2013, which proposes to increase the disturbance authorized to 549 acres. Approval of the Plan Amendment would allow for up to 549 acres of surface disturbance for exploration activities including overland access, new road construction, geophysical analysis, trenching, test wells, monitoring wells, communication sites, construction of exploration drill pads and sumps, and reclamation. The exploration techniques proposed to occur are described in Section 2.2. The Amendment would allow for exploration activities to occur within the HC/CUEP Plan boundary, but without constraint to only open and active areas, as well as specify that surface disturbance activities may include communication sites.

The Plan Amendment would incorporate project components described for the Plan Modification and Addendum. This EA discloses the environmental conditions of the proposed surface disturbance total of 549 acres and analyzes the effects compared to the existing 409 acres of surface disturbance.

2.1.2.1 Plan of Operations Amendment Proposed Disturbance

Under the HC/CUEP Plan Amendment, Barrick proposes to increase the total authorized disturbance by an additional 140 acres to 549 acres.

As of August 15, 2014, 986 drill holes have been completed within the HC/CUEP Plan boundary. Many of the pads have multiple holes drilled within the pad disturbance area. Barrick anticipates 550 to 650 additional drill holes will be completed in the future under the Plan Amendment. The maximum number of holes open at any one time will be 60 drill holes.

Table 2-2 presents the estimated surface disturbance associated with the HC/CUEP Plan Amendment. There may be adjustments to the acreage estimated by disturbance type depending on the results from the exploration program. A map of proposed road and pad construction for the following year would be submitted to the BLM in the work plan prior to initiation of disturbance activities.

Table 2-2 Plan of Operations Amendment Estimated Surface Disturbance

Disturbance Type	Private Acres	Public Acres	Total Acres
Drill Roads < 30% Underlying Slope	15	67	82
Drill Roads > 30% Underlying Slope	3	52	55
Drill Pads and Sumps < 30% Underlying Slope	15	74	89
Drill Pads and Sumps > 30% Underlying Slope	1	66	67
Trenches < 30% Underlying Slope	0	1	1
Trenches > 30% Underlying Slope	0	1	1
Communications Sites < 30% Underlying Slope	0.1	0.9	1
Communications Sites > 30% Underlying Slope	0	0	0
Geophysical Activities < 30% Underlying Slope	0	1	1
Geophysical Activities > 30% Underlying Slope	0	2	2
Surface Disturbance Recontoured/Seeded < 30% Underlying Slope	18.6	141.8	160.4
Surface Disturbance Recontoured/Seeded > 30% Underlying Slope	17.8	71.3	89.1
Total	70.5	478	548.5

2.2 HC/CUEP Plan Exploration Activities

Exploration activities of the Proposed Action would include overland access, new road construction, geophysical analysis, trenching, test wells, monitoring wells, construction of exploration drill pads and sumps, and reclamation. These activities would be tracked according to the reclamation survey protocol outlined in **Appendix A**. Geophysical analysis techniques vary; methods are determined based on acreage limitations and targeting needs. Trenching involves surface excavation of material to depths ranging from 2 to 15 feet in order to assess geological and geotechnical characteristics. The trenching operation typically generates from 16 to 22 square feet of disturbance per linear foot of trenching.

HC/CUEP components subject to approval under 43 CFR Subpart 3715 Use and Occupancy include those that involve full or part-time residence on BLM administered lands in support of the development of locatable mineral deposits. Use or occupancy is limited to that which is reasonably incident to mining. Structures associated with test wells, monitoring wells, communication sites, and support buildings have been identified as subject to subpart 3715 approval.

Exploration drilling would be conducted by RC rigs, core rigs, and track-mounted rigs. Each rig is supported by at least two rubber-tired vehicles. The number of drill rigs on-site varies depending on seasonal conditions and the type of drilling conducted (RC drilling versus core rigs).

Drill hole depths would range between 600 and 4,000 feet below ground surface (bgs) with an average depth of about 2,500 feet bgs. The depth to groundwater ranges between 150 and 1,500

feet bgs and averages about 300 feet bgs. Drill hole abandonment would be conducted as per Nevada Administrative Code (NAC) 534. Barrick would plug all drill holes in accordance with NAC 534.4371 as administered by the Nevada Division of Water Resources (NDWR), State Engineer's Office. Barrick would comply with the drill hole abandonment procedures set forth in NAC 534.420 through 534.437 to prevent cross contamination of aquifers or contamination of ground and surface waters.

Exploration roads or two-track trails would provide overland access for tire-mounted or track drill rigs with the support vehicles. The roads would be graded and graveled when needed. The gravel is obtained from permitted sources. Roads and pads are watered using fresh water and drill-produced water after sufficient settling to reduce the solids content of the water.

Drill pads would be constructed to maintain sufficient space for safe operation of equipment. Drill pads may have multiple holes and multiple sumps. Drill pads and the associated sumps to contain groundwater produced during drilling vary in size depending on the type of drill rig used. Sumps are backfilled after completion of drilling for safety reasons and to ensure protection of the environment. The RCE includes the actual surface disturbance for the drill pads and sumps.

Drill mud from the pre-collar RC drilling would be collected in sumps and reused where practicable for the subsequent core drilling. Panels, wire fencing, snow fencing, electric fencing, and other types of barriers are installed and maintained around each sump to prevent access by larger wildlife, wild horses, and livestock. Fencing around sumps may be removed once the sump is dry. One end of each sump is sloped to provide an escape route in the event an animal enters the sump.

Most sumps are designed to prevent discharge; however, certain sumps are designed for controlled discharge in compliance with state regulations. When necessary, temporary discharge permits would be obtained from the NDEP Bureau of Water Pollution Control (BWPC) to allow sumps to discharge water into ephemeral drainages. *DeMinimis* permits are obtained from the NDEP for any direct discharge to perennial waterways. Piping is used to prevent discoloration of the ground surface from bentonite when it is necessary to transfer water between sumps. The pipe is placed directly on the ground between the sumps and removed when the transfer is complete. Barrick would use a flocculent approved by the NDEP to accelerate the settling of particles. Other passive filtration methods, such as filter bags or centrifuges, are employed to manage the separation of fine particulates from the water.

Straw bales, wattles, and other diversion controls called for in the exploration Stormwater Pollution Prevention Plan (SWPPP) are utilized to prevent erosion. The SWPPP is further discussed in Section 3.4.

Exploration roads are constructed using D-7 through D-9 class bulldozers or a track-mounted excavator. Material is side cast for reclamation. The interim seed mix may be applied to the material stockpiles. Overland travel, without blading, is used where practical and safe. Efforts to minimize surface disturbance are implemented when overland travel occurs. Prior to final

reclamation, newly constructed roads are water-barred to minimize erosional damage in accordance with state regulations and 43 CFR 3809.

2.2.1 Quality Assurance Plan

Barrick would continue to conduct site inspections of exploration operations and road construction on a daily basis. This includes on-site inspections of the operation as well as cell phone or radio contact with the drilling and construction crews to respond to field conditions and to address unexpected conditions or problems that may be encountered. Sites are examined to ensure that cultural sites, wetlands, springs, seeps, and drainages are avoided. In addition, any stipulations imposed by BLM, such as seasonal restrictions, are strictly enforced by Barrick.

Barrick would monitor drill hole abandonment to verify compliance with NAC 534.

Barrick maintains an internal disturbance permitting system that ensures the protection of cultural, biological, and water resources.

2.2.2 Monitoring and Reporting

Barrick provides an annual work plan to the BLM by March 1 of each year, which documents work to be completed in the upcoming year. This work plan proposes locations for drill roads, drill pads and reclamation, and includes a map of the proposed construction. An annual summary report is provided to the BLM and NDEP by April 15, which documents actual work completed during the previous year. It also lists which drill holes were left open and the reason for this action. In addition, Barrick proposes to submit to the BLM a short letter report each quarter with the disturbance data collected for the previous three months.

2.2.3 Applicant-committed Environmental Protection Measures

Measures that would be taken to prevent unnecessary or undue degradation are derived from the general requirements established by 43 CFR 3809 surface management regulations as well as State of Nevada mining, reclamation, water quality, well drilling, and air quality regulations.

The Plan Modification, Addendum, and Amendment incorporate the Applicant-committed Environmental Protection Measures (EPMs) identified in the HC/CUEP II EA (BLM 2004a), as superseded by the 2011 Addendum to HC/CUEP II DR/FONSI (BLM 2011a) and August 2012 DR (BLM 2012a). These measures are the Conditions of Approval in the BLM Plan of Operations Approval, May 2011, which incorporates by reference EA No. NV063-EA04-61 and the Addendum to the EA (November 2010), with further defined construction design and operational measures for drilling sumps as outlined in the Barrick report dated December 3, 2012. All of these measures currently are, and would continue to be, implemented as standard operating procedures to prevent unnecessary or undue degradation and to mitigate potential impacts to the environment. Additional EMPs have been developed to address the Proposed Action of the Plan Modification, Addendum, and Amendment. See Section 2.2.3.4 for a detailed description of the greater sage grouse EMPs.

The No Action Alternative incorporates the Applicant-committed EPMs identified in the HC/CUEP II EA (BLM 2004a), as superseded by the 2011 Addendum to HC/CUEP II

DR/FONSI (BLM 2011a) and August 2012 DR (BLM 2012a). These measures are the Conditions of Approval in the BLM Plan of Operations Approval, May 2011, which incorporates by reference EA No. NV063-EA04-61 and the Addendum to the EA (November 2010), with further defined construction design and operational measures for drilling sumps as outlined in the Barrick report dated December 3, 2012.

2.2.3.1 Air Quality

Barrick, in compliance with the NDEP Bureau of Air Pollution Control (BAPC) Surface Disturbance Permit, would protect air quality by undertaking road maintenance activities to reduce fugitive dust emissions. Roads would continue to be watered using fresh water or drill-produced groundwater consistent with the NDEP approval, graveled, or chemically treated to reduce fugitive dust emissions, based upon weather and road conditions. Application of water and/or a dust suppression chemical such as magnesium chloride by water trucks would be done, as needed, in areas of close-spaced drilling and related activity. Barrick would use wet drilling methods. Speed limits are posted and vehicle speeds reduced in areas of disturbance to minimize the potential for fugitive dust emissions, to protect wildlife and livestock, and to maintain operational safety. Speed limits would continue to be enforced. Project vehicles would continue to be maintained regularly to ensure they are operating in a manner to minimize vehicle emissions.

2.2.3.2 Water Quality

Spill Contingency Plan

Materials and equipment necessary for spill cleanup would be kept at each drill rig. Equipment and materials would include, but not be limited to, shovels, gloves, safety glasses, sorbent materials, sand, sawdust, and plastic/metal trash containers specifically for this purpose.

Well-maintained equipment would be used to perform the work required at the HC/CUEP. When practicable, equipment maintenance would be performed off-site. In the event of oil, fuel, lubricating grease, or other equipment leaks, cleanup would be conducted as soon as possible. If the leak is on compacted soil, an oil-absorbing product, such as Absorb®, may be applied. Once the cleanup product has absorbed the spill material, the product is removed and placed in the petroleum contaminated soil bin located in the laydown yard, and the material disposed of according to state and federal regulations. Any contaminated soil would be removed, managed, and disposed of at an off-site facility in compliance with state and federal regulations.

In the event of oil, fuel, or hydraulic fluid leaks, cleanup would be conducted as soon as possible. In the event of a major spill, the following actions would be taken in addition to any federal, state, and local health and safety regulations:

- Contain the spread or migration of the spill using the on-hand supply of erosion control structures and/or by creating dirt berms, as feasible and necessary.
- Regulated wastes will be removed from the HC/CUEP area and disposed of in a state, federal, or local designated area.

- If a spill of a petroleum constitute is considered to meet the reportable quantity per the NDEP's guidelines (greater than 25 gallons or greater than 3 cubic yards of impacted material) or a reportable quantity for hazardous waste is released based on the U.S. Environmental Protection Agency (EPA) guidelines established under Title III List of Lists (40 CFR Part 302), the BLM and NDEP (775) 687-4670 would be notified within 24 hours and the appropriate remedial actions and confirmation sampling will be conducted under direction of the NDEP.

Soil and Erosion Prevention and Control

Barrick would continue to conduct exploration operations to minimize soil erosion. Erosion and runoff control measures, such as water bars, ditching, and other water control structures would be implemented in areas of surface disturbance. After the exploration program is completed in an area, the surface disturbance would be graded, recontoured, and available topsoil/growth medium replaced, and the area would be seeded with an appropriate and BLM-approved seed mixture in order to establish a ground cover and minimize erosion. Revegetation activities would continue to be commenced at the earliest feasible time following reclamation activities. Best Management Practices (BMPs) utilized to control erosion and sedimentation are detailed in **Appendix B**.

Water and Riparian Resources

Natural drainage patterns would not be altered. Drill site construction within drainages would be avoided unless prior approval from the BLM and NDEP is obtained. When drainages must be crossed with a road, BMPs would be followed to minimize the surface disturbance and erosion potential. Temporary culverts and/or straw bales would be utilized to protect drainages. Smaller drainage patterns that could be affected by trench or pad construction would be restored, and all culverts and pipes would be removed upon completion of the exploration program.

The following construction and maintenance practices from the BLM Gold Book, Surface Operating Standards and Guidelines, Fourth Edition, Revised 2007 would continue to be implemented:

- All culverts should be laid on natural ground or at the original elevation of any drainage crossed. All future culverts should have a minimum diameter of 18 inches. The outlet of all culverts should extend at least 1 foot beyond the toe of any slope.
- Ditch grades should be no less than 0.5 percent to provide positive drainage and to avoid siltation.
- For "dry bed" or low flow road crossing which do not require a culvert, the drainage would not be filled so that water can flow across the crossing without being impounded.

Barrick would continue to plug all drill holes in accordance with NAC 534.4371 as administered by the NDWR, State Engineer's Office. Barrick would comply with the drill hole abandonment procedures set forth in NAC 534.420 through 534.437 to prevent cross contamination of aquifers or contamination of ground and surface waters.

Barrick would not conduct new surface disturbing activities within at least 100 feet of any drainage, seep, or spring that is actively flowing. From June 1 through August 15, Barrick would not conduct new surface disturbing activities within 0.5 mile of any drainage, seep, or spring that is actively flowing to minimize impact to wildlife. All exploration activities would continue to be conducted using BMPs such that sediments, cuttings, drilling fluids, or any other material or substance will not enter flowing drainages.

If Barrick determines that new surface disturbing activities within the aforementioned exclusion zones are required, Barrick would submit to the BLM a 1:24,000 scale map showing the locations of the proposed drill pads and access roads. Barrick will not conduct the proposed operations unless authorized by BLM, which may require further environmental analysis or operating restrictions.

Sumps would be excavated and managed to prevent overtopping and saturating the safety berms. Barrick would monitor sumps regularly for seeps or other evidence of erosion and would direct drill crews to cease activity and notify supervisors if seepage is observed. Barrick would ensure that sump evacuation proceeds for as long as drilling or other water-producing activities continue; if evacuation is not possible, Barrick would cease drilling as soon as water levels approach the sump capacity. No trash would be placed in the sumps.

2.2.3.3 Solid and Hazardous Wastes

The HC/CUEP would not generate, use or dispose of any hazardous waste. Petroleum products would be used on-site. Petroleum products are excluded as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act Section 101(14). Diesel, oil, and lubricants would be transported to the site in portable containers (e.g., tanks in the pickup trucks for diesel fuel) but would not be stored on-site. If regulated materials (petroleum products) are spilled, measures would be taken under Barrick's spill response guidelines to control the extent of the spill, and the appropriate agencies would be notified in accordance with the applicable federal and state regulations.

Solid waste would be collected at each drill pad and transported offsite periodically for disposal at an approved solid waste facility.

2.2.3.4 Wildlife and Sensitive Species

Barrick would have a BLM-qualified biologist survey in early spring of each year all areas proposed for drilling or surface disturbance for the presence of active nests. If active nests are located, or if other evidence of nesting is observed (e.g., mating pairs, territorial defense, carrying nesting material, transporting food), Barrick would notify the BLM.

The BLM would consult with the Nevada Department of Wildlife (NDOW) and the U.S. Fish and Wildlife Service (USFWS) as appropriate to determine the extent of any exclusion zone around these nests that may be necessary to protect a particular species in a particular location. Once the BLM establishes an exclusion zone, Barrick would not conduct any drilling or surface

disturbing activities within the exclusion zone until the BLM determines that the birds are no longer nesting.

Each year during the nesting season (March 1 to July 31), Barrick would not conduct drilling or surface disturbing activities within a 0.5 mile radius of any active raptor nests. Upon identifying an active raptor nest, Barrick would immediately notify the BLM.

Greater Sage-grouse (*Centrocercus urophasianus*)

Barrick would adhere to EPMs as established by the BLM for sage-grouse lek/strutting grounds and for known nesting and brood rearing areas. Noise generated by exploration activities would not increase ambient levels by 10 A-weighted decibels (dBA) at active leks based upon BLM stipulations (BLM 2014c). The EPM is applicable to potentially affected active leks within four miles of the HC/CUEP, which currently include the Horse Creek 01 Lek and the New Cortez – Grass Valley Lek. The New Brock Canyon Lek is excluded from the EPM due to topographical features which reduce or eliminate noise generated from the Proposed Action. The EPM is subject to review by a BLM biologist and may be adjusted based on annual surveys of lek activity. Upon identifying any previously unknown sage-grouse lek/strutting ground or nesting or brood rearing area, Barrick would immediately notify the BLM.

To prevent effects at leks from potential increases in noise, Barrick would implement sound reduction measures which may include sound modelling as per BLM protocol (BLM 2014c), placement of a sound barrier at drill rigs, or restriction of drilling operations during seasonal and daily timing periods. If the sound modeling shows no projected increase in noise levels above 10 dBA, no additional measures are needed. If the sound modeling shows an increase in noise levels above 10 dBA or if no modeling is conducted, Barrick would install sound barriers (likely hay bales or similar material) at the drill rig or would adhere to seasonal and time operational restrictions. The restrictions would be in place from March 1 through May 15 from 4:00 a.m. to 10:00 a.m. (BLM 2014c).

BLM acknowledges that a HC/CUEP-specific sage grouse map which outlines Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH) has been developed based on vegetation surveys done by ESCO Associates (ESCO) (ESCO 2014a, ESCO 2014b). Barrick would provide a Work Plan for future surface disturbance locations to the BLM. BLM may conduct field verification of PPH/PGH in areas of proposed surface disturbance to further define sage grouse habitat impacts.

In order to reduce impacts due to disturbance within PPH/PGH, Barrick would provide one or more of the following EPMs in coordination with the BLM:

- Pinyon-juniper removal
- Install sage grouse flight deterrents
- Exclosures surrounding springs, meadows, and riparian areas
- Payment for sage grouse mitigation (as outlined below)

Barrick would implement the EPM measures within two years of the Decision Record for the Modification and Addendum; an extension of the timeframe for implementing the EPM may be authorized by BLM. For the Proposed Action of the additional 140 acres of surface disturbance, Barrick would implement the EPM measures for the surface disturbance acres proposed for that year's Work Plan within two years of the submittal of the Work Plan; an extension of the timeframe for implementing the EPM may be authorized by BLM. Sage grouse EPMs completed would be reported in the annual disturbance summary report, which is provided to the BLM and NDEP by April 15.

Use of hand-thinning methods (i.e. chainsaw, lop and scatter of slash, etc.) to remove pinyon and juniper trees in areas that are determined to be actively encroaching into sage grouse habitat would be implemented. Pinyon-juniper would be removed from three acres of encroachment areas for every one acre of Proposed Project disturbance. Pinyon-juniper treatment would be prioritized to occur within the HC/CUEP boundary, and focus on Phase I and Phase II pinyon-juniper conditions. Treatment activities would not occur within a four-mile buffer from active leks from March 1 through June 30 to minimize the potential for impacts to breeding and nesting sage grouse. Surveys for migratory birds would be required between March 1 and July 31.

To minimize potential impacts to cultural resources as a result of these measures, several additional actions would be undertaken. As specific treatment sites are identified, a BLM staff archaeologist would evaluate the potential of the area for cultural resources, and would undertake avoidance measures as needed. To reduce the risk of unauthorized collection, field crews would be instructed by an agency archaeologist regarding the importance of cultural resources and the possible penalties under the Archaeological Resources Protection Act for the destruction of archaeological resources. In order to decrease the risk of inadvertent damage to fragile remains, crews would also be instructed to recognize wood and brush cultural resources.

Sage grouse flight deterrents (fence markers) would be attached to fences within sage grouse habitat at a BLM-determined ratio of number of deterrents for every acre of disturbance. Preferred locations of flight deterrents include fencing near leks and associated buffer areas.

Exclosures would be constructed surrounding springs, meadows, and riparian areas identified by BLM as important sage grouse habitat.

As outlined in the Memorandum of Understanding (MOU) *Regarding the Establishment of a Partnership for the Conservation and Protection of the Greater Sage-Grouse and Greater Sage-Grouse Habitat* (BLM et al. 2013), payment may be made into a sage grouse mitigation bank account or other program in an amount equal to the cost of satisfying the target mitigation ratios. Costs for making such improvements on private lands would be based on the Nevada Standardized Reclamation Cost Estimator (SRCE) model. The Nevada SRCE would also provide the basis for negotiating costs for public lands including cost of NEPA compliance (BLM et al. 2013).

Where reclaimed areas are found to adequately address some or all of the impacts to sage grouse habitat, the required habitat improvement acreage may be reduced or credited on a 1 acre to 1 acre ratio as determined by BLM (BLM et al. 2013).

Bats

Barrick would not conduct surface disturbing activities within 50 feet of existing adits, shaft openings, or caves to prevent any impacts to bat species potentially residing in or near these structures. If a BLM qualified biologist surveys the site and determines that bats are not residing in or near the structure, the aforementioned exclusion zone would not apply.

Other Special Status Species

In the event that other special status plant or wildlife species are identified within the HC/CUEP, Barrick would not conduct surface disturbing activities within the species' habitat until the BLM can evaluate the potential impact and coordinate with Barrick to devise and implement a plan to avoid the habitat.

2.2.3.5 Roads

Road construction and drainage operations are governed by the provisions of the HC/CUEP Plan and the State of Nevada General Stormwater Permit NVR 300000 (MSW-798 approved March 2013). Roads would be designed to the minimum standards needed to accommodate intended safe use and to maintain surface resource protection. Where feasible, exploration roads would be constructed along existing contours. Exploration road construction would be conducted in such a manner as to minimize cuts and fills, including limiting road construction on steep slopes, where possible.

2.2.3.6 Livestock and Range Allotments

Barrick would protect fences, gates, stock ponds, and other range improvements within the HC/CUEP. Gates would be closed and/or locked as appropriate. Any range monitoring key areas in the HC/CUEP area would be avoided.

2.2.3.7 Cultural Resources

Barrick would continue to conduct exploration activities in accordance with all applicable state and federal regulations and the 2005 Programmatic Agreement (PA) among BLM, the State Historic Preservation Office (SHPO), and Barrick. Before conducting any surface disturbing activities, Barrick would submit to the BLM a 1:24,000 scale map showing the location of proposed activity. For areas that previously have been surveyed at the Class III level, BLM would then determine which cultural sites need to be monitored and establish an exclusion zone around each site eligible for the National Register of Historic Places (NRHP).

For areas that have not been surveyed at a Class III level, BLM would determine the Area of Potential Effect and whether a Class III survey is necessary. If a Class III survey is required, Barrick would retain a BLM qualified archaeologist to undertake the inventory. BLM would also select a Native American observer from a list provided by the Te-Moak Tribe of Western Shoshone to accompany the archaeologist during the inventory to provide information and/or

recommendations to the BLM. If a tribal observer is not available upon five days' notice, BLM may select another qualified Native American observer or waive the requirement if none is available within a reasonable period. The archaeologist would submit a report that adheres to the BLM's Cultural Resource Inventory Guidelines documenting the results of the inventory. All documented sites would be protected from surface disturbing activities by an exclusion zone determined by a BLM archaeologist until the BLM assesses whether the site is eligible for listing on the NRHP. If the BLM determines, in consultation with SHPO, that such site is or may be eligible for the NRHP, Barrick would not conduct any surface disturbing activities within the exclusion zone without further authorization from BLM, which may require further environmental and/or cultural analyses. If the site is determined not to be eligible, or BLM determines that existing cultural surveys are sufficient to conclude that no eligible sites exist, Barrick may conduct surface disturbing activities upon notification by the BLM.

If Barrick discovers previously unknown cultural resources while undertaking exploration activities, Barrick would immediately cease any surface disturbing activity within 100 meters/330 feet of the discovery and notify the BLM. If the BLM determines, in consultation with SHPO, that the site is or may be eligible for the NRHP, a BLM archaeologist would determine an exclusion zone adequate to protect the resource. Barrick would not conduct any surface disturbing activities within this exclusion zone without further authorization from the BLM, which may require further environmental and/or cultural analyses. If the site is determined not to be eligible, Barrick may resume surface disturbing activities upon notification by the BLM.

Barrick's employees and contractors would receive training on the potential for cultural resources and the procedures required by Barrick to avoid disturbing, altering, or destroying any remains or any historical or archaeological site, structure, building, or object on federal land. If exploration activities uncover human remains, Barrick would immediately cease all earth disturbing activities within 100 meters/330 feet of the discovery and notify the BLM and county law enforcement so that BLM and/or law enforcement can ensure compliance with all applicable laws regarding such discovery.

If Barrick discovers a vertebrate fossil deposit during surface disturbing activities, Barrick would immediately cease further activities that may affect the deposit and notify the BLM so that the BLM may evaluate the discovery and establish an exclusion zone. Barrick would not undertake any further surface disturbance within the exclusion zone.

2.2.3.8 Native American Resources and Concerns

After more than 10 years of ethnographic work and consultation in the Crescent Valley/Cortez/Grass Valley/Pine Valley areas, which included interviews with knowledgeable individuals and groups, compilations of ethnographic research, field tours, and formal government-to-government consultations with federally recognized Native American tribes in the area, BLM determined that Mount Tenabo/White Cliffs and portions of Horse Canyon are eligible for listing on the NRHP as Properties of Cultural and Religious Importance (PCRI).

Before conducting any activity in the PCRI areas, Barrick would notify the BLM of the proposed activity so that the BLM may establish exclusion zones as necessary to protect the features identified as contributing elements in the April 19, 2004 eligibility determinations for the PCRI areas. Barrick would not conduct any activity within such exclusion zones without further authorization from the BLM, which may require further environmental and/or cultural analyses. For any activity conducted inside the PCRI areas, but outside of the exclusion zones, Barrick would arrange for a BLM qualified archaeologist and a Native American observer (as provided above) to be on site during new surface disturbing activity to ensure that contributing elements are not adversely affected by the operations.

2.2.3.9 Survey Monuments

Survey monuments, witness corners, and/or reference monuments would be protected to the extent economically and technically feasible. Should moving such a feature be required, Barrick would ensure that a licensed Professional Land Surveyor oversee and execute the relocation in a manner consistent with applicable laws. The BLM would be notified in writing prior to the moving of any such survey monument.

2.2.3.10 Fire Prevention and Control

Barrick would comply with all applicable federal and state fire laws and regulations, and would take all reasonable measures to prevent and suppress fires in the area of operations. Barrick and contractors are required to carry fire extinguishers, hand tools, and/or backpack-type water pumps in their vehicles to suppress small fires.

2.2.3.11 Noxious Weeds, Invasive and Non-native Species

Barrick would be responsible for controlling all noxious weeds in newly disturbed areas until the reclamation activities have been determined to be successful and released by the BLM Authorized Officer.

A noxious weed management plan has been prepared for HC/CUEP (ESCO 2013). The purpose of the plan is to prevent, mitigate, and control the spread of noxious weeds during and following exploration. The plan prescribes a control protocol using disturbance categories and best applicable control methods for effectiveness. Disturbance categories are applied to areas of HC/CUEP based on frequency of disturbance. The plan also includes a list of five weed control alternative methods, including manual, chemical, and seeding of desirable species methods, which are applied to each disturbance category.

Barrick would follow the noxious weed management plan (ESCO 2013). As part of weed control measures, Barrick would require that the undercarriage of all contractor vehicles be cleaned prior to entering the HC/CUEP area if the vehicle is coming from an area outside of northeastern Nevada. A list of State of Nevada weeds can be found at the State of Nevada Department of Agriculture website: http://agri.nv.gov/ Plant/Noxious_Weeds/.

Only chemicals approved for use on public land would be used for invasive, non-native weed treatment. Barrick would conduct weed eradication programs annually in areas of their activities. Areas of known noxious weeds, invasive and non-native species would be avoided during periods when weeds could be spread by vehicles (i.e. periods of potential seed dispersal).

The use of suitable seed mixes with only certified and tested seed, combined with implementation of prompt and appropriate revegetation techniques, would reduce the potential for invasive, non-native weed invasion. The BMPs of actively treating invasive, non-native weed upon discovery would also prevent these weed species from spreading and dominating the site. Re-establishment of vegetation in disturbance areas would be conducted as soon as practical to reduce the potential for wind and water erosion, minimize impacts to soils and vegetation, and help prevent the spread of noxious weeds, invasive and non-native species.

Reclaimed areas will be seeded with BLM-approved recommendations for seed mix, application rates, and seeding methods. The BMPs of actively treating noxious weeds, invasive and non-native species upon discovery would also prevent these weed species from spreading and dominating the site. Compliance with the noxious weed management plan (ESCO 2013) would insure exploration activities follow proper BLM protocol regarding noxious weeds, invasive and non-native species.

2.2.3.12 Forestry and Woodland Resources

Barrick would minimize where possible any injury or removal of pinyon pine, juniper, aspen, limber pine, or mountain mahogany during activities associated with drill pad and road construction. However, pinyon pine and juniper that has been removed due to exploration activities would be made available to the public.

2.2.3.13 Employee Training

Barrick would train employees, contractors, and other related personnel as to the environmental and cultural resources responsibilities required under this Plan as well as applicable state and federal law.

2.2.4 Reclamation

Reclamation of disturbed areas resulting from activities outlined in the Plan would be completed in accordance with BLM and NDEP regulations and requirements. Barrick would prepare a Documentation of Reclamation Activities for Surety Release to request release of areas that have been recontoured and seeded and meet the reclaimed desired plant communities (RDPCs). The RDPCs are described in Nevada Guidelines for Successful Revegetation for the Nevada Division of Environmental Protection, the U.S. Bureau of Land Management, and the U.S.D.A. Forest Service (Nevada Guidelines). As required by the Nevada Guidelines, "the plant community for the RDPC should be diverse, and when appropriate for the site should include grasses, forbs, shrubs, and/or trees. The RDPC shall be comprised of species native to the area, or introduced species where the need is documented for inclusion to achieve the approved post-mining land use. The RDPC must meet the requirements of applicable state and federal seed,

poisonous and noxious plants, and introduced species laws or regulations. All RDPCs must be approved by the agencies."

A qualified botanist would establish proposed reference areas for comparison with the reclaimed growth in accordance with Nevada Guidelines, taking into consideration elevation, slopes, soils, and aspect. The proposed reference areas and protocol would be submitted to the BLM and the NDEP for review and approval. Barrick has completed a vegetation survey to identify the proposed reference areas, including cover percentages. Barrick may request bond release for those reclaimed areas which meet the release criteria after the BLM and NDEP have approved the reference areas and protocol.

2.2.4.1 Reclamation Schedule

The anticipated time frame for the exploration activities is 10 years from the date of approval. Exploration activities are anticipated to continue regardless of weather conditions. Concurrent reclamation would take place where practicable. Drill pads and roads would be reclaimed in accordance with Nevada Revised Statute (NRS) 519A.285, and final reclamation would be initiated once the exploration program has been completed; such reclamation would be concluded within two years of cessation of exploration activities.

The estimated time to complete reclamation assumes average precipitation occurs during the year following seeding. Periods of drought could delay revegetation, while excessive precipitation could delay recontouring. The time to complete reclamation and closure activities is assumed to be staged in a manner that allows completion of earthworks within 18 to 24 months; however, planning and bond cost estimation is not dependent on whether the reclamation is completed in a single year or two years.

2.2.4.2 Post-exploration Land Uses

When the exploration program is completed; the post-exploration land use would revert back to the original land uses. Major existing land uses in the HC/CUEP area include livestock grazing, wildlife habitat, mineral exploration, and recreation.

2.2.4.3 Growth Media Stockpiling and Use

Material salvaged from the disturbed areas would be replaced. Where available (i.e., not in areas covered with rock), soils capable of serving as growth media would be salvaged and stockpiled as part of the fill. In addition to the soils, as much of the soil organic matter as possible would be salvaged to minimize compaction and promote aeration.

Seed Mixes

Generally, the final surface of backfilled sites and recontoured roads would be left in rough condition to hold seed and to optimize germination. Reclaimed areas would be seeded by broadcasting and harrowing, drill seeding, or hydroseeding and mulching with the approved BLM seed mixes; changes and/or adjustments to the seed mix and/or application rate may be made upon approval by the BLM. Seedlings would be planted by hand. The individual species and application rates have been selected to promote optimum seed germination and plant

growth. Seeding would typically occur between the months of October and April to take advantage of the winter/spring moisture.

Barrick has an ongoing reclamation program to seed areas that have been recontoured. Seed mixes are shown in **Table 2-3** and **Table 2-4**. Barrick has begun a program of handplanting Wyoming Big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and bitterbrush (*Purshia tridentata*) seedlings in reclaimed areas. Similar programs for hand-planting seedlings may occur in the future as deemed necessary to achieve the reclamation objectives.

Disturbed areas where an exploration interest remains, but final reclamation is not yet warranted would be seeded with the interim seed mix (**Table 2-5**). The purpose of the interim seed mix is to stabilize soils to prevent erosion and excess sedimentation for areas that may be re-disturbed in the future. Features that may undergo interim seeding include road cuts, side-cast material, and drill pads and sumps.

In the event of surface disturbance associated with an unplanned fluid release, Barrick would recontour any rills or gullies resulting from the release. Straw bales, wattles, and other diversion controls may be utilized to prevent erosion pending revegetation. The affected area would be seeded (hand seeded if the area is not accessible by equipment) using the BLM approved seed mix.

Table 2-3 HC/CUEP Seed Mix - higher elevations (above 6,000 feet amsl)

Species	Older Synonyms	Common Name	Percent of mix	Seeds per square foot	Broadcast Rate (PLS pounds/ acre)	Seeds/ pound
Pseudoroegneria spicata	Agropyron spicatum	Bluebunch wheatgrass	4.5	6.4	2	140,000
Thinopyrum intermedium	Agropyron trichophorum	Pubescent wheatgrass	2.1	3.0	3	100,000
Leymus cinereus	Elymus cinereus	Basin wildrye	6.3	9.0	3	130,000
Elymus lanceolatus ssp. lanceolatus	Agropyron dasystachyum	Thickspike wheatgrass	7.5	10.6	3	154,000
Festuca ovina		Sheep fescue	5.5	7.8	0.5	680,000
Ericameria nauseosa	Chrysothamnus nauseosus	Rubber rabbitbrush	6.5	9.2	1	400,000
Atriplex canescens		Fourwing saltbush	0.8	1.2	1	52,000
Purshia tridentata		Antelope bitterbrush	0.2	0.3	1	15,000
Artemisia tridentata ssp.		Wyoming big sagebrush	8.1	11.5	0.2	2,500,000

Species	**Older Synonyms**	**Common Name**	**Percent of mix**	**Seeds per square foot**	**Broadcast Rate (PLS pounds/ acre)**	**Seeds/ pound**
wyomingensis						
Melilotus officinalis		Yellowblossum sweetclover	0.4	0.6	0.5	52,000
Sanguisorba minor		Small burnet	0.4	0.6	0.5	49,000
Achillea lanulosa	*Achillea millefolium ssp lanulosa*	Western yarrow	44.8	63.6	1	2,770,000
Adenolinum lewisii	*Linum lewisii*	Lewis flax	2.8	3.9	1	170,000
Penstemon palmeri		Palmer penstemon	9.9	14.0	1	610,000
Totals			**99.9**	**141.6**	**18.7**	

Table 2-4 HC/CUEP Seed Mix - lower elevations (below 6,000 feet amsl)

Species	Older Synonyms	Common Name	Percent of mix	Broadcast Seeds per square feet.	Broadcast Rate (PLS pounds/ acre)	Seeds/ pound
Agropyron cristatum	*Agropyron desertorum*	Crested wheatgrass	5.2	12.2	2	265,260
Leymus cinereus	*Elymus cinereus*	Basin wildrye	3.8	9.0	3	130,000
Elymus lanceolatus ssp. lanceolatus	*Agropyron dasystachyum*	Thickspike wheatgrass	3.0	7.1	2	154,000
Poa secunda	*Poa sandbergii*	Sandberg bluegrass	5.1	12.0	0.5	1,047,000
Achnatherum hymenoides	*Oryzopsis hymenoides*	Indian ricegrass	1.4	3.2	1	141,000
Elymus elymoides	*Sitanion hystrix*	Bottlebrush squirreltail	1.9	4.4	1	192,000
Sanguisorba minor		Small burnet	0.2	0.6	0.5	49,000
Ericameria nauseosa	*Chrysothamnus nauseosus*	Rubber rabbitbrush	2.0	4.6	0.5	400,000
Penstemon palmeri		Palmer penstemon	6.0	14.0	1	610,000
Achillea lanulosa	*Achillea millefolium ssp lanulosa*	Western yarrow	27.0	63.6	1	2,770,000
Atriplex canescens		Fourwing saltbush	1.0	2.4	2	52,000
Artemisia tridentata ssp. wyomingensis		Wyoming big sagebrush	4.9	11.5	0.2	2,500,000
Atriplex confertifolia		Shadscale	0.2	0.4	0.25	64,900
Kraaschninnikovia lanata	*Eurotia, Ceratoides lanata*	Winterfat	0.3	0.7	0.25	123,000
Totals			**61.9**	**145.6**	**15.2**	

Table 2-5 Interim Stabilization Seed Mix

Scientific Name	Common Name	Application Rate (broadcast) (pounds pure-live-seed per acre)
Medicago sativa	Alfalfa	1.0
Agropyron crisatum	Crested wheatgrass	1.0
Total Application Rate		**2.0**

2.2.4.4 Noxious Weed Management

Weed management would follow steps described in Section 2.2.3.11, including those described in the HC/CUEP noxious weed management plan (ESCO 2013).

2.2.4.5 Disposition of Structures, Equipment, and Materials

Temporary facilities, such as portable toilets or storage trailers, would be removed from the site during reclamation activities.

When drilling activities are completed, drill steel, drilling products, portable light plants/generators, or other drilling equipment would be removed from the site when the drilling contractor demobilizes.

2.2.4.6 Road, Drill Pad, and Sump Reclamation

Roads would be narrowed to approximate pre-disturbance conditions and would be reclaimed, unless there is a subsequent agreement with the BLM to maintain selected post-closure road access. Drill pads and sumps no longer needed for exploration activities would be reclaimed.

Reclamation of the roads in very steep terrain (steeper than 3H:1V) may result in original topography not being attained. In this case, the cross-section would be blended to ensure no steeper than 2.5H:1V slopes except where cut banks are on the inside of the road and located generally in bedrock.

In the Plan area, roads and safety berms would be graded approximately to the original contour before disturbance. Where the road is located on fill, the side slopes would be rounded and graded to 2.5H:1V. Finished slopes would be relatively similar to the surrounding topography. Compacted road surfaces would then be ripped, covered with reclamation material from the safety berms or road fill, and revegetated. Ditches that would no longer be required would be graded and unneeded culverts removed. Some access roads may be needed to access monitoring points.

2.2.4.7 Drill Hole Plugging and Water Well Abandonment

Mineral exploration, development, and condemnation drill holes as well as monitoring and production wells subject to NDWR regulations would be abandoned in accordance with applicable rules and regulations (NAC 534.420 through 534.427). Boreholes would be sealed to prevent cross contamination between aquifers, and the required shallow seal would be placed to prevent contamination by surface access.

2.2.4.8 Post-reclamation Monitoring and Maintenance

Following the end of exploration activities, berm and sign maintenance, site inspections, and other necessary monitoring for the period of reclamation responsibility would be conducted. Monitoring of revegetation success would be conducted annually until the revegetation standards have been met, as determined by the BLM and the NDEP. Revegetation monitoring would occur based on seasonal growth patterns, nearby reference area vegetation patterns, precipitation, and weather conditions. Noxious weed monitoring would be undertaken in conjunction with revegetation monitoring.

2.2.4.9 Measures to be taken during Extended Periods of Non-Operation

The standard operating schedules at the HC/CUEP area would be up to 24 hours a day, 365 days a year. No temporary or interim closures of the exploration program are planned. However, due to weather conditions, mechanical or technical difficulties, unfavorable economic conditions, litigation, severe seismic events, or other unforeseen events, activities may have to be temporarily ceased.

In the event that continuous operation is interrupted due to economic considerations or unforeseen circumstances, care and maintenance may be initiated as outlined below:

- Roads: The major roads would receive maintenance, as necessary.
- Erosion Control Measures: All erosion control measures and BMPs would be regularly inspected and maintained.

Per NAC 519A.320(2), Barrick would notify the BLM and the NDEP Bureau of Mining Regulation and Reclamation in writing within 90 days after any project suspension that is anticipated to last longer than 120 days. Barrick would identify the nature and reason for the suspension, the duration of the suspension, and the events expected to result in either resumption of exploration or the abandonment of the exploration project.

2.3 No Action Alternative

Under the No Action Alternative, BLM would not grant approval of the Plan Modification and Addendum. Exploration and reclamation activities would continue in open and active areas only. The No Action Alternative incorporates the Applicant-committed EPMs identified in the HC/CUEP II EA (BLM 2004a), and superseded by the 2011 Addendum to HC/CUEP II DR/FONSI (BLM 2011a) and August 2012 DR (BLM 2012a). These measures are the Conditions of Approval in the BLM Plan of Operations Approval, May 2011, which incorporates by reference EA No. NV063-EA04-61 and the Addendum to the EA (November 2010), with further defined construction design and operational measures for drilling sumps as outlined in the Barrick report dated December 3, 2012.

Under the No Action Alternative, the Plan of Operations Amendment would not be approved. Additional exploration activities proposed by Barrick in the Plan Amendment would not be authorized or implemented.

2.4 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, present, and RFFAs that could interact with the Proposed Action in a manner that would result in cumulative impacts. The past and present actions and RFFAs were described in detail in the Cortez Hills Expansion Project Final Environmental Impact Statement (FEIS) (BLM 2008c) and are updated for this EA analysis. These projects and actions are identified in **Table 2-6**.

The area of concern for cumulative effects varies by resource, and cumulative impacts could involve more than surface disturbance. The cumulative effects study area includes the HC/CUEP Plan boundary at a minimum. Additional details for resource-specific cumulative effects study areas are described in resource sections of Chapter 3.0, as applicable. The period of potential cumulative impact is defined as the 10 years of exploration activities from the date of approval of the HC/CUEP Plan Modification and Addendum, and the HC/CUEP Plan Amendment, plus two years of reclamation. The cumulative effects analysis in this EA tiers off of and expands the analysis in the Cortez Hills FEIS (BLM 2008c).

Table 2-6 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
Barrick Cortez, Inc. (BCI) Cortez Gold Mine (CGM) Operations Area (incl. 2011 Plan Amend)	16,119	0	16,119
BCI CGM Operations Area (2014 Plan Amend)	0	581	581
BCI Horse Canyon	698	0	698
BCI Robertson Mine	285	0	285
BCI Satellite Mine Southeast of Cortez Hills (1)	0	1,500	1,500
BCI Satellite Mine North- Northwest of	0	1,500	1,500

Table 2-6 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)
Pipeline/South Pipeline (2)			
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[1]	18	0	18
Mud Spring Gulch	10	0	10
South Silicified Project	31	0	31
Utah Mine and Camp	6	0	6
Subtotal	18,996	3,581	22,577
			Exploration
Notices BLM-BMD Office: 118 expired, 8 pending, and 30 authorized[2]	265	0	265
Plans (7) BLM-BMD Office[2]	306	0	306
Notices (10) BLM-Ely Field Office[2]	50	0	50
BCI CGM Operations Area	391	0	391
BCI Cortez Underground Exploration Project	5	0	5
BCI HC/CUEP	250	--	--
BCI West Pine Valley	150	0	150
BCI West Side	0	200	200
CGM Operations 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[3]	22	0	22
Dean Mine	67	0	67
Fire Creek Exploration/Underground Project	50	0	50
Mud Springs	0	10	10
Robertson Exploration Project[3]	194	100	294
Santa Fe Mill Canyon	250	0	250

Table 2-6 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)
South Roberts	0	3	3
Toiyabe Project	20	0	20
Uhalde Lease	100	0	100
Mill Canyon Exploration [4]	250	0	250
Subtotal	2,524	913	3,187
Utilities/Community			
State Route 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)[5]	0	58	58
BCI Jeremy's Knob Communications Tower and right-of-way (ROW)[6]	0	0.5	0.5
Towns of Crescent Valley and Beowawe[7]	900	0	900
Subtotal	3,605	123	3,728
Other Development and Actions			
BLM Fuels Reduction Projects[8]	5,641	900	6,541
Wildfires[9]	90,099	0	90,099
Recreation[10]	0	0	0
Livestock[11]	10	4,313	4,323
Agriculture Development[12]	9,750	0	9,750
BCI Additional Irrigation Pivots at Dean Ranch	0	640	640
Lodge at Pine Valley[13]	30	0	30
Crescent Valley Water Supply	2	0	2
Subtotal	105,532	5,853	111,385
Total	130,657	10,470	140,877

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

[3] Coral Resources' Robertson Exploration Project boundary is located immediately north of, and partially within, the CGM Operations Area.

[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 from the 250 acres of disturbance authorized in 1993.

[5] ROW would run from the Lodge at Pine Valley to BCI Control #3. Projected ROW length is approximately 24 miles.

[6] BCI facility located in T28N, R47E, South (S) 18SESE just north of the CGM Operations Area; ROW N-092170 .

[7] 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.

[8] Inclusive of acreage associated with the Crescent Valley Wildland Urban Interface Fire Defense System, Tonkin Hazardous Fuels Reduction Project, Red Hills Hazardous Fuels Reduction Project, and the proposed Greater sage-grouse EPM. Of the total acreage, planned prescribed burns would affect up to 2,537 acres of pinyon-juniper woodland, and 800 acres of pinyon-juniper woodland would be thinned. The HC/CUEP Greater sage-grouse EPM accounts for future treatment of 900 acres of encroaching pinyon-juniper.

[9] Reflects acreage of vegetation affected by wildland fires from 1998 through 2006. The acreage is inclusive of approximately 22,918 acres of fire-affected pinyon-juniper woodland.

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

[11] 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.

[12] 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 Division of Water Resources. These values are based on permitted or authorized use of water and may not reflect actual use in a given year.

[13] This facility is located on the JD Ranch Road approximately four miles west of State Route 278 at the BCI-owned JD Ranch. The facility provides accommodations for up to 300 workers.

Source: BLM 2014a.

3.0 Affected Environment and Environmental Consequences

This chapter describes the environment affected by the Proposed Action and the No Action alternatives, the anticipated direct and indirect impacts of the Proposed Action and the No Action alternatives, as well as potential cumulative impacts. The analysis of potential impacts of the Proposed Action incorporates implementation of the applicant-committed EPMs identified in Section 2.2.3. Additional protection measures identified for individual resources in response to anticipated impacts are discussed at the end of each resource section, as applicable.

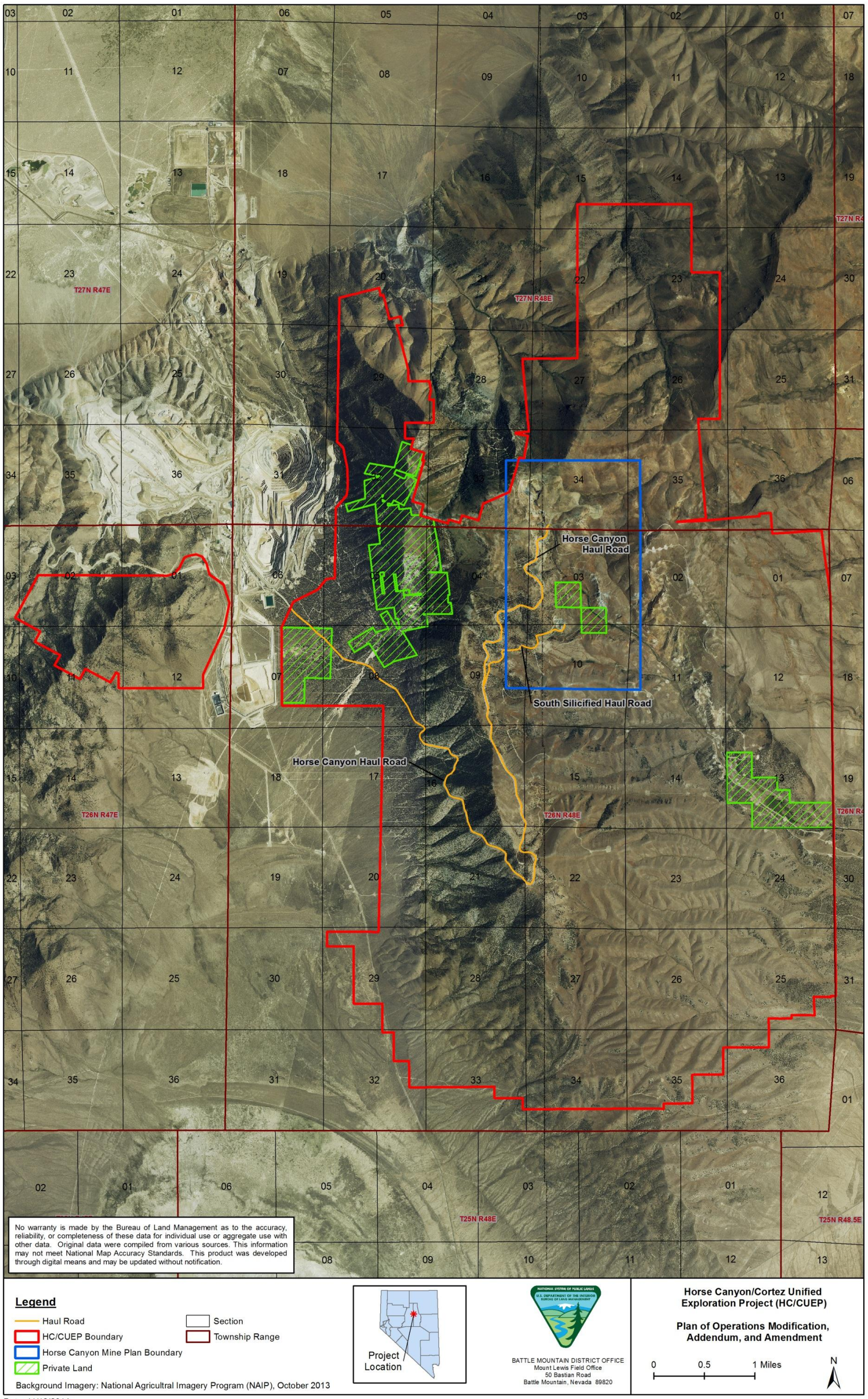
For resources where HC/CUEP (Project)-specific impacts are identified, the Proposed Action is considered with other past and present actions and reasonably foreseeable future actions (RFFAs) to assess the potential for cumulative effects. The area considered in the cumulative effects analyses differs by resource. At a maximum, the cumulative analysis considers projects that have caused surface disturbance within a geographic area that incorporates the southwestern portion of Pine Valley, the southern portion of Crescent Valley, and the northern portion of Grass Valley. The period of potential cumulative impact is defined as approximately 10 years, plus two additional years for final reclamation.

3.1 General Setting

The HC/CUEP area principally lies along the east side of the Cortez Mountains in Eureka and Lander counties, Nevada. A small portion of the HC/CUEP area extends to the western flank of the Cortez Mountains. Current exploration activities within the HC/CUEP Plan of Operations (Plan) boundary have been centralized in the Horse Canyon area. Understanding the exploration history is important when considering surface disturbance associated with HC/CUEP activities. Pre-1981 roads created in the HC/CUEP area are not part of the existing 409 acres of HC/CUEP exploration disturbance.

The Horse Canyon haul road, which connects the Cortez Mill #1 area to the former Horse Canyon Mine, is authorized under the Cortez Mine Plan (NVN-067575) and the Horse Canyon Mine Plan (NVN-066879). Additional surface disturbance authorized by the Horse Canyon Mine Plan of Operations includes open pits, waste rock disposal facility, and supporting roads. **Figure 3-1** shows the HC/CUEP Plan boundary and the Horse Canyon Mine Plan boundary overlaid on National Agriculture Imagery Program (NAIP) imagery dated 2013.

Figure 3-1 General Setting



Date: 11/12/2014

3.2 Supplemental Authorities/Resources Considered for Analysis

The BLM's NEPA Handbook H-1790-1 (BLM 2008a) and Nevada Instruction Memorandum (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.

Table 3-2 includes other resources deemed appropriate for evaluation by the BLM. These tables also indicate whether an element or resource was analyzed in the EA, and the location in this chapter where the element or resource is addressed. The elements and resources that do not occur in the HC/CUEP area or would not be affected based on internal scoping are not discussed further in this EA. The elimination of non-relevant elements complies with the CEQ policy.

Table 3-1 Supplemental Authorities to be Considered

Supplemental Authority	Not Present	Present/Not Affected	Present/May Be Affected	EA Section Number or Rationale for Elimination
Air Quality			x	3.13
Areas of Critical Environmental Concern (ACEC)	x			Would not be affected. No ACECs occur in the HC/CUEP vicinity.
Cultural Resources			x	3.11
Environmental Justice	x			Based on a review of existing baseline data, no minority or low-income groups would be disproportionately affected by health or environmental effects as a result of implementation of the Proposed Action. This element is not present within the Project Area or vicinity and is not further analyzed in this EA.
Farm Lands (prime or unique)	x			Would not be affected. No prime or unique farm lands occur in the HC/CUEP vicinity.
Floodplains		x		Would not be affected. Proposed activities would not alter natural floodplains; Project area occurs within Zone C (low risk).
Forests and Rangelands (Healthy Forest Restoration Act [HFRA] only)	x			Would not be affected. HC/CUEP does not meet the requirements to qualify as a HFRA project.
Human Health and Safety (Herbicide Projects)		x		The Project may use herbicides in accordance with Barrick's authorized noxious weed management plan (see Section 2.2.3.11); however, EO 13045 would not apply as pesticides and herbicides would not be used in locations where children would be exposed.
Migratory Birds			x	3.9

Table 3-1 Supplemental Authorities to be Considered

Supplemental Authority	Not Present	Present/Not Affected	Present/May Be Affected	EA Section Number or Rationale for Elimination
Native American Cultural Concerns			x	3.12
Noxious Weeds, Invasive and Non-native Species			x	3.5
Threatened and Endangered Species (Plants and Animals)			x	3.9
Wastes, Hazardous or Solid			x	3.14
Water Quality, Surface/Groundwater			x	3.4
Wetlands/Riparian Zones			x	3.4
Wild and Scenic Rivers	x			Would not be affected. No wild and scenic rivers occur in the HC/CUEP or vicinity.
Wilderness/Wilderness Study Areas (WSAs)/lands of wilderness characteristics	x			Wilderness or WSAs are not present within the Project Area or vicinity. The BLM conducted a lands with wilderness characteristics inventory of the Project Area on September 10, 2014, and determined there are no lands with wilderness characteristics in the Project Area. These elements are not further analyzed in this EA. Would not be affected. No wilderness occurs in the HC/CUEP vicinity.

Table 3-2 Other Resources of the Human Environment

Other Resources	Not Present	Present/Not Affected	Present/May Be Affected	EA Section Number or Rationale for Elimination
Fish and Wildlife			x	3.8
Grazing Management			x	3.10
Land Use Authorization		x		Would not be affected according to LR2000 report, accessed 10/8/14; no changes anticipated.
Geology		x		3.3 (Carried forward for informational purposes and for supporting related resources.)
Noise			x	Effects related to wildlife analyzed in 3.8.
Paleontological Resources	x			Would not be affected; not present.
Recreation			x	3.16
Social and Economic Values			x	3.17
Soils			x	3.7
Special Status Plant Species			x	3.9
Special Status Fish and Wildlife Species			x	3.9
Vegetation			x	3.5
Forestry and Woodland Resources			x	3.6
Visual Resources			x	3.15
Wild Horses and Burros	x			Would not be affected. HC/CUEP is outside the boundaries of designated herd management areas.

3.3 Geology

This section describes the geologic resources found within the existing HC/CUEP Plan boundary. Geologic resources are presented to provide information on the project setting and support other resource analyses. Impacts to geology were not identified.

3.3.1 Geologic Setting

The regional geology of the HC/CUEP area is shown in **Figure 3-2**. **Figure 3-3** shows geologic cross-sections in the HC/CUEP area.

The geology in the HC/CUEP area includes a relatively complex sedimentary sequence of Paleozoic-aged rocks. Paleozoic sedimentary rocks are the dominant geologic formations throughout the area and have undergone a history of sedimentation and deformation. During the early Paleozoic Era, clastic and carbonate rocks were deposited in a shallow marine

environment on the western continental margin of North America. These marine clastic rocks (referred to as the Western Assemblage) were deposited in the deep water to the west, while carbonate rocks (referred to as the Eastern Assemblage) were deposited in the shallow water to the east (Stewart 1980). The formations associated with the Western Assemblage are predominantly siliceous with very little carbonate, while formations associated with the Eastern Assemblage are predominantly carbonate (Gilluly and Masursky 1965).

During the Late Devonian and Early Mississippian geologic periods, sedimentary deposition was interrupted, and the Paleozoic sediments were uplifted, folded, and faulted during a tectonic event referred to as the Antler Orogeny. The Roberts Mountain Thrust, a system of low-angle thrust faults which created major deformation of the Paleozoic rocks, is the main structural expression of the Antler Orogeny. Movement along the Roberts Mountain Thrust resulted in the displacement of the Western Assemblage up to 90 miles eastward over the Eastern Assemblage (Stewart 1980). As a result, the Western Assemblage occurs in the upper plate of the thrust, while the Eastern Assemblage occurs in the lower plate of the thrust (Gilluly and Masursky 1965).

Within the Eastern Assemblage (lower plate), the Ordovician-age dolomites and limestones of the Hanson Creek Formation are the deepest-lying units of interest, overlain by Silurian-age calcareous siltstones and dolostones of the Roberts Mountains Formation. The Devonian-age Wenban Formation, composed of impure carbonate rocks, overlies the Roberts Mountains Formation. The Devonian-age Horse Canyon Formation overlies the Wenban Formation, and comprises siliclastic and calcareous clastic rocks.

The Ordovician-age Vinini Formation, the stratigraphically lowest member of the Western Assemblage (upper plate), unconformably overlies the Horse Canyon Formation.

The structural architecture created by the Antler Orogeny accommodated the emplacement of the Jurassic-aged Mill Canyon stock: a composite stock predominantly of quartz monzonite composition. The Mill Canyon stock intrudes the lower plate carbonate sedimentary rocks providing additional ground preparation and a local heat source for later mineralizing fluids. Gilluly and Masursky (1965) describe two parts of the stock: (1) a discordant, rectangular shape along the western lobe and (2) a laccolithic or bysmalithic eastern lobe.

Tertiary basalt flows, up to 200 feet thick, occur in the Cortez Mountains. During the late Tertiary and Quaternary periods, continual uplift and erosion of the mountains have partially filled the basins with unconsolidated to poorly consolidated silt, sand, gravel, and boulders. The boundary between the mountains and the valley margins generally is covered by coalescing alluvial fan deposits, whereas the centers of the valleys are dominated by finer-grained alluvium deposited by ephemeral streams and in playas (Stewart 1980). Alluvial sediments filling the valleys in north-central Nevada typically are thousands of feet thick. The alluvial sediments in Pine Valley are expected to be similar in thickness (BLM 2011b). The generalized stratigraphic sequence of the HC/CUEP area is summarized below.

Strategraphic Sequence

Tertiary-Quaternary alluviums (Qa) – Alluvial, colluvial, terrace, pediment, and landslide deposits (Wells and Elliott 1971; Gilluly and Masursky 1965).

Tertiary basalt (Tb) – Tertiary extrusive basaltic andesite overlying Tertiary gravels and forming a cuesta dipping gently to the southeast. The basaltic andesite is intruded and overlain by Tertiary rhyolite porphyry in some locations (Wells and Elliott 1971; Gilluly and Masursky 1965).

Tertiary tuffs and gravels (Ttf and Tg) – Gravels of dominantly upper-plate lithology having variable percentages of clay-altered volcanics, with interbedded, variably clay-altered tuffs that underlie the Tertiary basalt. Occasionally present at or near the surface where the basalt is absent.

Jurassic quartz monzonite (Jqm) – The Mill Canyon stock is a composite stock with an older porphyritic quartz phase, a magnetite-bearing phase, and a phaneritic (coarse-grained) phase. Mineral composition consists of biotite, feldspars, and quartz with minor magnetite. The composition of the Mill Canyon stock ranges from quartz monzonite to granodiorite.

Ordovician Vinini Formation (Ovi) – Upper-plate unit with sequences of siltstone and shale interbedded with fine-grained chert, sandstone, and quartzite that are generally extensively sheared, carbonaceous siliciclastics (Gilluly and Masursky 1965).

Devonian Horse Canyon Siltstones (Dhc) – A lower-plate unit consisting of largely calcareous siltstones, which are readily silicified to the extent that they appear similar to siliciclastics of the upper plate. Dhc is a principal host of gold in the Project area and in other mines in the district, including the Horse Canyon and Cortez Hills mines. Four sub-units are noted, of which Unit 3 is the most commonly observed and is a primary gold host. Unit 3 is a weakly calcareous, thinly planar-laminated siltstone between 50 and 400 feet thick, the lower portion of which commonly contains thin interbeds of siliceous siltstone. The Horse Canyon/Wenban contact is interpreted to be structural based on outcrop observations and drill intercepts, likely representing a major movement plane during the Antler Orogeny and subsequent Mesozoic deformation.

Devonian Wenban Limestone (Dw) – The Wenban Limestone is a dark-grey, thick-bedded, bioclastic limestone that is interbedded with thin-bedded argillaceous weathering slabby limestone (Gilluly and Masursky 1965). Dw is another primary host of gold in the Project area. Eight sub-units of the Wenban Limestone have been characterized. Of these, the most important gold-host horizon is Unit 5, a sequence of thinly laminated silty limestone interspersed with turbidites/debris flows. Evidence for mineralized zones deeper in the Wenban section (Units 4 and 3) is observed in scattered drilling but available data at those depths are limited.

Silurian Roberts Mountains Formation (Srm) – The Roberts Mountains Formation is a homogeneous, black, pyritic, laminated, silty, graptolitic limestone composed of approximately 80 percent calcite, 15 percent quartz, five percent potassium feldspar, and less than one percent

muscovite (Gilluly and Masursky 1965). It lies conformably below the Wenban Limestone (Gilluly and Masursky 1965).

Ordovician Hanson Creek Formation (Ohc) – Comprised of an upper and lower fine-grained dolomite member with a middle member of siliceous limestone; lower dolomite is dark gray to black, the middle limestone is massive and light gray, and the upper dolomite is massive and light gray with fossils in the upper-most beds (Gilluly and Masursky 1965).

3.3.2 Alteration and Mineralization

The two major types of alteration are silicification and argillization. Alteration in the Dw Unit 5 is dominated by a thick stratiform silica-sulfide breccia (50 to 150 feet). The breccia shows features typical of collapse brecciation (angular clasts, graded cavity fill, etc.) and commonly contains clasts of mafic dike material. Decarbonitization occurs in large parts of the middle Dw, resulting in solution collapse and subsequent strong silicification. Carbonate units frequently show strong decarbonitization and argillization above and below the breccia horizon, with remobilized carbon and fine-grained sulfides replacing carbonate minerals with little or no replacement silica present.

The mineralization is typical Carlin-style. The breccia horizon in the Dw Unit 5 is variably sulfidized; sulfide enrichment appears to be directly correlatable to gold grade. The replacement-style alteration can locally host high grade gold (>0.25 ounce/ton), particularly at the Horse Canyon/Wenban contact and in the middle Dw.

The mineral resources within the HC/CUEP area and the adjacent West Pine Valley Plan of Operations (NVN-077213) area are collectively referred to as the Barrick Goldrush Project. Barrick has defined the following mineral resources for the Goldrush Project, based on a gold price of $1,500 per ounce, as reported in the Barrick 2013 Annual Report:

Measured and Indicated	9.537 million ounces
Inferred	5.555 million ounces

Figure 3-2 Regional Geology

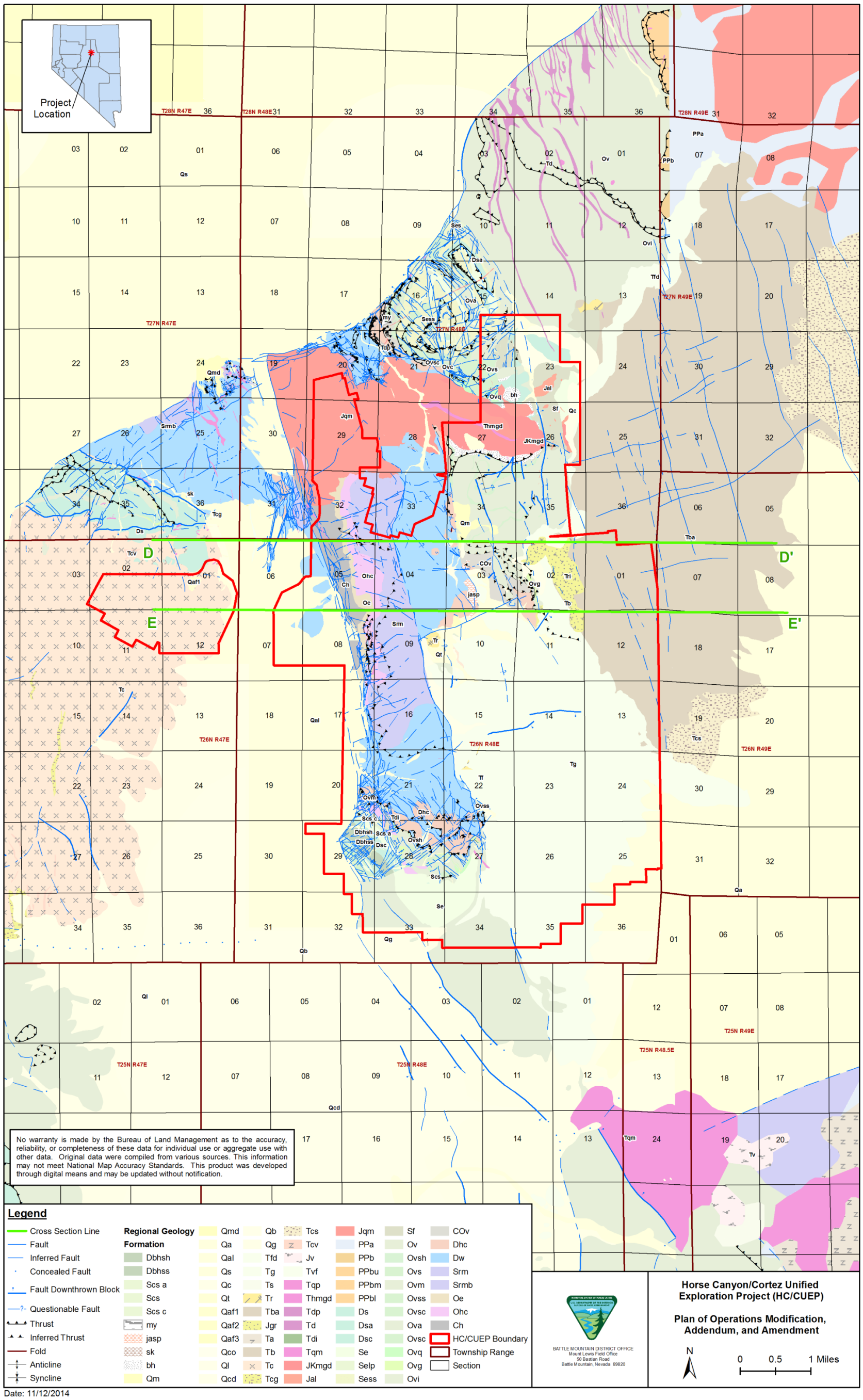


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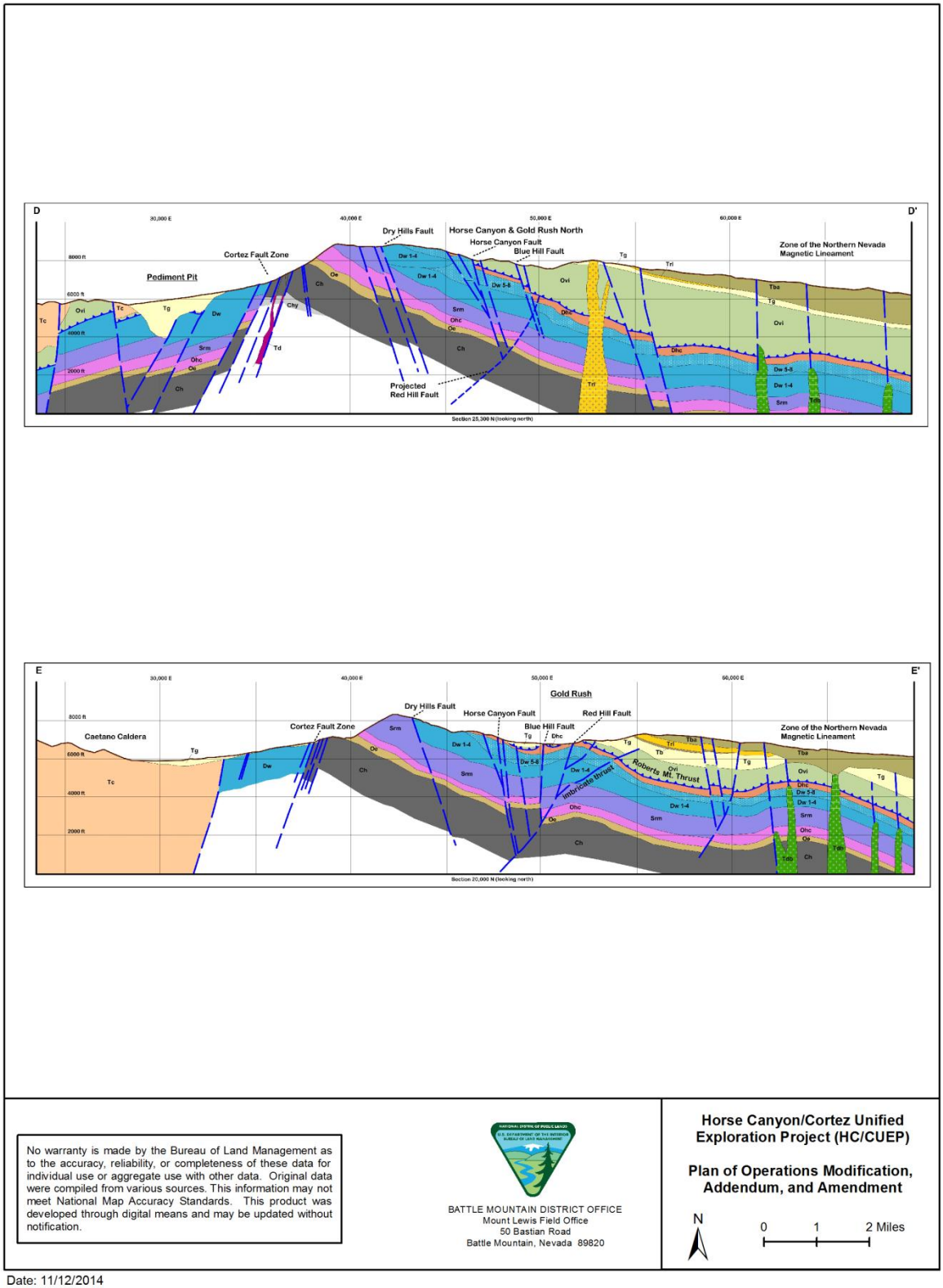
Figure 3-3 Geologic Cross-sections



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

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Battle Mountain, Nevada 89820

Horse Canyon/Cortez Unified Exploration Project (HC/CUEP)

Plan of Operations Modification, Addendum, and Amendment

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Date: 11/12/2014

3.4 Water Resources

This section describes the affected environment for consideration of direct, indirect, and cumulative impacts to water resources, including surface water resources (streams, seeps/springs, and wetlands) and groundwater resources. The analysis of potential direct, indirect, and cumulative impacts to surface water resources includes the evaluation of water quality and quantity for surface water features found within the HC/CUEP Plan boundary. For groundwater, the direct, indirect, and cumulative analysis area includes two principal hydrogeologic units: the basin fill unit and the carbonate bedrock lower-plate unit.

3.4.1 Affected Environment Water Resources

The HC/CUEP Plan boundary encompasses portions of the Crescent Valley Hydrographic Area (No. 54), the Pine Valley Hydrographic Area (No. 53), and the Grass Valley Hydrographic Area (No. 138) as defined by the NDWR (**Figure 3-4**).

Mount Tenabo marks the intersection of these three hydrographic areas, separating Crescent Valley to the north, Grass Valley to the southwest, and Pine Valley to the east. Both the Crescent Valley and Pine Valley hydrographic areas are part of the Humboldt River Region (Hydrographic Region 4). Grass Valley is part of the Central Region (Hydrographic Region 10) (NDWP 1999).

As is typical in the Basin and Range Province, the HC/CUEP area is dominated by mountain block watersheds that drain onto broad alluvial fans and valley fills. Drainages in the HC/CUEP area are described below, and are shown on **Figure 3-4**.

The northern portion of the HC/CUEP area drains into Crescent Valley. Canyons in this area include Fourmile Canyon, Mill Canyon, Cortez Canyon, and Copper Canyon. Crescent Valley is bordered by the Shoshone Range on the west, the Cortez Mountains and Dry Hills on the east and northeast, and the Toiyabe Range on the south. The northwestern portion of the valley opens up to the floodplain of the Humboldt River (Zones 1961). Unconsolidated sediments have accumulated in Crescent Valley as a result of erosion and transportation of sediment from mountain streams. Flow volumes from mountain streams diminish rapidly due to percolation of water into the alluvium. This results in few streams reaching the valley playas except during high levels of runoff (Zones 1961). Runoff in Crescent Valley does not drain into the Humboldt River except during unusually high precipitation events. Underflow from Crescent Valley to the Humboldt River is believed to be small and limited to the extreme northern portion of the valley (Zones 1961).

The eastern slopes of the HC/CUEP area drain into Pine Valley, with the primary drainages being Horse Creek, Willow Creek, and their tributaries. Pine Valley is a semi-enclosed basin that is bounded on the west by the Cortez Mountains, on the east by the Sulfur Springs and Pinion ranges, and on the south by the Simpson Park and Roberts mountains. Runoff into Pine Valley is low and most of Pine Creek is maintained by groundwater discharge from springs (Eakin 1961). Pine Creek flows north and drains into the Humboldt River (Eakin 1961).

The western and southern slopes of the HC/CUEP area drain into Grass Valley. Grass Valley is a closed basin, both topographically and hydrologically (Everett and Rush 1966). The Toiyabe Range forms its western boundary and the Cortez Mountains forms its northern boundary. As with Pine Valley and Crescent Valley, much of the streamflow into Grass Valley is absorbed by the alluvium. No streams from the Cortez Mountains reach the playa in the valley bottom (Everett and Rush 1966).

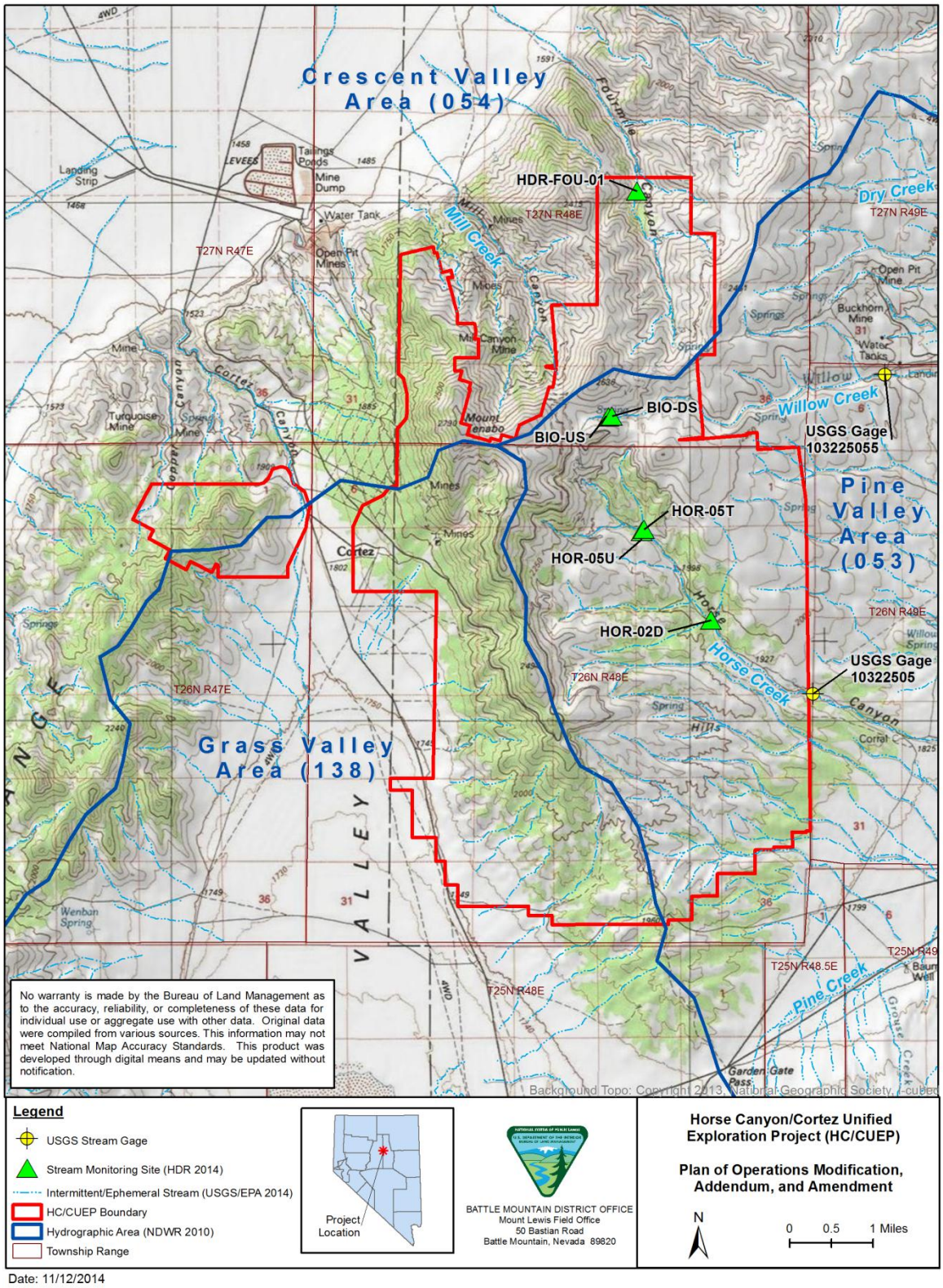
The quantity of surface water in the HC/CUEP area is relatively limited due to the low annual precipitation and the dry climate that promotes evaporation. Data obtained from IML Air Science indicates that precipitation as of the end of October 2014 in the Horse Canyon area is 7.55 inches (IML Air Science 2014). Monthly precipitation averages for 2013 that were reported in the HDR Engineering, Inc. (HDR) report (HDR 2014) are from the Cortez Pipeline Weather Station (**Table 3-3**).

Table 3-3 Cortez Pipeline Weather Station Precipitation Data

Month (2013)	Total Precipitation (inches)
January	0.60
February	0.98
March	0.93
April	1.07
May	1.17
June	0.13
July	0.36
August	0.12
September	2.81
October	3.24
November	0.13
December	1.02

Source: IML Air Science 2013

Figure 3-4 Hydrographic Areas and Streams



Nevada 303(d) List

The NDEP implements the Clean Water Act (CWA) in Nevada, with oversight from the EPA. Every two years, Nevada conducts a comprehensive analysis of water quality data associated with Nevada's surface waters to determine whether state surface water quality standards are being met and designated uses are being supported. The analysis lists waters requiring a Total Maximum Daily Load (TMDL) for various parameters which may adversely affect the health of the waterbody. The results of the latest analysis are compiled in the Nevada 2012 Water Quality Integrated Report (NDEP 2014a), which was prepared in accordance with the requirements of sections 303(d)/305(b)/314 of the CWA. The report covers an assessment period of October 1, 2006 through September 30, 2011. Classified waterbody segments in or near HC/CUEP are described below.

Willow Creek is classified as Category 5 for 15 miles from its origin to Pine Creek, below the Buckhorn Mine (Waterbody ID NV04-HR-83_00) (NDEP 2014a). A portion of this segment, where the stream originates, is located in the HC/CUEP area. A Category 5 designation means that available data indicate that at least one designated use is not being supported and a TMDL is needed. Specifically, use for municipal or domestic supply is impaired for this segment of Willow Creek due to total dissolved solids (TDS) levels. There is an assessment sampling station (WC1-BUCK), for which Barrick is listed as the sampling agency.

Pine Creek is classified as Category 3 for a 32.5-mile segment from its origin to the confluence with Dry Creek (Waterbody ID NV04-HR-55_00) (NDEP 2014a). The headwaters of this segment are located to the southeast of the HC/CUEP area. Horse Creek flows out of the HC/CUEP area and into this segment of Pine Creek. Note that this is the "Dry Creek" that is located in the Sulphur Springs Range, and is not the "Dry Creek" near the HC/CUEP area to the north of the Willow Creek drainage. A Category 3 designation means that there is insufficient information or data are lacking to make a determination as to whether the waterbody supports any of the beneficial uses.

Floodplains

The Federal Emergency Management Agency (FEMA) mapped the entire site as being within a non-shaded Zone C. This zone is described as "areas of minimal flooding" (SRK 2013).

3.4.1.1 Surface Waters

Surface water features in the HC/CUEP area have been inventoried and monitored, and a repeat monitoring and sampling program has been developed. A baseline study report entitled *Horse Canyon/Cortez Unified Exploration Project 2013 Surface Water Baseline Study* was completed by HDR (HDR 2014). The report documents the study components: stream monitoring and sampling, a seep/spring reconnaissance survey, seep/spring monitoring and sampling, and wetland delineations. The complete report is included in the project record. Information presented below is summarized from the 2014 HDR report.

Streams

There are no perennial streams within the HC/CUEP area. Three drainages of HC/CUEP include segments that exhibit seasonal (intermittent) flow: Horse Creek, Willow Creek, and Fourmile Canyon (HDR 2014). Intermittent flows are from isolated springs, and short-term seasonal runoff from snowmelt or winter storms. Many small, ephemeral drainages also occur that convey flow from infrequent, intense storm events (HDR 2014). Lengths of the primary streams that occur within the HC/CUEP area were measured using a Geographic Information System (GIS): Horse Creek 6.4 miles; Willow Creek 1.5 miles; Fourmile Canyon 3.1 miles.

Barrick Stream Monitoring Stations

Barrick maintains six stream monitoring stations. Streams and station locations are shown in **Table 3-4** (HDR 2014) and are displayed on **Figure 3-4**.

Table 3-4 HC/CUEP Stream Monitoring Stations

Site ID	Group/Drainage	Northing/Easting	Location Description
HOR-02D	Horse Canyon	4442123 / 540350	Mouth of Horse Creek
HOR-05T	Horse Canyon	4443817 / 539102	Upstream of confluence with Horse Creek, downstream of road crossing
HOR-05U	Horse Canyon	4443836 / 539017	Upstream of the confluence with Horse Creek tributary
BIO-US	Willow Creek	4446048 / 538369	Upstream of Willow Creek bioreactor
BIO-DS	Willow Creek	4446065 / 538438	Downstream of Willow Creek bioreactor
HDR-FOU-01	Fourmile Canyon	4450408 / 538921	Near midpoint along Fourmile Creek and immediately upstream of the second large tributary

Surface water monitoring activities at each Barrick stream monitoring station included the following (HDR 2014):

- Stream flow measurements
- In-situ field water quality parameters
- Grab sample for laboratory analysis
- Site photographs
- Documenting notable conditions or significant disturbance to the area

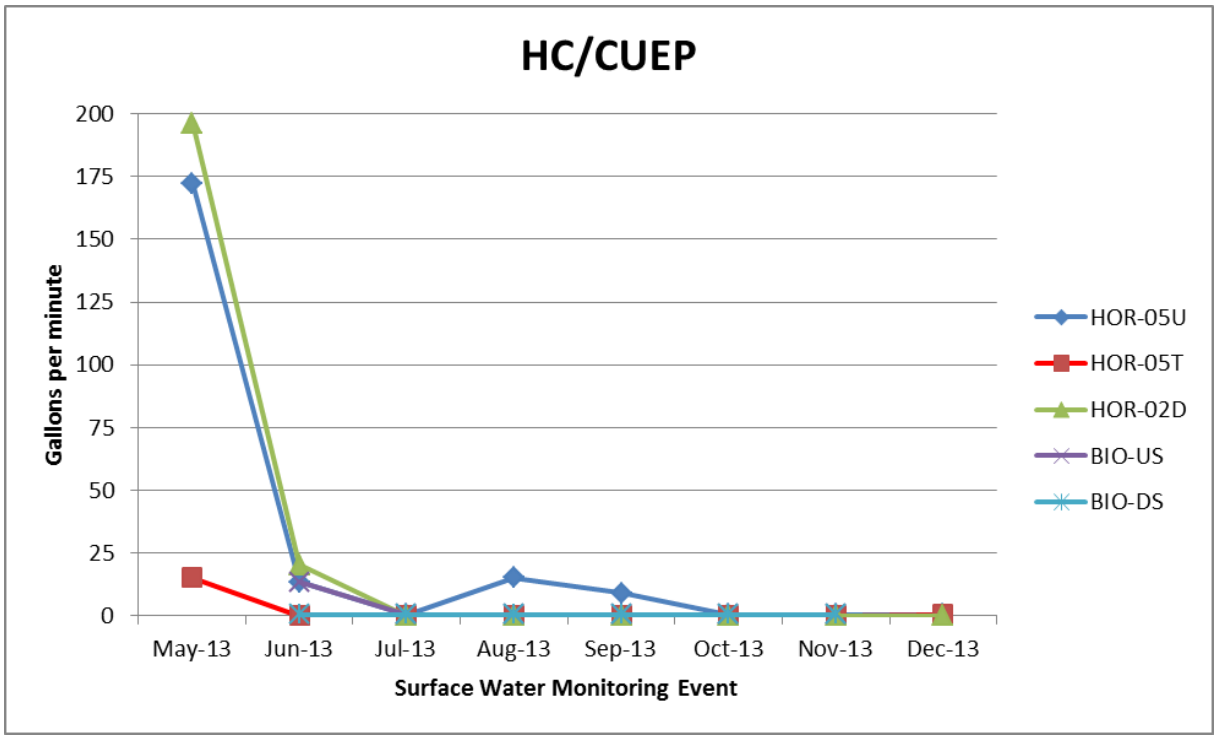
The following in-situ field parameters were collected (HDR 2014):

- Temperature (degrees Celsius [°C])
- Dissolved oxygen (milligrams per liter [mg/L])

- pH (standard units [s.u.])
- Conductivity (micromhos per centimeter [µhos/cm])
- Salinity (%)
- Oxidative reduction potential (millivolts [mV])
- TDS (mg/L)

Measurements of turbidity, stream velocity, channel dimension, and depth-to-water measurements (for volume measurements as cubic feet) were also collected, which allows for flow calculations. Stream flows recorded in 2013 are shown in **Figure 3-5** for each drainage group. During the 2013 monitoring, HOR-05U was the only location that exhibited flow during every monitoring event. Fourmile Canyon (HDR-FOU-01) flow and sampling results are not included, as it did not have flow at the time of the monitoring event.

Figure 3-5 Stream Flow



Tabular results from the 2013 stream water quality sampling effort are included in the baseline study report (HDR 2014) available in the project record. Samples collected during the events from May to August 2013 were analyzed for NDEP Profile I constituents, not including total phosphorus. Samples collected during the events from September to December 2013 were analyzed for NDEP Profile II constituents, including total phosphorus and total recoverable metals. None of the samples were analyzed for weak acid dissociable (WAD) cyanide with the exception of the BIO-US and BIO-DS monitoring sites, which were analyzed for WAD cyanide for the May through August 2013 sampling events. Analysis for WAD cyanide was

discontinued for the September 2013 event and future monitoring events. The results by drainage group are summarized below (HDR 2014).

Horse Creek Group

All physical parameters measured for the samples collected from the Horse Canyon sites were within the NDEP reference values, with the exceptions of pH levels in HOR-02D, HOR-05U, and HOR-05T. However, the lab and field pH readings were never both out of range (either below or above the range) for the same sampling period (HDR 2014).

All major ions, nutrients, and non-metals concentrations in samples collected from the Horse Canyon monitoring stations were reported within NDEP reference values. The concentrations of dissolved arsenic were reported above the NDEP reference values for samples collected from HOR-02D, HOR-05U, and HOR-05T, but this is consistent with what has been historically reported for these locations and represents naturally occurring background levels. All other constituents of dissolved metals were reported within NDEP reference values (HDR 2014).

In September and December 2013, the samples collected from HOR-05U had reported total recoverable aluminum concentrations of 4.81 and 0.52 mg/L, respectively, which are above the EPA secondary standard for drinking water of 0.20 mg/L. The samples collected from HOR-05U had reported total recoverable iron concentrations of 6.85 and 0.61 mg/L, respectively, which are above the EPA secondary standard for drinking water of 0.30 mg/L. The samples collected from HOR-05U had reported total recoverable manganese concentrations of 0.28 and 0.09 mg/L, respectively, which are above the EPA secondary standard for drinking water of 0.05 mg/L. All other constituents of total recoverable metals were reported below the EPA secondary standards. Total recoverable metals have not been historically analyzed at the Horse Canyon monitoring stations (HDR 2014).

Willow Creek Group

Water was present and samples were collected at BIO-US and BIO-DS for most of the monitoring events in 2013. These sites were not monitored during December since they were not accessible.

The levels of TDS reported at BIO-US and BIO-DS exceeded the NDEP reference value of 1,000 mg/L for the majority of the monitoring events in 2013. This is consistent with what was reported for each of these locations in 2012. The highest levels of TDS were reported in November 2013 with BIO-US at 2,330 mg/L and BIO-DS at 2,280 mg/L. All other physical parameters measured were within NDEP reference values.

Conductivity and TDS measured at the BIO-US and BIO-DS monitoring stations were higher than what was recorded at other monitoring stations. The highest conductivity readings were measured in November 2013 with BIO-US at 2,805 µhos/cm and BIO-DS at 2,756 µhos/cm. The remaining parameters were consistent with what was measured at other stations during the 2013 monitoring program.

Stream flow at BIO-US was 13.46 gallons per minute (gpm) in June 2013. Flows at BIO-US and BIO-DS were not measurable for the remaining 2013 events, but enough water was present to sample these locations when the sites were accessible.

Magnesium levels reported for all monitoring events in 2013 at BIO-US and BIO-DS were slightly above the NDEP reference level of 150 mg/L. Sulfate levels reported for all monitoring events in 2013 at BIO-US and BIO-DS were above the NDEP reference level of 500 mg/L but are consistent with historic levels.

The BIO-US and BIO-DS stations were also monitored for WAD cyanide during the June, July, and August 2013 monitoring events. The level of WAD cyanide reported did not exceed NDEP Profile I reference values.

The concentrations of dissolved arsenic were reported above the NDEP reference values for samples collected from BIO-DS in August and September 2013, but this is consistent with what has been historically reported for this location and represents naturally occurring background levels. All other constituents of dissolved metals were reported within NDEP reference values. Concentrations of total recoverable aluminum were reported at 0.43 mg/L in the sample collected from BIO-US in September 2013, above the EPA secondary standard for drinking water of 0.20 mg/L. Total recoverable iron concentrations in samples collected from BIO-US were reported at 0.96 mg/L and 0.35 mg/L in September and October 2013, above the EPA secondary standard for drinking water of 0.30 mg/L. Total recoverable manganese concentrations were slightly above the EPA secondary standards in samples collected from BIO-US and BIO-DS in September, October, and November 2013. All other constituents of total recoverable metals were reported below the EPA secondary standards. Total recoverable metals have not been historically analyzed at the Willow Creek monitoring stations.

USGS Stream Monitoring Stations

U.S. Geological Survey (USGS) stream gauges were installed in April 2014 on Willow Creek and Horse Creek (**Figure 3-4**). They are identified as USGS Site Number 103225055 (Willow Creek at Allison Ranch), and USGS Site Number 10322505 (Horse Creek at Horse Canyon) (USGS 2014). Measurements from the USGS stream gauges include gage height and discharge (cubic feet per second), and are recorded continuously. Data are available to the public at the USGS website.

Seeps, Springs, and Wetlands

Wetlands are areas where saturation by water is the dominant factor controlling soil development and the vegetation growing at the site (Cowardin et al. 1979). Seep/spring features were evaluated for the three criteria that define a wetland (soils, vegetation, and hydrology), as regulated by the CWA. Seeps and springs that met the wetland criteria were added to the seep/spring annual monitoring and sampling program (HDR 2014).

A total of 112 seep/spring features were monitored in 2013 to determine wetland status. Of these, a total of 65 seep/spring features were identified as wetlands (HDR 2014). The features have been organized into the following groups based on watersheds and geographic features:

Dry Hills (nine seep/spring sites), Fourmile Canyon (three seep/spring sites), Horse Creek (35 seep/spring sites), Mill Canyon (two seep/spring sites), North Toiyabe Range West (one seep/spring site), Willow Creek (13 seep/spring sites), and Willow Springs (two seep/spring sites). Seep and spring sampling sites are listed in **Appendix C, Table B-1**. Of the 112 seep/spring features, the remaining 47 were determined to not be wetlands, and were not included in the sampling program.

In September 2013, the 65 seep/spring features were monitored and sampled. When sufficient water was present, the following data were collected:

- Spring flow measurements (if water was present)
- In-situ field water quality parameters (described below, if water was present)
- Grab sample for laboratory analysis (if water was present)
- Site photographs
- Documentation of dominant vegetation, the presence of noxious and invasive plant species, and any notable conditions or significant disturbance to the area

The following in-situ field parameters were collected (HDR 2014):

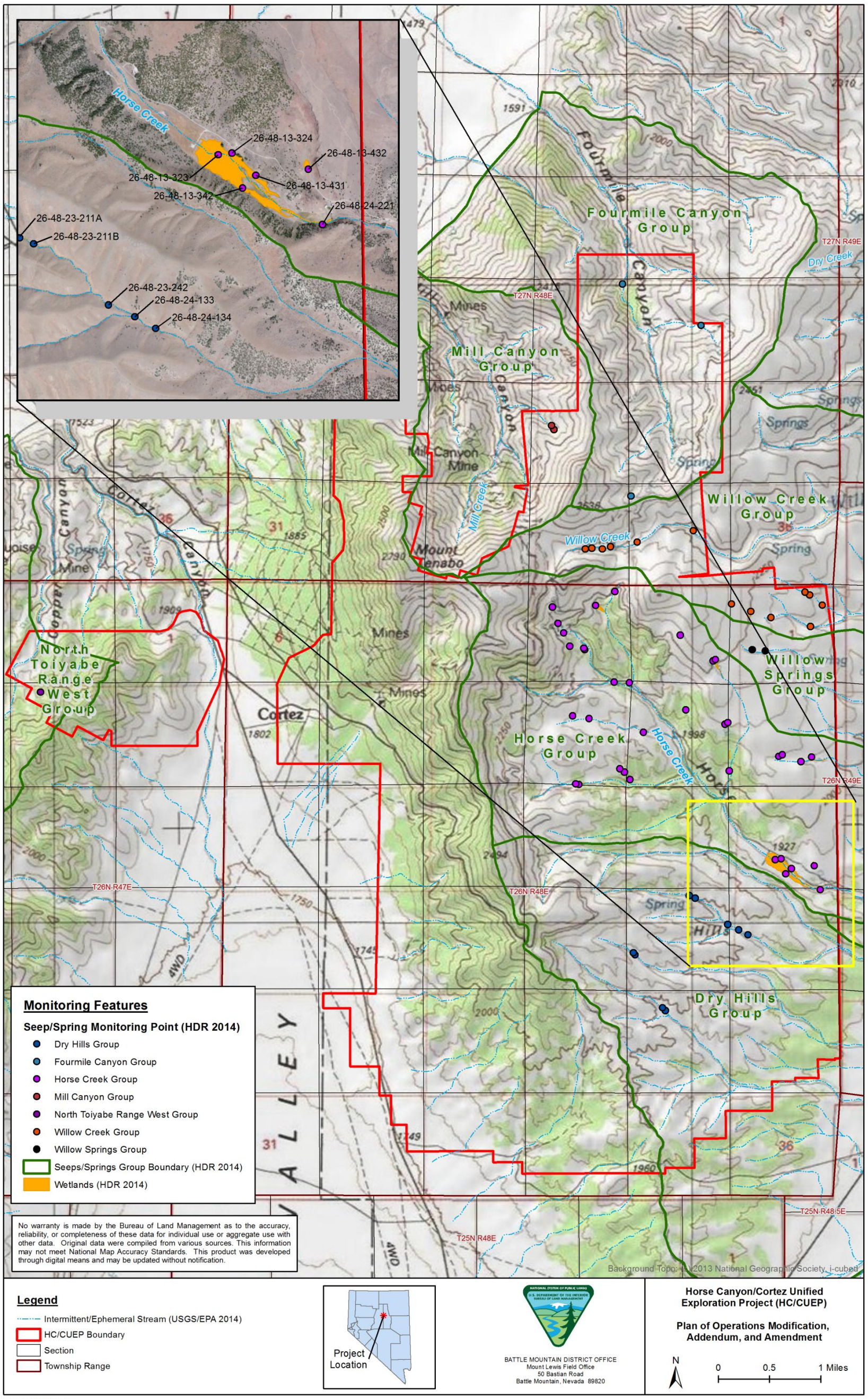
- Temperature (°C)
- Dissolved oxygen (mg/L)
- pH (s.u.)
- Conductivity (µhos/cm)
- Salinity (%)
- Oxidative reduction potential (mV)
- TDS (mg/L)
- NDEP Profile II

Turbidity, stream velocity, channel dimension, and depth-to-water measurements (for volume measurements as cubic feet) were also collected, which allowed for flow calculations.

Wetland areas associated with seep/spring features may include multiple seeps/springs that are accounted for individually in the seep/spring sampling program. **Appendix C, Table B-2** presents a table of the 57 wetland areas (associated with the 65 seep/spring features) identified in the HC/CUEP area and associated acreages (HDR 2014). Wetlands that include more than one seep/spring location are indicated in **Appendix C, Table B-2** by including multiple site identification numbers within a wetland feature.

Figure 3-6 displays the seep/spring features and the wetland areas delineated in the HC/CUEP area.

Figure 3-6 Monitoring Locations for Seeps/Springs and Wetlands



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3.4.1.2 Groundwater

Precipitation in the mountain ranges and pediments that does not immediately evaporate either infiltrates directly into bedrock, primarily through fractures, or is conveyed by streams to lower elevations where the water percolates into the alluvial fans. Basin-wide groundwater recharge rates for Crescent Valley are estimated to average approximately 0.55 inches/year (Geomega 2007). For the southern portion of Pine Valley included in the Mount Hope Study Area, groundwater recharge rates are estimated to average approximately 0.90 inches/year (BLM 2011b). In western Pine Valley, groundwater in the mountain and alluvial fan areas generally flows to the east-southeast and then eventually turns northward following the Pine Creek drainage toward the Humboldt River.

Pine Valley and Crescent Valley are designated groundwater water basins (also referred to as Administered Groundwater Basins) according to the State Engineer. In these basins, permitted water use is equal to or exceeds the estimated average annual recharge or otherwise requires additional administration.

There are two principal hydrogeologic units in the HC/CUEP area: the basin fill unit and the carbonate bedrock lower-plate unit. The basin fill hydrogeologic unit is comprised of the alluvial, colluvial, terrace, pediment, and landslide deposits which comprise the Tertiary-Quaternary alluviums (Qa), the Tertiary basalt (Tb), the gravels of dominantly upper-plate lithology having variable percentages of clay-altered volcanics (Tg), and the interbedded, variably clay-altered tuffs (Ttf).

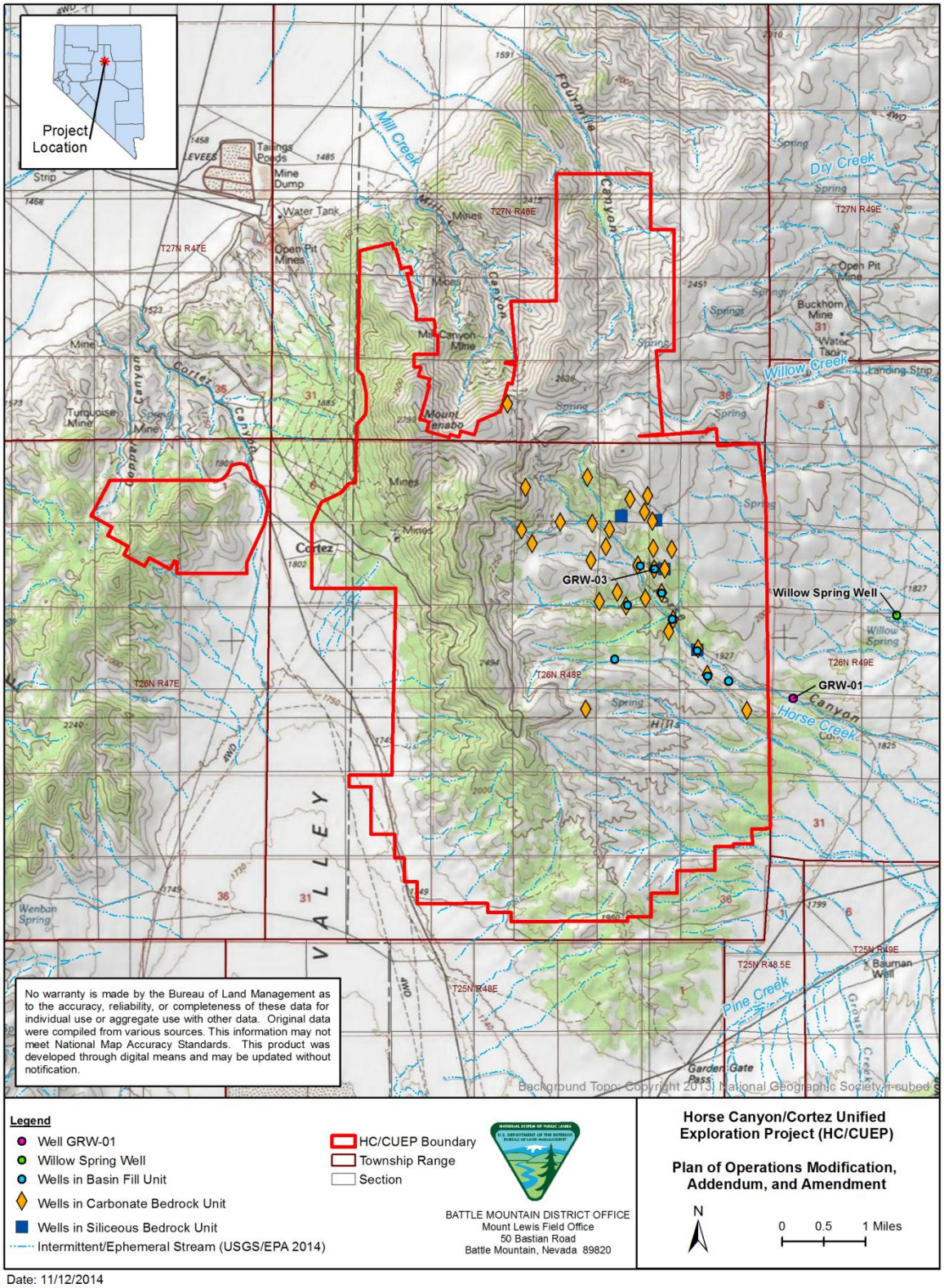
The carbonate bedrock lower-plate hydrogeologic unit is comprised of the Devonian Horse Canyon Member (Dhc) which consists of largely calcareous siltstones, the Devonian Wenban Limestone (Dw) which is a dark-grey, thick-bedded, bioclastic limestone that is interbedded with thin-bedded argillaceous weathering slabby limestone, the Silurian Roberts Mountains Formation (Srm) which is a homogeneous, black, pyritic, laminated, silty, graptolitic limestone, and the Ordovician Hanson Creek Formation (Ohc) which is fine-grained massive dolomite with siliceous limestone.

There is also a siliceous bedrock upper-plate hydrogeologic unit in the HC/CUEP area comprised of the Ordovician Vinini Formation (Ovi) which contains sequences of siltstone and shale interbedded with fine-grained chert, sandstone, and quartzite that are generally extensively sheared, carbonaceous siliciclastics.

Groundwater Monitoring

Groundwater monitoring wells and piezometers within the HC/CUEP area are shown on **Figure 3-7**. The coordinates and screened intervals of the monitoring wells and piezometers are shown in **Appendix C, Table B-3**.

Figure 3-7 Groundwater Monitoring Wells and Piezometers



Within the HC/CUEP area, there are 11 groundwater monitoring wells/piezometers in the basin fill unit. In this unit, there is a gradient from the higher elevations towards the alluvial fan to the southeast. The water levels vary from 6,450 to 6,250 feet, with a hydraulic gradient of approximately 0.1 foot:1 foot.

In the carbonate bedrock lower-plate unit, there are 47 groundwater monitoring wells/piezometers. There is a relatively flat phreatic surface within the carbonate unit. The groundwater elevation (as of June 2014) is at approximately 6,100 feet. There has been a head reduction in the carbonate bedrock unit which has corresponded to water level declines measured in the monitoring wells and piezometers; the current declines in the HC/CUEP area range from 10 to 50 feet/year. The head reduction is most likely a result of groundwater pumping at the Pipeline and Cortez Hills mining operations in Crescent Valley. There has been no corresponding head reduction in the overlying basin fill unit.

There are four groundwater monitoring wells/piezometers in the siliceous bedrock upper-plate unit. There is a gradient towards the southeast, in which the water levels vary from 6,390 feet to 6,270 feet, with a hydraulic gradient of approximately 0.05 foot:1 foot.

Hydraulic Conductivity

The hydraulic conductivity (K) of the basin fill materials is partly dependent on the geology of the eroded source material of which it is composed, as well as the proportion of fines, degree of sorting, cementation, and consolidation. Barrick conducted short-term hydrologic stress tests on two artesian wells completed in the basin fill deposits in the adjacent West Pine Valley Plan of Operations (NVN-077213) area. The first test was an 8-hour flow-and-shut-in test performed on the Willow Springs well, which is located about 2,300 feet from the eastern edge of the HC/CUEP Plan boundary. The second test was a 5-day pumping test of well GRW-01, which is located near the eastern edge of the HC/CUEP Plan boundary. The locations of these two wells are shown on **Figure 3-7**.

A K-value of 108 feet/day was calculated for the Willow Springs test (Itasca 2013). Hydraulic conductivity values of this order of magnitude have been reported for permeable basalt and for gravel, as well as for karstic and fractured limestone (Domenico and Schwartz 1990; Spitz and Moreno 1996).

A K-value of only 1.2 to 2.2 feet/day was calculated for the well GRW-01 test (Itasca 2013). These estimated K-values are two orders-of-magnitude less than the estimated K-value derived from the Willow Springs well test, but they are within the reported ranges for permeable basalt (0.1 to 104 feet/day) and for sand and silty sand (0.01 to 102 feet/day) (Spitz and Moreno 1996).

The difference in K-values is possibly due to the shallower completion interval of the Willow Springs well, which presumably does not penetrate into the deeper zone of Tertiary gravel dominated by a strong clay/volcanoclastic matrix. In this case, the higher K-value of 108 feet/day appears to be associated with the shallower (upper 200 feet) overburden material, which has a weak clay component, whereas K-values on the order of 1 foot/day are

representative of the slightly deeper (below 200 feet) overburden material, which has a strong clay/volcanoclastic component (Itasca 2013).

In the carbonate bedrock lower plate unit, recharge, storage, flow, and discharge of groundwater are primarily controlled by the secondary features (fractured zones, faults, and solution cavities) that have enhanced the overall porosity and permeability of the rock (BLM 2011b). Barrick conducted a 45-day hydrologic stress test on well GRW-03 completed in the Dw formation. The location of this well is shown on **Figure 3-7**. K-values that range from 0.7 to 4.2 feet/day were calculated, with a geometric mean of 1.0 feet/day (Itasca 2014).

Only one of the water-level monitoring locations in formations other than Dw (GRGT-006 P2 in the Dhc) recorded drawdown due to the 45-day pumping test. Other monitoring wells and piezometers in the non-carbonate formations, including some locations in relatively close proximity to the pumping well (e.g., RHPZ-08 P1 and P2, and GRPZ-13 P3), did not see any drawdown due to the pumping test (Itasca 2014).

3.4.2 Environmental Consequences Water Resources

3.4.2.1 Proposed Action

Surface Water Features

The 2013 monitoring event conducted under the existing conditions of 409 acres of surface disturbance did not detect water quality physical parameters or laboratory analytical results that consistently exceeded reference values. Some exceptions were recorded, but these values were determined as either similar to historic background levels, or as slight deviations from secondary standards and are not considered a threat to human health or the environment.

Annual precipitation in the HC/CUEP area is low. Thus, water flow is relatively low, which reduces the energy available to carry sediment downstream. There are no perennial waterways in the HC/CUEP Plan boundary.

NDEP administers temporary discharge permits to allow sumps to discharge water into drainages. Barrick obtained a *DeMinimis* general discharge permit (NVG201000) for the 45-day constant-rate pumping test described above.

In order to remain compliant with the current General Stormwater Permit NVR300000 issued by the NDEP (NDEP 2013), Barrick prepared a Stormwater Pollution Prevention Plan (SWPPP) (SRK 2013) for the site in accordance with the National Pollutant Discharge Elimination System (NPDES) regulation. The objective of the SWPPP is to minimize the discharges of sediment or contaminants as either direct or indirect discharges to wetlands or other waters through the appropriate use of the current BMPs within the HC/CUEP Plan (SRK 2013). Barrick has also developed a spill contingency plan for compliance with CWA regulations that require established procedures to prevent the discharge of oil into waters of the U.S.

Exploration activities have been conducted under current permits and approvals, and in accordance with the applicant-committed EPMs detailed in Section 2.2.3, and BMPs listed in

Appendix B. These permits, measures and practices have been and would continue to be implemented under the Proposed Action. Specific to surface waters, the protection measures and BMPs include: the spill contingency plan; soil erosion prevention and control practices; distance set-backs, design standards, dust control measures; and drill hole abandonment procedures set forth in NAC 534.420 through 534.437.

Road construction and drainage operations are governed by the State of Nevada General Stormwater Permit NVR300000 (MSW-798 approved March 2013). BMPs for road construction and maintenance are described in Section 2.2.3.5.

In addition, reclamation has stabilized soils, reducing the potential for impacts to surface waters. Reclamation activities have recontoured and seeded 250 acres of the existing 409 acres of disturbance; however, none of this acreage has been released from the reclamation assurance by the BLM or the NDEP.

Seeps/springs and other wetland areas have been avoided through adherence to the applicant-committed EPMs. These surface features have not been impacted.

For these reasons, under the Proposed Action, the potential for increased sedimentation to have occurred as a result of the 409 acres of surface disturbance activities is low. HC/CUEP exploration activities have not resulted in adverse effects to surface waters, or caused a change or loss of wetlands and riparian zones.

Under the Proposed Action, the acreage of total allowable surface disturbance would increase by 140 acres to 549 total acres of disturbance. Water quality would continue to be monitored at the established stream and seep/spring sites. With continued implementation of the applicant-committed EPMs, BMPs, and reclamation practices, increasing the total allowable surface disturbance to 549 acres is not anticipated to increase the potential for effects to water quality or surface water features, including streams, seeps/springs, and other wetlands and riparian zones. Minor amounts of sediment may enter surface waters due to disturbance activities and driving on dirt roads, however, erosion and dust control measures would continue to maintain the effects at negligible levels. Reclamation practices described in Section 2.2.4 would further minimize the potential for impacts to surface waters by eliminating bare ground and the chance for erosion and subsequent sedimentation to occur. Impacts to surface waters under the Proposed Action may include small amounts of sedimentation over a short-term duration, but effects would be minor due to the prevention measures and existing baseline conditions.

Groundwater

Results from groundwater monitoring wells and piezometers show limited connectivity in the HC/CUEP area between the two primary hydrogeologic units, the basin fill unit and the carbonate bedrock lower-plate unit.

During the 45-day pumping test, only one of the water-level monitoring locations in a formation other than Dw recorded drawdown. Other monitoring wells and piezometers in the non-carbonate formations did not see any drawdown due to the pumping test. The test results are

consistent with the concept of limited hydraulic connection between the Dw and most of the other non-carbonate units in the Horse Canyon area (Itasca 2014). HC/CUEP exploration activities have not been shown to affect groundwater levels.

Mineral exploration, development, and condemnation drill holes as well as monitoring and production wells subject to NDWR regulations will be abandoned in accordance with applicable rules and regulations (NAC 534.420 through 534.427). Boreholes will be sealed to prevent cross contamination between aquifers, and the required shallow seal will be placed to prevent contamination by surface access. The potential for contamination by drilling fluids is minimized by adherence to BMPs and drill hole abandonment procedures. It is further minimized by the fact that connectivity between the hydrologic units is shown to be limited. The groundwater monitoring program was implemented under the Proposed Action during the surface disturbance of 409 acres. The groundwater monitoring program would continue under the Proposed Action for the additional 140 acres of surface disturbance. As outlined above, exploration activities resulting in 409 acres of current disturbance and the proposed additional 140 acres of disturbance are not anticipated to have detrimental effects on groundwater.

3.4.2.2 No Action

Under the No Action Alternative, impacts to surface water would be minimal, as exploration activities would be limited to only occurring in open and active areas. The applicant-committed EPMs and BMPs to prevent sedimentation or other impacts to surface water would continue to be implemented. Reclamation would be ongoing and would reestablish vegetation in the remaining open and active areas once exploration work is completed. There is limited connectivity between the primary hydrogeologic units. Impacts to groundwater are not anticipated.

3.4.2.3 Cumulative Effects

Proposed Action

Sedimentation would be minimized by the implementation of applicant-committed EPMs and BMPs. The amounts are anticipated to be relatively small, and would not combine with other past, present, and RFFAs to result in significant cumulative impacts. Direct or indirect impacts to seeps/springs and other wetlands, and groundwater are not anticipated, therefore, cumulative effects would not occur.

No Action

Sedimentation may occur, but would be minimal with the implementation of the BMPs and EPMs outlined previously. As such, it is not anticipated to combine with effects from other past, present, and RFFAs to result in a significant cumulative impact. Direct or indirect impacts to seeps/springs and other wetlands, and groundwater are not anticipated, therefore, cumulative effects would not occur.

3.5 Vegetation Resources

This section describes the general vegetation found in the HC/CUEP area. Special status plant species are discussed in Section 3.9. The analysis of potential direct and indirect impacts considers general vegetation, noxious weeds, and invasive and non-native plants within the HC/CUEP Plan boundary. The cumulative effects analysis considers past, present, and RFFAs listed in **Table 2-6** that have involved disturbance to vegetation within a geographic area encompassing the southwestern portion of Pine Valley, the southern portion of Crescent Valley, and the northern portion of Grass Valley.

3.5.1 Affected Environment Vegetation Resources

Vegetation of northeastern Nevada, including the Cortez Mountains, has experienced substantial change over the past 100 years. The majority of these changes are a result of wildfire and grazing by domestic livestock (ESCO 2014a). Much of the region is now dominated by cheatgrass (*Bromus tectorum*); altering native vegetation community compositions. Cheatgrass is highly flammable, and wildfires in cheatgrass communities occur at higher frequency and intensity compared to fires in native vegetation communities. This increase in fire interval tends to encourage further spread of cheatgrass and other annual/winter opportunistic species (McAdoo et al. 2007). In 1999, a range fire impacted the eastern portion of the HC/CUEP area, burning approximately 9,321 acres (42 percent) of the HC/CUEP area.

3.5.1.1 Vegetation and Land Cover Types

Vegetation inventories of the HC/CUEP area have been conducted since 2009 to document existing conditions and account for alterations in vegetation communities due to disturbance from wildfire as well as HC/CUEP exploration and reclamation activities. Twenty-nine vegetation and land cover types have been identified in the HC/CUEP area (ESCO 2014a). Results of the inventory are shown in **Table 3-5** and **Figure 3-8**.

Table 3-5 HC/CUEP Mapped Vegetation and Land Cover Types

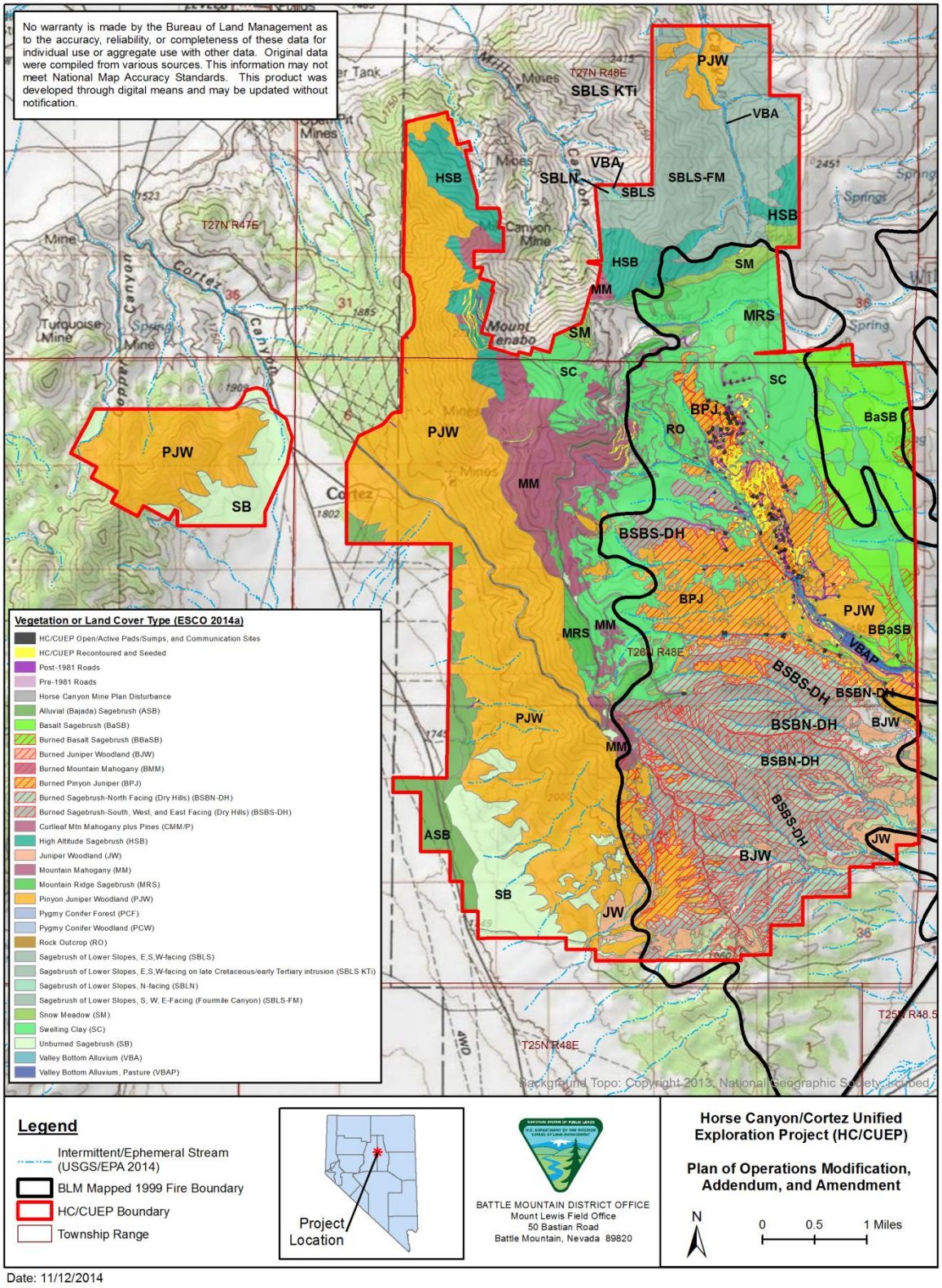
Vegetation and Land Cover Type	Acres	Percent of HC/CUEP Area
Pinyon-Juniper Woodland (PJW)	6,049	27.1
Swelling Clay (SC)	2,959	13.3
Burned Sagebrush-South, West, and East Facing (Dry Hills) (BSBS-DH)	1,898	8.5
Burned Pinyon-Juniper (BPJ)	1,507	6.8
Sagebrush of Lower Slopes, S, W, E-Facing (Fourmile Canyon) (SBLS-FM)	1,446	6.5
Burned Sagebrush-North Facing (Dry Hills) (BSBN-DH)	1,205	5.4
Mountain Mahogany (MM)	1,114	5.0
Unburned Sagebrush (SB)	1,104	4.9

Table 3-5 HC/CUEP Mapped Vegetation and Land Cover Types

Vegetation and Land Cover Type	Acres	Percent of HC/CUEP Area
Basalt Sagebrush (BaSB)	1,033	4.6
High Altitude Sagebrush (HSB)	819	3.7
Juniper Woodland (JW)	498	2.2
Alluvial (Bajada) Sagebrush (ASB)	477	2.1
Burned Juniper Woodland (BJW)	446	2.0
Horse Canyon Mine Plan Disturbance (Dist)	425	1.9
HC/CUEP Disturbance[1] *Recontoured and Seeded (250 acres)* *Active/Open Pads and Sumps (86 acres)* *Post-1981 Roads (72 acres)* *Communication Sites (1 acre)*	409	1.8
Mountain Ridge Sagebrush (MRS)	250	1.1
Snow Meadow (SM)	217	1.0
Burned Basalt Sagebrush (BBaSB)	149	0.7
Sagebrush of Lower Slopes, E,S,W-facing (SBLS)	77	0.3
Pre-1981 Roads	65	0.3
Valley Bottom Alluvium, Pasture (VBAP)	58	0.3
Valley Bottom Alluvium (VBA)	37	0.2
Sagebrush of Lower Slopes, N-facing (SBLN)	32	0.1
Sagebrush of Lower Slopes, E,S,W-facing on late Cretaceous or early Tertiary intrusion (SBLS KTi)	13	0.1
Burned Mountain Mahogany (BMM)	12	0.1
Rock Outcrop (RO)	7	<0.1
Pygmy Conifer Woodland (PCW)	1	<0.1
Curl-leaf Mountain Mahogany plus Pines (CMM/P)	0.2	<0.1
Pygmy Conifer Forest (PCF)	0.2	<0.1

[1] Measurement inventory conducted in accordance with revised surface disturbance and reclamation survey protocol (Appendix A).

Figure 3-8 Vegetation and Land Cover Types



Date: 11/12/2014

Descriptions are given below for the most common vegetation and land cover types, which account for 90 percent of the HC/CUEP area. All descriptions are derived from ESCO (2014a).

Pinyon-Juniper Woodland and Juniper Woodland

Pinyon-Juniper Woodland and Juniper Woodland land cover types are the most common vegetation communities in the HC/CUEP area. Together they account for approximately 30 percent of the land cover within HC/CUEP.

The majority of the intact (i.e., unburned) pinyon-juniper communities are concentrated in the western portion of the HC/CUEP area, on the west slope of the Cortez Mountains. The dominant trees within the existing woodlands are singleleaf pinyon pine (*Pinus monophylla*) and/or Utah juniper (*Juniperus osteosperma*) with occasional occurrences of one-seeded juniper (*Juniperus monosperma*).

Juniper woodlands occur in small areas on the southern and southeastern slopes of the HC/CUEP area. This vegetation type, which lacks the pinyon component, was identified as a separate type from the Pinyon-Juniper Woodland to account for the different wildlife habitat provided by each and the cultural importance represented by the pinyon pine component of the pinyon-juniper woodland. The herbaceous understory of native perennial grasses and forbs averages less than three percent cover in both the pinyon-juniper woodland and juniper woodland types.

Low Elevation Sagebrush

The Low Elevation Sagebrush land cover type that was mapped in HC/CUEP includes sagebrush of lower slopes, unburned sagebrush, basalt sagebrush, and alluvial sagebrush (ESCO 2014a). Together they comprise approximately 23 percent of the HC/CUEP area. These sagebrush communities are generally found in the HC/CUEP area below 7,200 feet elevation on variable terrain and soil parent material. Basalt sagebrush is located on the eastern edge of HC/CUEP and alluvial sagebrush is located on the western edge of HC/CUEP near Grass Valley. Unburned sagebrush is also located on the western edge of the HC/CUEP boundary, as well as on the western-most HC/CUEP parcel in the Toiyabe Range. Other low elevation sagebrush is on the lower slopes of Fourmile Canyon.

Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the dominant sage species, but basin big sagebrush (*A.t. tridentata*) occurs at lower geomorphic positions. Some black sagebrush (*A. nova*) and low sagebrush (*A. arbuscula*) occur on shallow, rocky sites. The lower elevation sagebrush averages about 15 percent shrub cover, and is typically dominated by sagebrush and cheatgrass with varying amounts of native bunchgrasses and other native grasses. There are limited native perennial forbs at these lower elevation sagebrush communities. The 1999 fire altered large expanses of lower elevation sagebrush in the Horse Canyon area.

Sagebrush communities of the northern portion of the HC/CUEP area (e.g. Fourmile Canyon) have generally much steeper slopes and differing soil parent material. The presence of ravine fescue (*Festuca sororia*) and Nevada needlegrass (*Achnatherum nevadense*) are among the

compositional differences. Cheatgrass is much more abundant on north-facing slopes compared to other aspects in the Fourmile Canyon area.

Burned Sagebrush

Burned Sagebrush land cover type is located on all aspects of the Dry Hills area (i.e., burned sagebrush-south, west, and east facing (Dry Hills); and burned sagebrush-north facing (Dry Hills)). This cover type comprises approximately 14 percent of the HC/CUEP area.

The Dry Hills are located within the southern portion of the HC/CUEP area. There has been limited recovery of sagebrush in areas that burned in the 1999 fire, with sagebrush cover averaging between 0.1 and 0.2 percent. Characteristics of burned sagebrush on northern aspects differ from burned sagebrush on other aspects. The main shrub is Douglas rabbitbrush (*Chrysothamnus viscidiflorus*); with a total shrub cover of 10 percent on north-facing slopes, and about five percent on other aspects. The burned sagebrush areas have more bluebunch wheatgrass (*Pseudoroegneria spicata*) and Thurber needlegrass (*Achnatherum thurberianum*) compared to unburned sagebrush areas. The north-facing burned sagebrush has approximately twice as much grass cover. The native perennial forb cover average in burned sagebrush is about 15 percent on the north-facing areas and five percent on other exposures compared to the less than one percent for the unburned sagebrush areas. Cheatgrass cover on the burned sagebrush north-facing areas is nearly 30 percent and about 20 percent on the other exposures compared to less than two percent in unburned sagebrush.

Swelling Clay

The Swelling Clay land cover type accounts for approximately 13 percent of the HC/CUEP area. It occurs on the middle to upper slopes in the northeastern and central portions of the HC/CUEP area. This type is characterized by claypan soils. Shrub cover is typically moderate, consisting of big sagebrush and Douglas rabbitbrush. The forb cover is generally much higher than at other sagebrush sites. Large numbers of tap-rooted perennials often co-occur. Some sites are located on high elevation, wind-swept sites with concave topography. This topography collects wind-blown snow, which in conjunction with high soil surface permeability, provides moisture to deep-rooted species in the spring and early summer.

Burned Pinyon-Juniper and Burned Juniper Woodland

The Burned Pinyon-Juniper and Burned Juniper Woodland land cover types account for approximately nine percent of the HC/CUEP area. These types occur in the eastern and southern portions of the HC/CUEP area, including within Horse Canyon. The burned juniper woodlands are found at lower elevations than the burned pinyon-juniper woodlands. Tree cover is non-existent and average perennial herbaceous cover is relatively high (greater than 30 percent). Cheatgrass cover in these burned woodlands has been estimated to be relatively low, approximately eight percent.

Mountain Mahogany

The Mountain Mahogany land cover type accounts for approximately five percent of the HC/CUEP area. It occurs at the high elevations on the east slope of the Cortez Mountains, in the central portion of the HC/CUEP area. This vegetation type consists of about 16 percent cover of curlleaf mountain mahogany (*Cercocarpus ledifolius*) with varying amounts of singleleaf pinyon pine. Limber pine (*Pinus flexilis*) occurs sporadically. Other woody plants that are present include serviceberry (*Amelanchier alnifolia*), desert gooseberry (*Ribes velutinum*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and desert snowberry (*Symphoricarpos longiflorus*). Cover by native perennial grasses averages less than two percent and cover by native perennial forbs averages about 20 percent. Cheatgrass is very limited, averaging 0.3 percent cover. Native annual and biennial plants are diverse, even though they average less than two percent cover.

High Altitude Sagebrush

The High Altitude Sagebrush land cover type comprises approximately four percent of the HC/CUEP area. It occurs at higher elevations in the northern portion of the HC/CUEP area, north of Mount Tenabo. This sagebrush shrubland is dominated by a mix of mountain big sagebrush and varying amounts of other shrub species. The diversity of grasses, shrubs and native perennial forbs is higher than the lower elevation sagebrush sites.

Horse Canyon Mine Plan Disturbance and Pre-1981 Roads

The Horse Canyon Mine Plan disturbance and pre-1981 roads together encompass approximately two percent of the HC/CUEP area. This category includes only those disturbance features that were created by actions external to HC/CUEP exploration (e.g., pits associated with the Horse Canyon Mine; the Horse Canyon haul road) or pre-1981 roads. It does not include the disturbance from HC/CUEP exploration activities.

HC/CUEP Disturbance

This category accounts for surface disturbance related to HC/CUEP exploration activities (i.e., pads and sumps, post-1981 roads, communication sites, and recontoured and seeded areas). It includes open and active areas. The existing HC/CUEP exploration disturbance of 409 acres is 1.8 percent of the total HC/CUEP area of 22,307 acres.

3.5.1.2 Noxious Weeds, Invasive, and Non-native Plant Species

Noxious weeds, invasive, and non-native plant species are species that are highly competitive, highly aggressive, and spread easily. 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" (BLM 2014b). The Federal Noxious Weed Act of 1974 (as amended by Section 15, Management of Undesirable Plants on Federal Lands, 1990) authorizes cooperation among federal and state agencies in the control of weeds. The BMD recognizes the current noxious weed list designated by the State of Nevada Department of Agriculture (NDA) statute, found in NAC 555.010.

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). As of May 2014, 47 noxious weeds were on the Nevada Noxious Weed List (NDA 2014).

The BLM's policy relating to the management and coordination of noxious weeds and invasive plant species activities is set forth in the BLM Manual 9015 – Integrated Weed Management (BLM 1992). The BLM's primary focus is providing adequate capability to detect and treat smaller weed infestations in high-risk areas before they have a chance to spread. Noxious weed control is based on a program of prevention, early detection, and rapid response.

Annual noxious weed surveys have been conducted in the HC/CUEP area since 2009 (ESCO 2013). As of 2012, six noxious weed species are known to occur within the HC/CUEP area. The most extensive of these noxious weeds is hoary cress (*Cardaria draba*), followed by musk thistle (*Carduus nutans*), and Scotch thistle (*Onopordon acanthium*). Canada thistle (*Cirsium arvense*), poison hemlock (*Conium maculatum*), and Klamath weed, or spotted St. Johnswort, (*Hypericum perforatum*) occur to a limited degree.

Barrick has taken weed control actions to address the hoary cress and musk thistle in the Horse Canyon area (ESCO 2013). The noxious weed management plan describes control methods used, which include manual removal, manual prevention of flowering (e.g. mowing), chemical application, and development of desirable annual or perennial competition (ESCO 2013). The noxious weed management plan also outlines proper herbicide application and handling techniques, worker safety, and describes how to handle spills.

The most common invasive plant species found within HC/CUEP is cheatgrass. Much like its distribution throughout Nevada, the species is found throughout the HC/CUEP area in varying densities depending on localized disturbance history, including fire.

Section 2.2.3.11 includes details on the applicant-committed EPMs related to weed control that are incorporated into the Proposed Action.

3.5.1.3 Reclamation

Reclamation activities that are incorporated into the Proposed Action are summarized in Section 2.2.4 (Barrick 2013a, Barrick 2013c).

3.5.2 Environmental Consequences Vegetation Resources

3.5.2.1 Proposed Action

Surface disturbance associated with HC/CUEP exploration has affected 409 acres of the HC/CUEP area, which equates to 1.8 percent of the total HC/CUEP Plan area of 22,307 acres. The total acreage disturbed includes 250 acres that has been recontoured and seeded; however; none of this acreage has been released from the reclamation assurance by BLM of the NDEP.

The majority of surface disturbance has occurred in areas mapped as Burned Pinyon-Juniper, Swelling Clay, sagebrush, and burned sagebrush communities. Changes to vegetation

composition in the burned areas of HC/CUEP have not altered undisturbed communities. Reclamation has improved or would improve the condition of vegetation in areas that burned in the 1999 fire events.

Reclamation is completed in accordance with BLM and NDEP regulations and requirements. The reclamation plan specifies seed mixes to be used and standards that must be met to qualify areas as reclaimed desired plant communities (RDPCs). Additional details on reclamation practices of the HC/CUEP Plan are included in Section 2.2.4.

With the revised disturbance tracking and reporting protocol currently in place (**Appendix A**), ongoing reclamation and a revised RCE and financial guarantee recognizing all HC/CUEP exploration disturbance, the Plan Modification and Addendum have adequately accounted for the current disturbance of 409 acres. No additional mitigation is necessary.

The Proposed Action would also allow for a 140 acre increase in surface disturbance within the current HC/CUEP Plan boundary to 549 acres. The 140 acre increase is an additional 0.6 percent of the land area within the HC/CUEP boundary. Acres of disturbance would be tracked and reported according to the revised protocol (**Appendix A**); total surface disturbance under the Plan Amendment would not exceed 549 acres.

Reclamation activities would continue as exploration work is completed, gradually increasing the amount of area that is recontoured and seeded. Exploration activities would have an immediate effect on vegetation community composition, but long-term, residual effects would be minimized through weed management practices and as reclamation is completed. Effects on vegetation as a result of the Proposed Action for an additional 140 acres of surface disturbance would be minimal, given the small percentage of disturbance in the total HC/CUEP area and the regulatory requirement (and financial guarantee) for reclamation.

As part of the Proposed Action, implementation of the greater sage-grouse EPM could affect approximately 900 acres of pinyon-juniper and juniper community types (see Section 2.2.3 and Section 3.9). The implementation of the greater sage-grouse EPM would help to maintain and enhance diverse natural plant communities in good ecological condition, exhibiting strong soil/slope stabilizing characteristics. Reducing the spread of pinyon-juniper expansion woodlands, and/or their transition to increasingly tree-dominated states, is expected to sustain and stimulate herbaceous plant vigor, maintain water infiltration capacity, and reduce soil erosion potential (Reid et al. 1999; Pierson et al. 2007). Conifer competition with shrubs, grasses and forbs would be reduced, preserving and propagating these species, which are especially important for wildlife and may result in a change in the current vegetation community to a sagebrush type.

Noxious Weeds, Invasive, and Non-native Plant Species

Surface disturbance activities and vehicular travel could result in establishment or spread of undesirable weed species. Weed populations have not been identified as a major threat to vegetation communities in the HC/CUEP area. Existing control measures (Section 2.2.3.11),

the current noxious weed management plan, and reclamation activities appear to have been effective at minimizing new infestations and the spread of existing weeds at HC/CUEP.

Noxious and invasive weed control measures detailed in Section 2.2.3.11 were implemented during the surface disturbance associated with HC/CUEP exploration. Under the Proposed Action, the noxious and invasive weed control measures would continue to be implemented. The noxious weed management plan (ESCO 2013) would be followed and annual vegetation inventory efforts would continue, which include monitoring existing weed populations and identifying new populations. Weed control measures include preventative actions to reduce the chance of spreading seeds from vehicle traffic. This would include avoiding known areas of noxious weeds, invasive, and non-native plant species during periods when they could be spread by vehicles. Compliance with the noxious weed management plan would ensure exploration activities follow proper BLM protocol regarding invasive, non-native weeds.

Implementation of the greater sage-grouse pinyon-juniper treatment EPM would not contribute to the creation of conditions favorable for the spread and establishment of noxious weeds, invasive and non-native species since the activity does not result in ground disturbance and hand crews would be required to practice BMPs.

Ongoing HC/CUEP reclamation activities would include applying site-specific seed mixes to disturbed areas to reduce the establishment of weed infestations and to increase competition against weeds. It is likely that weed control efforts and reclamation completed in support of HC/CUEP activities in previously burned areas have improved vegetation conditions. With continued implementation of the weed control efforts and ongoing reclamation activities, weeds are not anticipated to have a major effect on vegetation communities at HC/CUEP.

3.5.2.2 No Action

No additional surface disturbance would be allowed under the No Action Alternative. Open and active areas would be reclaimed once exploration activities are completed. No new disturbance would be allowed. Noxious and invasive weed control measures would continue to be implemented. The No Action Alternative would not result in impacts to vegetation.

3.5.2.3 Cumulative Effects

Proposed Action

The current surface disturbance associated with HC/CUEP exploration is considered relative to surface disturbance caused by past, present, and RFFAs listed in **Table 2-6**. The cumulative assessment also considers vegetation affected by the 1999 fires, which impacted an estimated 90,000 acres of the cumulative assessment area. Total surface disturbance estimated from these other past, present, and RFFAs equals 140,877 acres. This total does not account for acres reclaimed.

The Proposed Action of 409 acres of surface disturbance associated with exploration activities at HC/CUEP is approximately 0.3 percent of the disturbance approved or projected within the cumulative assessment area. The Proposed Action of an additional 140 acres of surface

disturbance would total approximately 0.4 percent of the disturbance approved or projected within the cumulative assessment area. The Proposed Action for HC/CUEP includes reclamation and weed control measures, which would prevent long-term, residual effects. Therefore, significant cumulative impacts to vegetation are not anticipated.

No Action

The No Action Alternative would not result in impacts to vegetation. Cumulative effects would not occur.

3.6 Forestry and Woodland Resources

3.6.1 Affected Environment Forestry and Woodland Resources

Forestry and woodland resources found within HC/CUEP include commercial and personal firewood and pine nut collection. Vegetation communities included in these activities are: Pinyon-Juniper Woodland, Burned Pinyon-Juniper, Mountain Mahogany, Burned Mountain Mahogany, Juniper Woodland, Burned Juniper Woodland, Pygmy Conifer Woodland, Curl-leaf Mountain Mahogany plus Pines, and Pygmy Conifer Forest. Vegetation community descriptions and acres are described in Section 3.5 Vegetation Resources. **Figure 3-8** displays cover extent of vegetation communities mapped within HC/CUEP. Pinyon-Juniper Woodland is the most extensive of these communities, covering approximately 6,049 acres (27.1 percent) of the HC/CUEP area.

The proposed sage grouse EPM does not constitute a comprehensive pinyon-juniper management plan for the proposed Project area. The proposed greater sage-grouse EPM represents a relatively low cost, limited scope effort, to reduce or reverse early-stage pinyon-juniper encroachment of greater sage-grouse habitat, and would be limited exclusively to early stage expansion woodlands as defined by the Intermountain Society of American Foresters (ISAF 2013).

3.6.2 Environmental Consequences Forestry and Woodland Resources

3.6.2.1 Proposed Action

Exploration activities have disturbed 409 acres, or 1.8 percent, of the HC/CUEP area. A portion of this disturbance includes the vegetation communities that support forestry and woodland resources. Of the types considered as supporting forestry and woodland resources, the Burned Pinyon-Juniper type, which may support commercial and personnel firewood collection activities, has experienced the majority of disturbance. This type is extensive in the HC/CUEP area, mapped as covering 1,507 acres. Other dominant types include Pinyon-Juniper Woodland and Juniper Woodland, which combined total 6,547 acres. Exploration activities have not restricted public access for the continuation of forestry and woodland uses. As stated in the applicant-committed EPMs, Barrick would minimize where possible any injury or removal of pinyon pine, juniper, aspen, limber pine, or mountain mahogany during activities associated with drill pad and road construction. Pinyon pine and juniper that has been removed due to exploration activities is made available to the public.

The proposed additional 140 acres of allowable surface disturbance may occur within vegetation types that support forestry and woodland resources. Barrick would continue to implement the forestry and woodland resources applicant-committed EPM. The HC/CUEP area would not be restricted from permissible uses such as firewood collection and pine nut collection.

The proposed implementation of the greater sage-grouse EPM could affect approximately 900 acres of pinyon-juniper community types. Areas of pinyon-juniper woodland identified as encroaching into sagebrush community types (Phase I and II) would be the focus of this EPM, which may result in a change in the vegetation community to a sagebrush type. Trees cut in association with the Proposed Action would be available not only for personal harvest but also for commercial use under a commercial deadwood permit. Access for public collection of woodland products would not be reduced.

3.6.2.2 No Action

No additional surface disturbance would be allowed under the No Action Alternative. The No Action Alternative would not result in impacts to forestry and woodland resources.

3.6.2.3 Cumulative Effects

Proposed Action

Other past, present, and RFFAs listed in **Table 2-6** have resulted in surface disturbance. The cumulative assessment considers vegetation affected by the 1999 fires, which impacted an estimated 90,000 acres of the cumulative assessment area. Total surface disturbance estimated from these other past, present, and RFFAs equals 140,877 acres. This total does not account for acres reclaimed.

The Proposed Action of 409 acres of surface disturbance associated with exploration activities at HC/CUEP is approximately 0.3 percent of the disturbance approved or projected within the cumulative assessment area. The Proposed Action of an additional 140 acres of surface disturbance would total 549 acres, or approximately 0.4 percent of the disturbance approved or projected within the cumulative assessment area. Trees cut in association with the proposed Project would be available not only for personal harvest but also for commercial use under a commercial deadwood permit. Additionally, pinyon-juniper areas within and surrounding the Project area would remain open to commercial Christmas tree and pine nut collection. Due to these reasons, and implementing the EPMs, impacts on forestry resources would be very limited under the Proposed Action. Significant cumulative effects to forestry and woodland resources are not anticipated.

No Action

The No Action Alternative would not result in impacts to forestry and woodland resources and cumulative effects would not occur.

3.7 Soils

This section describes the affected environment for consideration of direct, indirect, and cumulative impacts to soils. The direct and indirect analysis considers soil resources found within the HC/CUEP Plan boundary. The cumulative analysis considers projects that have caused surface disturbance within a geographic area that incorporates the southwestern portion of Pine Valley, the southern portion of Crescent Valley, and the northern portion of Grass Valley.

3.7.1 Affected Environment Soils

Soils in the HC/CUEP area have been mapped and described by the Natural Resources Conservation Service (NRCS) in the soil surveys of Eureka (NRCS 2013a) and Lander (NRCS 2013b) counties, Nevada. There are 29 soil map unit associations in the HC/CUEP area (**Figure 3-9**). Acreages for these units and a brief summary of map unit characteristics are shown in **Table 3-6**. Full descriptions of the individual soil map units are available online as Soil Survey Geographic Database (SSURGO) reports.

A field investigation of soils in HC/CUEP was completed in 2014 (SMITH 2014). The locations of soil test pits are shown on **Figure 3-9**. The objectives of the investigation were to evaluate the ground conditions identified in the NRCS soil map units and verify the vegetation communities occurring across the different soils. Results are presented below in **Table 3-7**. The complete field report entitled *Soils Investigation of the Horse Canyon-Cortez Unified Exploration Project Plan of Operations Area in Eureka County and Lander County, Nevada* (SMITH 2014) is available in the project record.

The HC/CUEP area is largely comprised of soils derived from tuffaceous sandstone and limestone and igneous rocks, occurring as residuum and colluvium deposits that occupy moderate to steep hillslopes at higher elevations. In general, these soils are coarse and well drained; a shallow restrictive layer is common. Organic material in these soils is low (less than five percent). Soil associations may contain minor loess and volcanic ash deposits in addition to residuum and colluvium. Alluvial deposits occupy a minor component of the HC/CUEP area, occurring in valley bottoms and lower elevations. These soils tend to be deep, moderately permeable, and well-drained.

3.7.1.1 Major Land Resource Areas and Ecological Sites

Major Land Resource Areas (MLRAs) are geographically associated land resource units used in statewide and regional planning. In the land resource hierarchy, MLRAs fall within a Land Resource Region (LRR) and are comprised of smaller Land Resource Units (LRUs) or Common Resource Areas (CRAs) (NRCS 2014). The HC/CUEP area contains portions of three MLRAs: MLRA 24 – Humboldt Area, MLRA 25 – Owyhee High Plateau, and MLRA 28B – Central Nevada Basin and Range. Within each of these MLRAs are numerous ecological sites. Ecological sites provide a consistent framework for describing and classifying rangeland and forestland soils and vegetation associations. Ecological site descriptions (ESDs) are written for the individual ecological sites which comprise the larger MLRA units. The ESDs provide

information to evaluate the land as to whether it is suitable for various land-uses, capable of responding to different management activities or disturbance processes, and whether it is able to sustain productivity over the long term (NRCS 2014). Ecological sites are subdivisions of natural landscapes that are differentiated in terms of the historic climax plant community (original or natural potential) they are capable of supporting. An ecological site is the product of all of the environmental factors responsible for its development including soils, topography, climate, and fire (UNR 2014).

ESDs are currently being revised for the HC/CUEP area, but are not yet final or approved by the NRCS, and are unavailable for public distribution at this time (UNR 2014). The best available information on ecological sites was obtained from the SSURGO reports. Ecological sites are listed for each soil map unit in **Table 3-6**.

3.7.1.2 Soils Field Inventory

Soil test pits were dug by hand at 26 locations pre-determined through a desktop review of the ESCO vegetation data and NRCS soil map units (SMITH 2014). Soils were classified to the series level. Samples were obtained from each horizon for purposes of characterizing the horizon and to determine suitability of the soil for plant growth.

Seventeen of the 26 profiles described are not a named component (soil series) of the NRCS soil map unit (SMITH 2014). Differences are summarized in **Table 3-7**, which lists the soil sample pit number, soil series mapped in the field, and NRCS soil association. The differences are relatively minor and explainable due to the fact that NRCS mapped associations are not derived from field data, but rather remotely-sensed data and landscape-scale interpretations of geology and topography.

Figure 3-9 NRCS Soil Associations and Soil Pit Locations

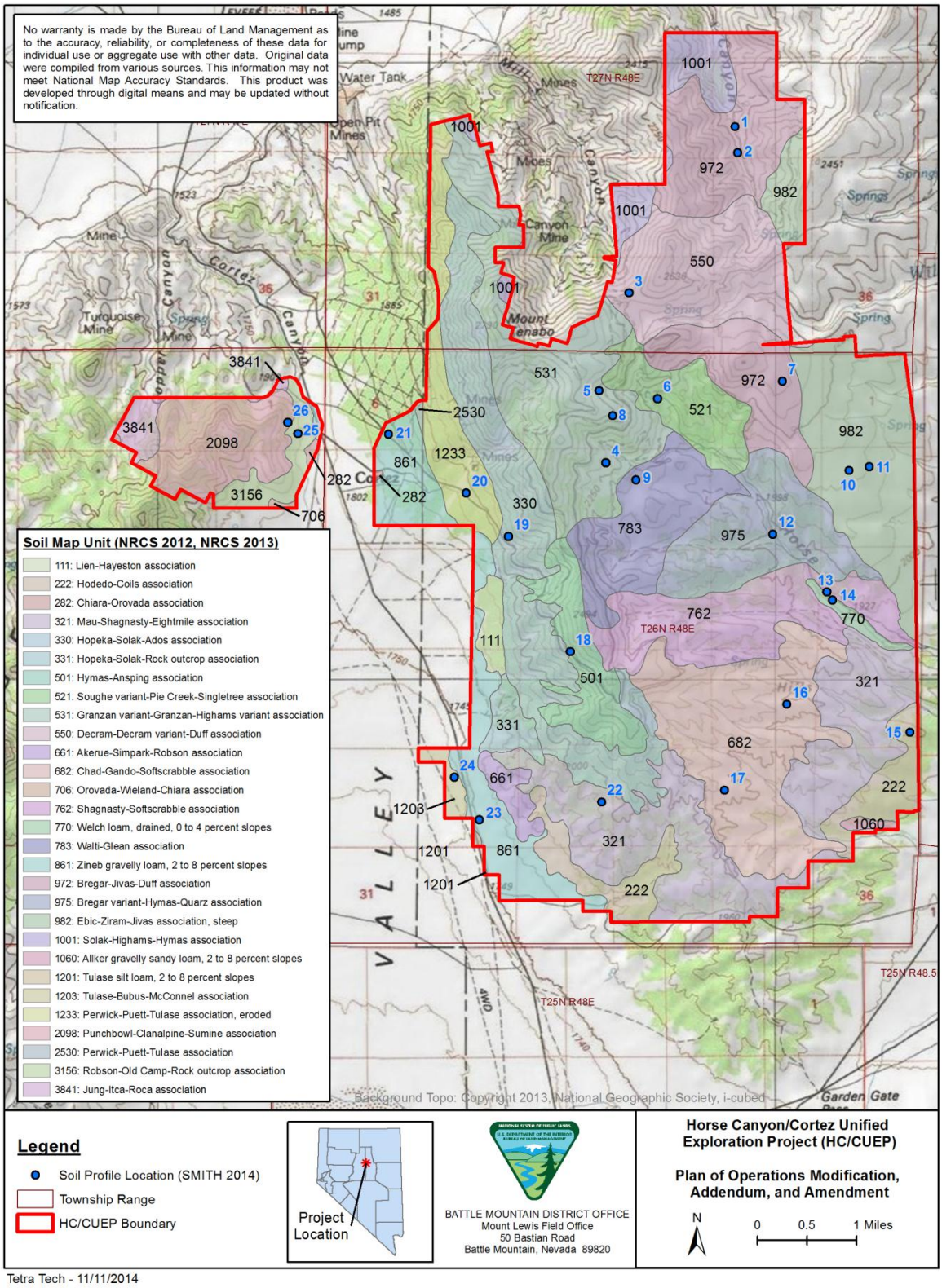


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Table 3-6 NRCS Soil Associations and ESDs of the HC/CUEP Area

Association (map units) and Ecological Sites	Characteristics	Acres	Percent Total
Mau-Shagnasty-Eightmile association (321) Mau (45%) *R028BY007NV Loamy 10-12 P.z.* ecological site Shagnasty (30%) and Eightmile (15%) *F024XY049NV Pinus monophylla-Juniperus osteosperma/Artemisia tridentata ssp. vaseyana / Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site	Residuum and coluvium derived from volcanic rocks (igneous and metamorphic); depth to a root restrictive layer, bedrock, lithic, is 20 to 39 inches; well-drained; shrink-swell potential is low to moderate. Includes small areas of open and active, recontoured/seeded.	2,323.8	10.4
Hopeka-Solak-Ados association (330) Hopeka (45%) and Ados (15%) *F024XY051NV Pinus monophylla-Juniperus osteosperma / Artemisia nova /Achnatherum thurberianum Pseudoroegneria spicata ssp. spicata* ecological site Solak (25%) *R028BY016NV Shallow Calcareous Slope 8-10 P.z.* ecological site	Colluvium, alluvium and residuum derived from limestone and dolomite; depth to a root restrictive layer, lithic, is 4 to 10 inches (Hopeka), 10 to 20 inches (Solak), petrocalcic, is 20 to 34 inches (Ados); well-drained; shrink swell potential is low.	1,970.5	8.8
Chad-Gando-Softscrabble association (682) Chad (45%) *R028BY027NV Shallow Calcareous Slope 14+ P.z.* ecological site Gando (20%) *R028BY034NV Mountain Ridge 12-14 P.z.* ecological site Softscrabble t (20%) *R028BY030NV Loamy 12-16 P.z.* ecological site	Residuum derived from mixed rocks, loess and volcanic ash; depth to a root restrictive layer, bedrock, paralithic, is 39 to 59 inches; well – drained; shrink-swell potential is low (Gando and Softscrabble) to high (Chad component only).	1,898.0	8.5
Granzan variant-Granzan-Highams variant association (531) Granzan variant (40%) *R028BY042NV Mahogany Thicket* ecological site Granzan (35%) *R025XY009NV South Slope 12-14 P.z.* ecological site Highams (15%) *R025XY024NV Mountain Ridge* ecological site	Residuum and colluvium derived from limestone and calcareous shale; depth to a root restrictive layer, bedrock, paralithic, is 25 to 39 inches, lithic, is 39 to 59 inches; well-drained; shrink-swell potential is low. Includes recontoured/seeded roads.	1,875.7	8.4
Bregar-Jivas-Duff association (972) Bregar (55%) *R025XY024NV Mountain Ridge* ecological site Jivas (20%) *R025XY009NV South Slope 12- 14 P.z.* ecological site Duff (15%) *R025XY012NV Loamy*	Residuum and colluvium derived from volcanic rocks and quartzite; depth to a root restrictive layer, bedrock, lithic, is 5 to 12 inches (Bregar), 39 to 59 inches (Jivas); well-drained; shrink-swell potential	1,834.5	8.2

Table 3-6 NRCS Soil Associations and ESDs of the HC/CUEP Area

Association (map units) and Ecological Sites	Characteristics	Acres	Percent Total
Slope 12-16 P.z. ecological site	is low to moderate (Duff). Includes open and active, recontoured/seeded areas.		
Ebic-Ziram-Jivas association, steep (982) Ebic (35%) and Ziram (35%) *R025XY017NV Claypan 12-16 P.z.* ecological site Jivas (15%) *R025XY009NV South Slope 12-14 P.z.* ecological site	Residuum and colluvium derived from volcanic rocks; depth to a root restrictive layer, bedrock, lithic, is 20 to 30 inches, 39-59 (Ziram); well-drained; shrink-swell potential is moderate to low (Jivas).	1,711.9	7.7
Decram-Decram variant-Duff association (550) Decram (50%) and Decram variant (20%) *R025XY024NV Mountain Ridge* ecological site Duff (20%) *R025XY012NV Loamy Slope 12-16 P.z.* ecological site	Residuum derived from quartzite, chert and volcanic rocks; depth to a root restrictive layer, bedrock, lithic, is 20 to 39 inches, 39 to 59 inches (Duff); well-drained; shrink-swell potential is low to moderate (Duff).	1,238.4	5.6
Shagnasty-Softscrabble association (762) Shagnasty (60%) *F024XY049NV Pinus monophylla-Juniperus osteosperma/ Artemisia tridentata ssp. vaseyana/ Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site Softscrabble (25%) *R028BY030NV Loamy 12-16 P.z.* ecological site	Residuum and colluvium derived from igneous and metamorphic rocks; depth to a root restrictive layer, bedrock, paralithic, is 50 to 59 inches, greater than 60 inches (Softscrabble); well-drained; shrink-swell potential is low to moderate. Includes open and active area.	1,217.5	5.5
Zineb gravelly loam, 2 to 8 percent slopes (861) Zineb (100%) *R025XY019NV Loamy 8-10 P.z.* ecological site	Alluvium derived from mixed rocks and volcanic ash; depth to a root restrictive layer is greater than 60 inches; well-drained; shrink-swell potential is low.	1,122.0	5.0
Bregar variant-Hymas-Quarz association (975) Bregar variant (50%) and Hymas (20%) *F024XY049NV Pinus monophylla-Juniperus osteosperma/Artemisia tridentata ssp. vaseyana/Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site Quarz (20%) *R025XY009NV South Slope 12-14 P.z.* ecological site	Resdiuum and colluvium derived from mixed rocks (Bregar variant and Quarz) and limestone (Hymas); depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches (Bregar variant and Hymas), 20 to 30 inches (Quarz); somewhat excessively drained (Bregar variant) and well-drained (Hymas and Quarz); shrink-swell potential is low (Bregar variant and Hymas) and moderate (Quarz). Includes open and active, recontoured/seeded areas	1,084.8	4.9
Walti-Glean association (783)	Colluvium and residuum derived	946.3	4.2

Table 3-6 NRCS Soil Associations and ESDs of the HC/CUEP Area

Association (map units) and Ecological Sites	Characteristics	Acres	Percent Total
Walti (70%) *R028BY037NV Claypan 12-14 P.z.* ecological site Glean (15%) *R028BY030NV Loamy 12-16 P.z.* ecological site	from volcanic rocks; depth to a root restrictive layer, bedrock, lithic, is 20 to 30 inches, 39 to 59 inches (Glean); well-drained; shrink-swell potential is high (Walti) to low (Glean). Includes small areas of open and active, recontoured/seeded		
Punchbowl-Clanalpine-Sumine association (2098) Punchbowl (40%) *R024XY030NV Shallow Calcareous Loam 8-10 P.z.* ecological site Clanalpine (30%) *F024XY054NV Pinus monophylla/Artemisia tridentata ssp. vaseyana/Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site Sumine (15%) *R024XY029NV South Slope 12-16 P.z.* ecological site	Residuum weathered from mixed (Punchbowl and Sumine), colluvium derived from volcanic rock and/or residuum weathered from volcanic rock (Clanalpine), and colluvium derived from mixed (Sumine); depth to a root restrictive layer, bedrock, lithic, is 8 to 14 inches (Punchbowl) and 20 to 39 inches (Sumine), paralithic, is 20 to 39 inches (Clanalpine); well-drained; shrink-swell potential is low (Punchbowl and Sumine) and moderate (Clanalpine).	797.7	3.6
Perwick-Puett-Tulase association, eroded (1233) Perwick (40%) and Puett (35%) *F025XY059NV Juniperus osteosperma/ Artemisia tridentata ssp. wyomingensis /Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site Tulase (15%) *R025XY019NV Loamy 8-10 P.z.* ecological site	Residuum derived from lacustrine deposits and siltstone, and residuum and colluvium derived from sedimentary rocks and tuff; depth to a root restrictive layer, bedrock, paralithic, is 10-20; 20 to 39 inches; well- drained; shrink-swell potential is low.	709.3	3.2
Hodedo-Coils association (222) Hodedo (60%) *F024XY049NV Pinus monophylla-Juniperus osteosperma /Artemisia tridentata ssp. vaseyana / Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site Coils (25%) *R028BY007NV Loamy 10-12 P.z.* ecological site	Alluvium derived from mixed rocks (volcanic and sedimentary); depth to a root restrictive layer, duripan, is 20 to 26 inches; well-drained; shrink-swell potential is high.	730.1	3.3
Hymas-Ansping association (501) Hymas (55%) and Ansping (30%) *F024XY049NV Pinus monophylla-Juniperus osteosperma/ Artemisia tridentata ssp. vaseyana/ Pseudoroegneria*	Residuum and colluvium derived from limestone, depth to restrictive layer, bedrock, lithic is 10 to 20 inches; and alluvium and colluvium derived from limestone, sedimentary and volcanic rocks,	615.8	2.8

Table 3-6 NRCS Soil Associations and ESDs of the HC/CUEP Area

Association (map units) and Ecological Sites	Characteristics	Acres	Percent Total
spicata ssp. spicata-Achnatherum thurberianum ecological site	depth to a root restrictive layer, duripan, is 39 to 55 inches; well-drained; shrink-swell potential is low.		
Soughe variant-Pie Creek-Singletree association (521) Soughe variant (50%) *F024XY049NV Pinus monophylla-Juniperus osteosperma/Artemisia tridentata ssp. vaseyana/Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site Pie Creek (20%) *R025XY018NV Claypan 10-12 P.z.* ecological site Singletree (20%) *R025XY012NV Loamy Slope 12-16 P.z.* ecological site	Residuum derived from mixed rocks (Soughe variant) and tuff (Pie Creek) and residuum and colluvium derived from igneous rocks, loess, and volcanic ash (Singletree); depth to a root restrictive layer, bedrock, paralithic, is 12 to 20 inches (Soughe variant), 39 to 59 inches (Singletree), lithic, is 23 to 39 inches (Pie Creek); well-drained; shrink-swell potential is high (Soughe variant and Pie Creek) and low (Singletree). Includes open and active, recontoured/seeded areas.	599.4	2.7
Solak-Highams-Hymas association (1001) Solak (40%) *R028BY016NV Shallow Calcareous Slope 8-10 P.z.* ecological site Highams (25%) *F024XY051NV Pinus monophylla-Juniperus osteosperma/Artemisia nova/Achnatherum thurberianum Pseudoroegneria spicata ssp. spicata* ecological site Hymas (25%) *F024XY049NV Pinus monophylla-Juniperus osteosperma/Artemisia tridentata ssp. vaseyana/Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site	Residuum and colluvium derived from mixed rocks (Solak) and limestone (Hymas) and residuum derived from limestone and dolomite (Highams); depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches; somewhat excessively drained (Solak) and well-drained (Highams and Hymas); shrink-swell potential is low (Solak and Hymas) and moderate (Highams).	472.0	2.1
Robson-Old Camp-Rock outcrop association (3156) Robson (50%) *R024XY018NV Claypan 10-12 P.z.* ecological site Old camp (20%) *R024XY005NV Loamy 8-10 P.z.* ecological site Rock outcrop (15%)[1]	Residuum weathered from igneous rock (Robson) and colluvium derived from volcanic rock and/or residuum weathered from volcanic rock (Old camp); depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches; well-drained; shrink-swell potential is moderate (Robson) and low (Old Camp).	260.7	1.2
Hopeka-Solak-Rock outcrop association (331) Hopeka (40%) *F024XY051NV Pinus monophylla-Juniperus*	Residuum and colluvium derived from limestone and dolomite (Hopeka) and mixed rocks (Solak); depth to a root restrictive layer, bedrock, lithic, is 4 to 10 inches	181.6	0.8

Table 3-6 NRCS Soil Associations and ESDs of the HC/CUEP Area

Association (map units) and Ecological Sites	Characteristics	Acres	Percent Total
osteosperma/Artemisia nova/Achnatherum thurberianum Pseudoroegneria spicata ssp. spicata ecological site Solak (35%) *R028BY016NV Shallow Calcareous Slope 8-10 P.z.* ecological site Rock outcrop (10%)[1]	(Hopeka) and 10 to 20 inches (Solak); well-drained (Hopeka) and somewhat excessively drained (Solak); shrink-swell potential is low.		
Akerue-Simpark-Robson association (661) Akerue (40%) and Simpark (35%) *R028BY016NV Shallow Calcareous Slope 8-10 P.z.* ecological site Robsin (10%) *R028BY037NV Claypan 12-14 P.z.* ecological site	Residuum derived from volcanic rocks and quartzite; depth to a root restrictive layer, duripan, is 14 to 20 inches; well-drained; shrink-swell potential is low to moderate.	161.9	0.7
Jung-Itca-Roca association (3841) Jung (35%) *R028BY016NV Shallow Calcareous Slope 8-10 P.z.* ecological site Itca (25%) *F024XY054NV Pinus monophylla/Artemisia tridentata ssp. vaseyana/Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site Roca (25%) *R024XY028NV South Slope 8-12 P.z.* ecological site	Colluvium derived from volcanic and sedimentary rock and/or residuum weathered from volcanic and sedimentary rock; depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches (Itca and Jung), 20 to 39 inches (Roca); well-drained; shrink-swell potential is moderate.	146.5	0.7
Lien-Hayeston association (111) Lien (40%) *F024XY051NV Pinus monophylla-Juniperus osteosperma /Artemisia nova /Achnatherum thurberianum Pseudoroegneria spicata ssp. spicata* ecological site Lien (30%) *R028BY011NV Shallow Calcareous Loam 8-10 P.z.* ecological site Hayeston (15%) *R028BY010NV Loamy 8-10 P.z.* ecological site	Alluvium derived from mixed rocks, loess and volcanic ash; depth to a root restrictive layer, duripan, is 6 to 14 inches; well-drained; shrink-swell potential is low.	142.6	0.6
Tulase-Bubus-McConnel association (1203) Tulase (40%) and McConnel (15%) *R024XY005NV Loamy 8-10 P.z.* ecological site Bubus (30%) *R024XY002NV Loamy 5-8 P.z.* ecological site	Alluvium derived from mixed rocks, loess and volcanic ash; depth to a root restrictive layer is greater than 60 inches; well-drained; shrink-swell potential is low.	92.2	0.4
Welch loam, drained, 0 to 4 percent slopes (770)	Alluvium derived from volcanic rocks; depth to a root restrictive	87.3	0.4

Table 3-6 NRCS Soil Associations and ESDs of the HC/CUEP Area

Association (map units) and Ecological Sites	Characteristics	Acres	Percent Total
Welch (95%) is in the *R028BY024NV Loamy Bottom 14+ P.z.* ecological site	layer is greater than 60 inches; moderately well-drained; shrink-swell potential is moderate. Includes small areas of open and active, recontoured/seeded.		
Allker gravelly sandy loam, 2 to 8 percent slopes (1060) Allker (85%) R024XY005NV Loamy 8-10 P.z. ecological site	Alluvium derived from mixed rocks and loess; depth to a root restrictive layer is greater than 60 inches; well-drained; shrink-swell potential is low.	35.8	0.2
Chiara-Orovada association (282) Chiara (50%) and Orovada (40%) *R024XY005NV Loamy 8-10 P.z.* ecological site	Alluvium derived from mixed (Chiara) and loess over alluvium derived from mixed (Orovada); depth to a root restrictive layer is greater than 60 inches (Orovada), duripan, is 10 to 20 inches (Chiara); well-drained; shrink-swell potential is low.	18.7	0.1
Orovada-Wieland-Chiara association (706) Orovada (45%), Wieland (25%), and Chiara (15%) *R024XY005NV Loamy 8-10 P.z.* ecological site	Loess over alluvium derived from mixed (Orovada), volcanic ash and/or alluvium derived from mixed and/or loess (Wieland), and alluvium derived from mixed (Chiara); depth to a root restrictive layer is greater than 60 inches (Orovada and Wieland), duripan, is 10 to 20 inches (Chiara); well-drained; shrink-swell potential is low (Orovado and Chiara) and moderate (Wieland).	12.4	0.1
Perwick-Puett-Tulase association (2530) Perwick (40%) and Puett (30%) *F025XY059NV Juniperus osteosperma/Artemisia tridentata ssp. wyomingensis/Pseudoroegneria spicata ssp. spicata-Achnatherum thurberianum* ecological site Tulase (15%) *R024XY005NV Loamy 8-10 P.z.* ecological site	Residuum weathered from sedimentary rock and/or tuff (Perwick and Puett), colluvium derived from tuff and/or sedimentary rock (Puett), volcanic ash and/or alluvium derived from mixed and/or loess (Tulase); depth to a root restrictive layer is greater than 60 inches (Tulase), bedrock, paralithic, is 20 to 39 inches (Perwick), 10 to 20 inches (Puett); well-drained; shrink-swell potential is low.	10.8	<0.1
Tulase silt loam, 2 to 8 percent slopes (1201) *R025XY019NV Loamy 8-10 P.z.* ecological site.	Alluvium derived from mixed rocks, loess and volcanic ash; depth to a root restrictive layer is greater than 60 inches; well-drained;	8.7	<0.1

Table 3-6 NRCS Soil Associations and ESDs of the HC/CUEP Area

Association (map units) and Ecological Sites	Characteristics	Acres	Percent Total
	shrink-swell potential is low.		
TOTAL		**22,307**	**100**

Table 3-7 Field Investigation Soil Profile – Soil Map Unit Relationships

Soil Profile	Soil Series	Classification to Family
1	Badhap	Bregar-Jivas-Duff Association (Map Unit 972)
2	Badhap	Bregar-Jivas-Duff Association (Map Unit 972)
3	Fairydell	Decram-Decram Variant-Duff Association (Map Unit 550) (Different series, but not deeper family; deeper to bedrock.)
4	Madeline	Granzan Variant-Granzan-Highams Variant Association (Map Unit 531) (Similar to Higrams Variant but layer of hard bedrock at less than 20 inches versus layer of soft bedrock; different family.)
5	Badhap	Granzan Variant-Granzan-Highams Variant Association (Map Unit 531) (Temperature regime found with the Badhap is cryic rather than frigid, which is consistent with topographic location of soil pit.)
6	Glean	Soughe Variant-Pie Creek-Singletree Association (Map Unit 521) (Not consistent with any series in the NRCS map unit; soil plot in landform (drainage swale) not consistent with surrounding landscape.)
7	Jivas	Bregar-Jivas-Duff Association (Map Unit 972)
8	Baldridge	Granzan Variant-Granzan-Highams Variant Association (Map Unit 531) (Similar to Granzan Series, but lacks a calcic horizon; soil pit is in landform typical of map unit.)
9	Lone	Walti-Glean Association (Map Unit 783) (Not like any series in NRCS map unit; landform is typical; differs by including a duripan at 29 inches instead of bedrock.)
10	Ebic	Ebic-Ziram-Jivas Association steep (Map Unit 982)
11	Ebic	Ebic-Ziram-Jivas Association steep (Map Unit 982)
12	Pie Creek	Bregar Variant-Hymas-Quarz Association (Map Unit 975) (Similar to Quarz, but differs due to percent of rock fragments is less in Pie Creek)
13	Shagnasty	Shagnasty-Softscramble Association (Map Unit 762)
14	Welch	Welch Loam, 0-4 % slopes (Map Unit 770)
15	Hodedo	Bregar-Jivas-Duff Association (Map Unit 972) (Similar to Jivas Series, but differs due to lower percentage of rock fragments, presence of duripan, and greater than 35% clay in argillic horizon; therefore, Great Group differs.)
16	Softscrabble	Chad-Gando-Softscrabble Association (Map Unit 682)
17	Chad	Chad-Gando-Softscrabble Association (Map Unit 682)
18	Hopeka	Hymas-Ansping Association (Map Unit 501) (Similar to Hymas, but differs due to lack of mollic epipedon, which changes the Order)
19	Hopeka	Hopeka-Solak-Ados Association (Map Unit 330)
20	Crookston Variant	Perwick-Puett-Tulase Association, Eroded (Map Unit 1233) (Unlike components of NRCS map unit; more similar to Tulase Series, but still differs by particle size class, presence of duripan and mollic epipedon; therefore Order is different than Tulase; landform is typical of map unit.)
21	Bannion	Zineb gravelly loam, 2-8 % slopes (Map Unit 861) (Similar to Zineb, except for

		presence of duripan rather than only duric material, which changes suborder)
22	Lone	Mau-Shagnasty-Eightmile Association (Map Unit 321) (Similar to Mau, except for presence of duripan rather than only duric material; less clay and lack of argillic horizon; therefore, suborder changes.)
23	Cewat	Zineb gravelly loam, 2-8 % slopes (Map Unit 861) (Similar to Zineb, except for lack of duric material, which changes subgroup.)
24	Turpin	Tulase-Bubus-McConnel Association (Map Unit 1203)
25	Robson	Robson-Old Camp-Rock Outcrop Association (Map Unit 3156)
26	Sumine	Punchbowl-Clanalpine-Sumine Association (Map Unit 2098)

3.7.2 Environmental Consequences Soils

3.7.2.1 Proposed Action

Exploration activities disturb the soil surface, increasing the potential for erosion from wind and water. Compaction of soils may reduce nutrient uptake and aeration, and cause reduced infiltration rates and increased runoff.

There are currently 409 acres of surface disturbance in the HC/CUEP area. Of the 409 acres of surface disturbance, 250 acres have been recontoured and reseeded; however, none of this acreage has been released from the reclamation assurance by the BLM of the NDEP. The majority of HC/CUEP surface disturbance has occurred in the Horse Canyon area. Soils in the Horse Canyon area are generally well-drained with low to moderate shrink-swell potential. Erosion control and compaction prevention measures in these areas have been implemented as standard practice. Some soils in the upper reaches of Horse Canyon are characterized as having a high shrink-swell potential and are found in a claypan ecological site (Walti unit of the Walti-Glean association (783), *R028BY037NV Claypan 12-14 P.z.* ecological site; Pie Creek unit of the Sough-variant-Pie Creek-Singletree association (521), *R025XY018NV Claypan 10-12 P.z.* ecological site). These areas may be more prone to compaction and increased runoff.

Applicant-committed EPMs to prevent adverse effects to soils, such as soil loss and compaction, have been implemented under the Proposed Action for the 409 acres of disturbance and are included in the Proposed Action for the additional 140 acres of surface disturbance (Section 2.2.3). Erosion and runoff control measures, such as water bars, ditching, and other water control structures are used in areas of surface disturbance. Erosion prevention BMPs and general exploration BMPs are outlined in the HC/CUEP Plan and included as part of the Proposed Action (**Appendix B**).

Reclamation activities, outlined in Section 2.2.4, also minimize the potential for soil loss and compaction. After the exploration program is completed in an area, the surface disturbance is re-graded, contoured, and available topsoil/growth medium is replaced. Seeding is completed using the site-appropriate mix and amounts (Section 2.2.4). Revegetation activities are commenced at the earliest feasible time following exploration activities.

Under the Proposed Action of the existing disturbance of 409 acres, the disturbance constitutes 1.8 percent of the 22,307 acres of surface area within the HC/CUEP boundary. The Proposed

Action of an additional 140 acres of surface disturbance would constitute an additional 0.6 percent of the total surface acreage within the HC/CUEP boundary. The potential for soil loss and compaction would be minimized with implementation of the applicant-committed EPMs, BMPs, and reclamation practices. Impacts to soils as a result of the Proposed Action would be minimal.

The proposed implementation of the greater sage-grouse EPM could affect approximately 900 acres of juniper community types. Areas of live pinyon-juniper woodland identified as encroaching into sagebrush community types would be the focus of this EPM. Hand-removal techniques would be used to minimize impacts to soils. The vegetation treatment would not result in additional surface disturbance. Pinyon-juniper encroachment into sagebrush-steppe promotes water and soil loss by increasing bare ground connectivity and amplifying runoff. Initial tree encroachment minimally impacts runoff and erosion, but continued encroachment may cause a shift from a resource-conserving to a non-conserving state. Sites on soils with inherently low infiltration and high erodibility may rapidly transform to a non-conserving state (particularly under drought conditions) as tree dominance promotes bare soil between trees as well as connectivity between bare areas. Runoff and erosion increase exponentially where bare soil exceeds 50 percent (Pierson et al. 2010). By implementing the greater sage-grouse EPM as part of the Proposed Action, pinyon-juniper treatment aimed at maintaining and improving shrub and herbaceous cover and structure, may also increase infiltration and aggregate stability (Pierson et al. 2012).

3.7.2.2 No Action

Under the No Action Alternative, exploration would occur only in open and active areas under the terms and conditions of current permits and approvals. Reclamation practices would commence as exploration activities are completed. The applicant-committed EPMs and BMPs for erosion control would continue to be implemented and reclamation would continue under the current reclamation permit. Impacts to soils would be minimal.

3.7.2.3 Cumulative Effects

Proposed Action

The existing surface disturbance associated with HC/CUEP exploration of 409 acres and the potential for an additional 140 acres of surface disturbance is considered relative to surface disturbance caused by past, present, and RFFAs listed in **Table 2-6**. Total surface disturbance estimated from the other past, present, and RFFAs equals 140,877 acres. This total does not account for acres reclaimed.

The Proposed Action of existing surface disturbance of 409 acres within the HC/CUEP Plan boundary is approximately 0.3 percent of the disturbance approved or projected with other past, present, and RFFAs within the cumulative assessment area. The Proposed Action for an additional 140 acres within the HC/CUEP Plan boundary would be approximately 0.1 percent more disturbance relative to the disturbance approved or projected with other past, present, and RFFAs within the cumulative assessment area. These amounts are negligible. The HC/CUEP

Plan would continue to implement the applicant-committed EPMs, BMPs, and reclamation to prevent short-term and long-term effects to soils. Significant cumulative impacts to soils are not anticipated.

No Action

The No Action Alternative would implement the applicant-committed EPMs, BMPs, and reclamation through completion of exploration activities in the remaining open and active areas. Effects would be similar to the Proposed Action, but proportionally smaller.

3.8 Wildlife Resources

This section describes the affected environment for consideration of direct, indirect, and cumulative impacts to general wildlife resources. Special status species are discussed in Section 3.9. Analyses of the direct, indirect, and cumulative impacts consider wildlife resources found within the HC/CUEP Plan boundary. Species-specific analysis areas are identified for those particular species, as applicable.

A separate Wildlife Report was prepared to support this EA (Tetra Tech 2014). It is incorporated by reference and available in the project record. The report includes agency coordination, and describes key habitats in the HC/CUEP area, methods and results from baseline field surveys, and provides detailed natural history information for wildlife species that are expected or known to occur within HC/CUEP.

3.8.1 Affected Environment Wildlife Resources

3.8.1.1 Habitat Types

The BLM IM 2006-114 uses the 2012 Nevada Wildlife Action Plan (WAP) (WAPT 2012) to identify wildlife species assemblages and key habitats for land use planning. Key habitats were identified in the HC/CUEP area by reclassifying the vegetation types mapped by ESCO (ESCO 2014a) to fit into the WAP categories. (See Wildlife Report for more information.) Nevada WAP key habitat types in HC/CUEP include sagebrush (38 percent), Lower Montane Woodlands and Chaparral (34 percent), Burned Sagebrush (15 percent), Burned Lower Montane Woodlands and Chaparral (nine percent), and Barren/Disturbed (four percent). Grasslands and Meadows, Intermountain Rivers and Streams, and Rocky Cliffs and Canyons are also present but comprise less than one percent of the HC/CUEP area. Caves/Mines and Springs/Springbrooks are also present.

3.8.1.2 General Wildlife

The Wildlife Report describes big game, furbearers, upland game, and non-game species that may inhabit the HC/CUEP area (Tetra Tech 2014). The majority of the HC/CUEP area is mapped as year-round mule deer (*Odocoileus hemionus*) range (NDOW 2009). There are small areas in the southeastern, southwestern, and western portions of the HC/CUEP area that are mapped as year-round pronghorn antelope (*Antilocapra americana*) habitat (NDOW 2010). In addition, pronghorn winter range is located approximately 0.5 mile south and east of the HC/CUEP area (NDOW 2010).

3.8.1.3 Fisheries

There are no perennial streams and, therefore; no fisheries occur in the HC/CUEP area. The fisheries resource is not discussed further in this EA.

3.8.2 Environmental Consequences Wildlife Resources

3.8.2.1 Proposed Action

General impacts to wildlife that may occur as a result of the Proposed Action include habitat loss as a result of removing vegetation and disturbing soil, and disturbance associated with increased noise, traffic, and human presence. HC/CUEP exploration activities have resulted in 409 acres of surface disturbance, which equates to 1.8 percent of the land surface within the HC/CUEP Plan boundary. The total 409 acres of current disturbance includes 250 acres that have been recontoured and reseeded; however, none of this acreage has been released from the reclamation assurance by the BLM or the NDEP.

The majority of surface disturbance has occurred in the Horse Canyon area in the sagebrush, burned sagebrush, lower montane woodlands/ chaparral, and burned lower montane woodlands/chaparral land cover types, resulting in a loss of these habitats for wildlife use. Applicant-committed EPMs provide for avoidance of seeps/springs and wetland habitat; thus, this habitat type was not impacted. Exploration activities that have resulted in the current surface disturbance of 409 acres were conducted according to the applicant-committed EPMs and BMPs detailed in Section 2.2.3, and the reclamation activities approved under the current Plan. In previously burned areas, reclamation of HC/CUEP disturbed areas has improved wildlife habitat from burned conditions. The 409 acres of surface disturbance from exploration activities at HC/CUEP appear to have not resulted in measurable impacts to wildlife resources.

The Proposed Action of an additional 140 acres of surface disturbance could occur anywhere within the HC/CUEP Plan boundary. The activities would be incremental over a 10-year period, and would occur in localized areas around drill pads and roads. Disturbance resulting in habitat loss may occur in areas used by wildlife. Wildlife may also be impacted by human presence and associated traffic and noise, resulting in short or long-term avoidance of localized areas where activities are occurring.

The existing 409 acres of surface disturbance and the proposed additional 140 acres of surface disturbance consist of linear or relatively small polygon features, including access roads, drill pads, and recontoured/seeded areas. It is expected that incremental reduction of sagebrush and woodland/chaparral communities in localized areas of HC/CUEP as a result of the Proposed Action would not decrease the quality of surrounding habitat within HC/CUEP, or adjacent areas in the Cortez Mountains and surrounding valleys. The existing surface disturbance of 409 acres has affected approximately 1.8 percent of the HC/CUEP area. The additional 140 acres of surface disturbance would affect an additional 0.6 percent of the HC/CUEP area.

Surface disturbance and vehicular traffic have the potential to contribute to introduction or spread of undesirable weed species. Existing control measures, the current noxious weed management plan, and the reclamation plan would minimize weed impacts to wildlife habitat.

Implementation of the reclamation plan would result in conversion of HC/CUEP disturbed areas to herbaceous and grass communities until shrubs become re-established and reach maturity. In previously burned areas, reclamation of HC/CUEP disturbed areas would improve habitat from burned conditions, resulting in a long-term positive effect on wildlife habitat.

As part of the Proposed Action, implementation of the pinyon-juniper option of the greater sage-grouse EPM may cause a short-term disruption of wildlife movement and habitat use as a result of human activity and chainsaw noise. In the long term (greater than one year), habitat quality for wildlife would be enhanced as understory vegetation, particularly grasses and forbs, are protected from competitive exclusion by pinyon-juniper.

Other procedures to minimize impacts to specific wildlife species and/or particular wildlife habitat features are included in the applicant-committed EPMs as part of the Proposed Action (Section 2.2.3.4). These measures are discussed in more detail below.

Big Game

Approximately 1.8 percent of the year-round mule deer habitat within HC/CUEP has been temporarily reduced as a result of the 409 acres of surface disturbance associated with the Proposed Action (250 acres have been recontoured and seeded; however, none of this acreage has been released from the reclamation assurance by the BLM or the NDEP). The proposed Action for an additional 140 acres of surface disturbance would result in a reduction of 0.6 percent of mule deer range within the HC/CUEP area.

Noise and human presence may limit mule deer presence temporarily and in localized areas of exploration activities. However, given the availability of suitable habitat in other areas of the Cortez Mountains and ability of the species to move relatively large distances, direct and indirect effects to the mule deer herd as a result of temporary habitat loss are expected to be negligible. In areas that have previously burned, reclamation activities have and would continue to improve habitat for mule deer. Reclamation following completion of exploration activities would further minimize any residual effects.

No pronghorn habitat has been impacted by the 409 acres of existing surface disturbance within the HC/CUEP boundaries. The Proposed Action for an additional 140 acres of surface disturbance could affect a small amount of year-round pronghorn antelope habitat depending on where drilling may occur; however, the majority of habitat for this species is located in adjacent valleys (Crescent Valley, Grass Valley, and Pine Valley). The impacts of habitat loss, noise, and human presence on pronghorn would be negligible given that disturbance to primary habitat in the valley basins would not occur.

The presence of vehicular traffic as a result of the Proposed Action may increase the potential for both mule deer and pronghorn mortality to occur from motor vehicle collisions. However, vehicle collisions are likely to be infrequent, and would not have a measurable impact on the overall Cortez Mountain mule deer population, or pronghorn herds occupying the valley basins.

Small Game/Non-game Species

Small mammals and other small non-game species (such as reptiles) may experience direct mortality from vehicle collisions or equipment moving through their habitat since it may be more difficult for them to avoid these intrusions compared to larger species. However, small species populations tend to recover more quickly from perturbations due to higher reproductive rates. Therefore, mortalities that may occur are unlikely to have long-term impacts on populations. Habitat loss would be temporary and localized, and would not have measurable, long-term impacts on these species following reclamation. Effects on small game/non-game species would be negligible.

3.8.2.2 No Action

Under the No Action Alternative, exploration and reclamation activities would occur only in open and active areas under the terms and conditions of current permits and approvals. The Proposed Action would not be approved. There would be no additional loss of habitats. Ongoing impacts to wildlife would be limited to disturbance associated with noise and human presence. The applicant-committed EPMs for wildlife would continue to be implemented, which would minimize the effects from noise and human disturbance. Reclamation would continue, which would replace habitat affected by past exploration activities, and improve areas where habitat was lost due to past fire events.

3.8.2.3 Cumulative Effects

Proposed Action

Wildlife would likely avoid localized areas within HC/CUEP during exploration activities. Other past, present, and RFFAs have likely caused or would cause the same behavioral effect. Species that are mobile and able to live in a variety of habitats could adapt and population-level effects or long-term impacts would not occur. Habitat alteration and the increase in human presence and noise would occur for 10 years, plus two additional years for reclamation. Once exploration is complete, and areas are reclaimed, habitats would be restored and species would likely return. Significant cumulative effects to these species would not be anticipated.

No Action

No additional habitat loss would occur under the No Action Alternative, and reclamation would gradually restore habitats as exploration is completed. Noise and human presence may cause wildlife to disperse into other areas, but this effect would diminish as exploration is terminated. Cumulative effects are not anticipated.

3.9 Special Status Species

BLM Manual 6840 defines special status species as: (1) species that are listed or proposed for listing under the Endangered Species Act (ESA), (2) species listed by a state in a threatened or endangered category implying potential endangerment or extinction, and (3) BLM sensitive species as designated by the State Director. BLM sensitive species are species that are given special management consideration to promote their conservation and reduce the likelihood and

need for future listing under the ESA. The State of Nevada classifies wildlife species under NAC 503 as endangered, protected, sensitive, or threatened.

The ESA (Section 7) requires federal agencies to ensure that any activities they authorize, fund, or carryout, do not jeopardize the continued existence of any species federally listed, or proposed for listing, as threatened or endangered. An official ESA species list for HC/CUEP (Eureka and Lander counties) was obtained through the USFWS Information, Planning, and Conservation System (IPAC) website.

A separate Wildlife Report was prepared to support this EA (Tetra Tech 2014). It is incorporated by reference and available in the project record. The report includes agency coordination, and describes key habitats in the HC/CUEP area, methods and results from baseline field surveys, and provides detailed natural history information for special status species that are expected or known to occur within HC/CUEP.

3.9.1 Affected Environment Special Status Animal Species

The Wildlife Report provides a list of species considered for analysis in this EA and the rationale for inclusion or exclusion (Tetra Tech 2014). Species were excluded based on the absence of suitable habitat, or because the HC/CUEP area was not within the species' geographic range.

3.9.1.1 Threatened, Endangered, and Candidate Species

The USFWS currently lists three species under the ESA for Eureka and Lander counties (USFWS 2014). The Lahontan cutthroat trout (*Oncorhynchus clarkia henshawi*) is a threatened species. The Columbia spotted frog (*Rana luteiventris*) and greater sage-grouse (*Centrocercus urophasianus*) are both candidate species. The Columbia spotted frog is also a state protected species according to NAC 503. Of these three species, only the greater sage-grouse would occur in the HC/CUEP area (see Wildlife Report). There is no critical habitat designated within the HC/CUEP area for these three species (USFWS 2014).

Greater Sage-grouse

In 2010, USFWS found that the greater sage-grouse was a candidate species for listing under the ESA, but that action was precluded by higher priority listings (USFWS 2010). In Nevada, sage grouse are distributed throughout the northern two-thirds of the state, and along the state border with California. Although this species' historic range has been reduced, it is still found in relatively large populations in Elko, northern Humboldt, northern Washoe, Eureka, Lander, and White Pine counties (NDOW 2004). In Eureka and Lander counties, the greater sage-grouse is currently a candidate for listing under the ESA (USFWS 2014).

Greater sage-grouse is a sagebrush-obligate species, meaning that it is restricted to sagebrush ecosystems and cannot survive in areas lacking this habitat. Sagebrush shrubs are used for forage and for nesting, brood-rearing, and fall/winter cover. Sage-grouse congregate at lekking grounds each spring (March 1 to May 15), where the males display breeding plumage to attract hens for mating. Nesting and early brood-rearing occurs from April through June (NDOW

2004). Nests are within 1.1 to 6.2 kilometers (0.7 to 3.9 miles) of the lek site on average (Connelly et al. 2000). Further detail on sage-grouse seasonal habitat requirements are given in the Wildlife Report (Tetra Tech 2014).

BLM Preliminary Habitat Map

The BLM and U.S. Forest Service (USFS) National Greater Sage-Grouse Planning Strategy is a framework for identifying two categories of sage-grouse habitat: Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH). A Preliminary Habitat Map was derived from the NDOW Sage grouse Habitat Categorization data (BLM 2012b). The NDOW Category 1 (Essential/Irreplaceable Habitat) and Category 2 (Important Habitat) were combined to create the PPH areas. The NDOW Category 3 (Moderate Importance Habitat) is shown as the PGH areas. The other NDOW categories are Category 4 (Low Value/Transitional Range), Category 5 (Unsuitable Habitat), and Non-Habitat. The greater sage-grouse habitat as mapped by the BLM Preliminary Habitat Map is shown in

Figure 3-10.

This Preliminary Habitat Map is a planning support tool that incorporates available data into a statewide preliminary spatial view of greater sage-grouse habitat. This map is not intended to be used to delineate sage grouse habitat at the project-level scale. To apply these results to specific locations, it is necessary to conduct a field investigation by a qualified biologist for the purpose of impact assessment (NDOW 2013). The Preliminary Habitat Map identified 7,085 acres of potential PPH and 8,325 acres of potential PGH within HC/CUEP.

Field Investigation of Greater Sage-grouse Habitat

A greater sage-grouse habitat map has been generated for the HC/CUEP area as shown on **Figure 3-11**. This habitat map was based on a detailed assessment of the vegetation mapping conducted from 2009 to 2014 by ESCO and field reviews. A field review was conducted by ESCO, BLM, and NDOW in May 2014; a subsequent field review was conducted by BLM and NDOW which refined the sage grouse habitat map (ESCO 2014b). The ESCO report that details the methods applied in developing the HC/CUEP-specific greater sage-grouse habitat map is included as **Appendix D**.

The greater sage-grouse habitat map (ESCO 2014b) shows 3,263 acres of PPH identified in HC/CUEP. Of this, there is no Essential/Irreplaceable Habitat as defined by NDOW, all the PPH is classified as Important Habitat, as defined by NDOW.

There are 5,110 acres of PGH. There are 13,651 acres of low value habitat and 282 acres of non-habitat (ESCO 2014b).

The greater sage grouse habitat map (ESCO 2014b) may be utilized as another tool, in combination with other sage grouse population data collection and habitat assessment methods,

to assist the BLM in determining potential future sage grouse habitat impacts that may result from proposed activities within and surrounding the HCCUEP boundary.

Figure 3-10 BLM Preliminary Habitat Map Greater Sage-grouse PPH and PGH

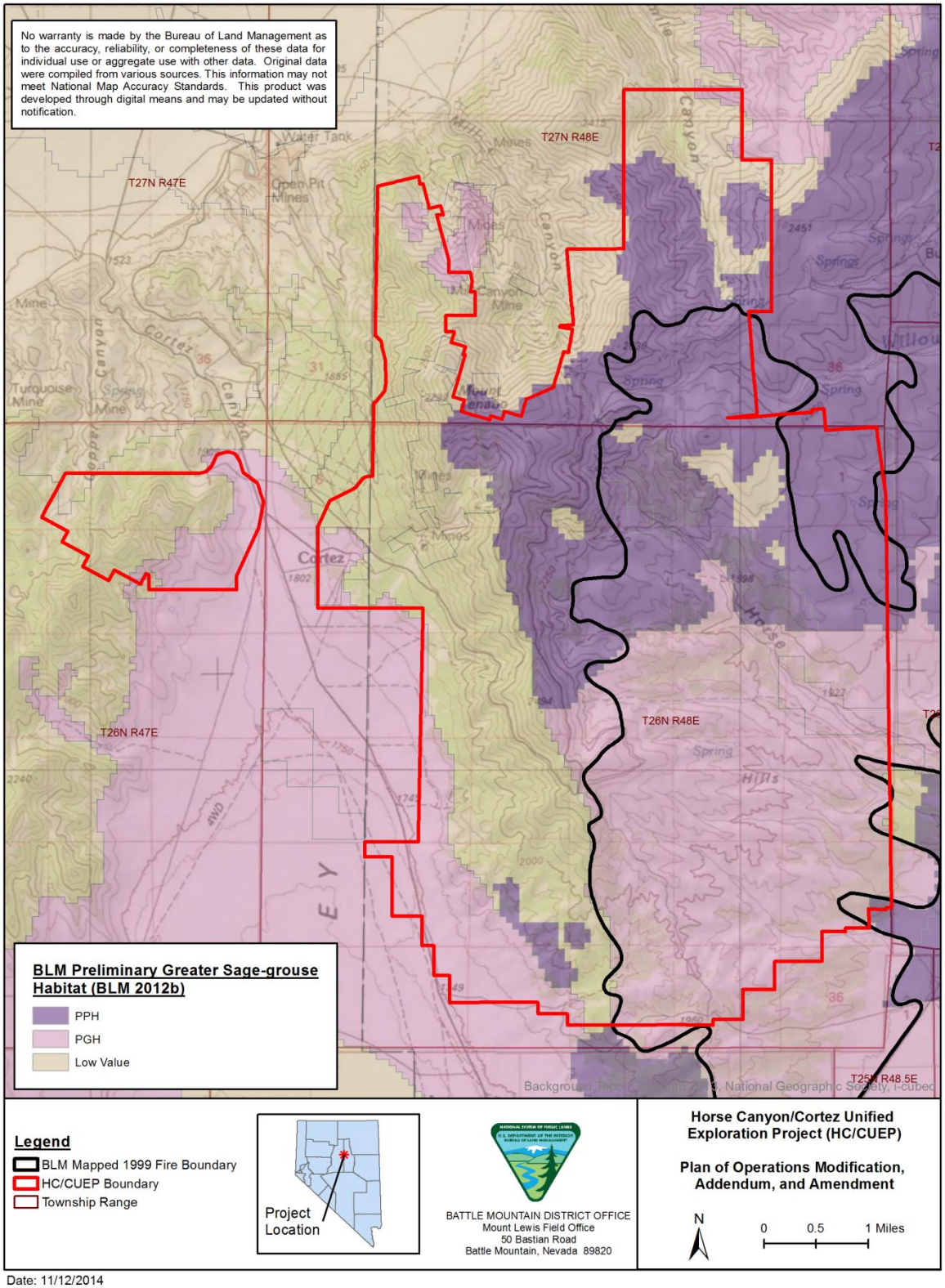
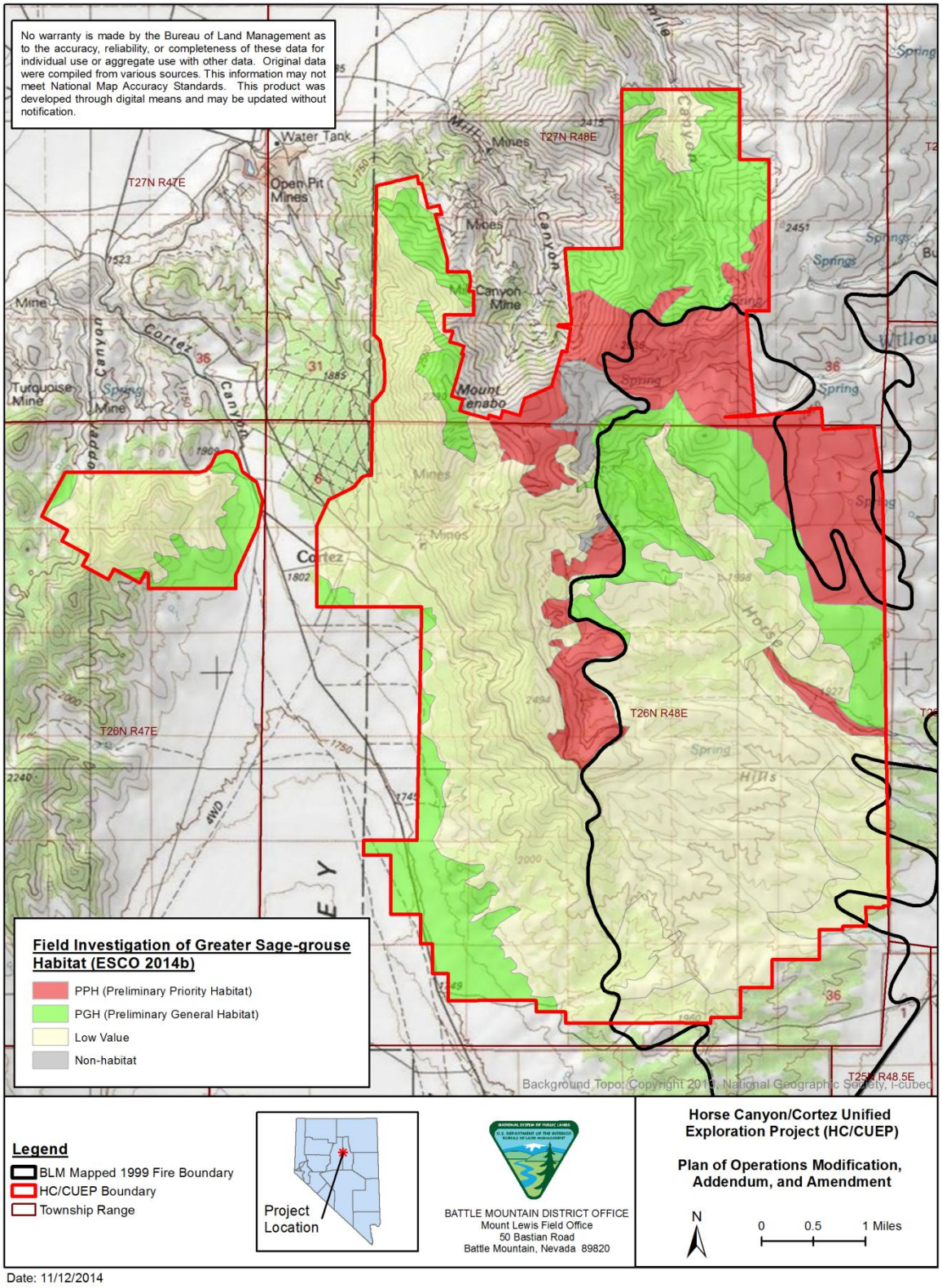


Figure 3-11 Field Investigation of Greater Sage-grouse PPH and PGH



Greater Sage-grouse Leks

According to NDOW data, within four miles of the HC/CUEP area there are five known leks, including one inactive lek (Horse Creek 02), two active leks (Horse Creek 01 and New Brock Canyon), and two leks where the status was unknown (Cortez-Grass Valley and Fye Canyon) (NDOW 2014). "Active" status is defined as two male greater sage-grouse sighted at least two times in the last five years (BLM 2014c).

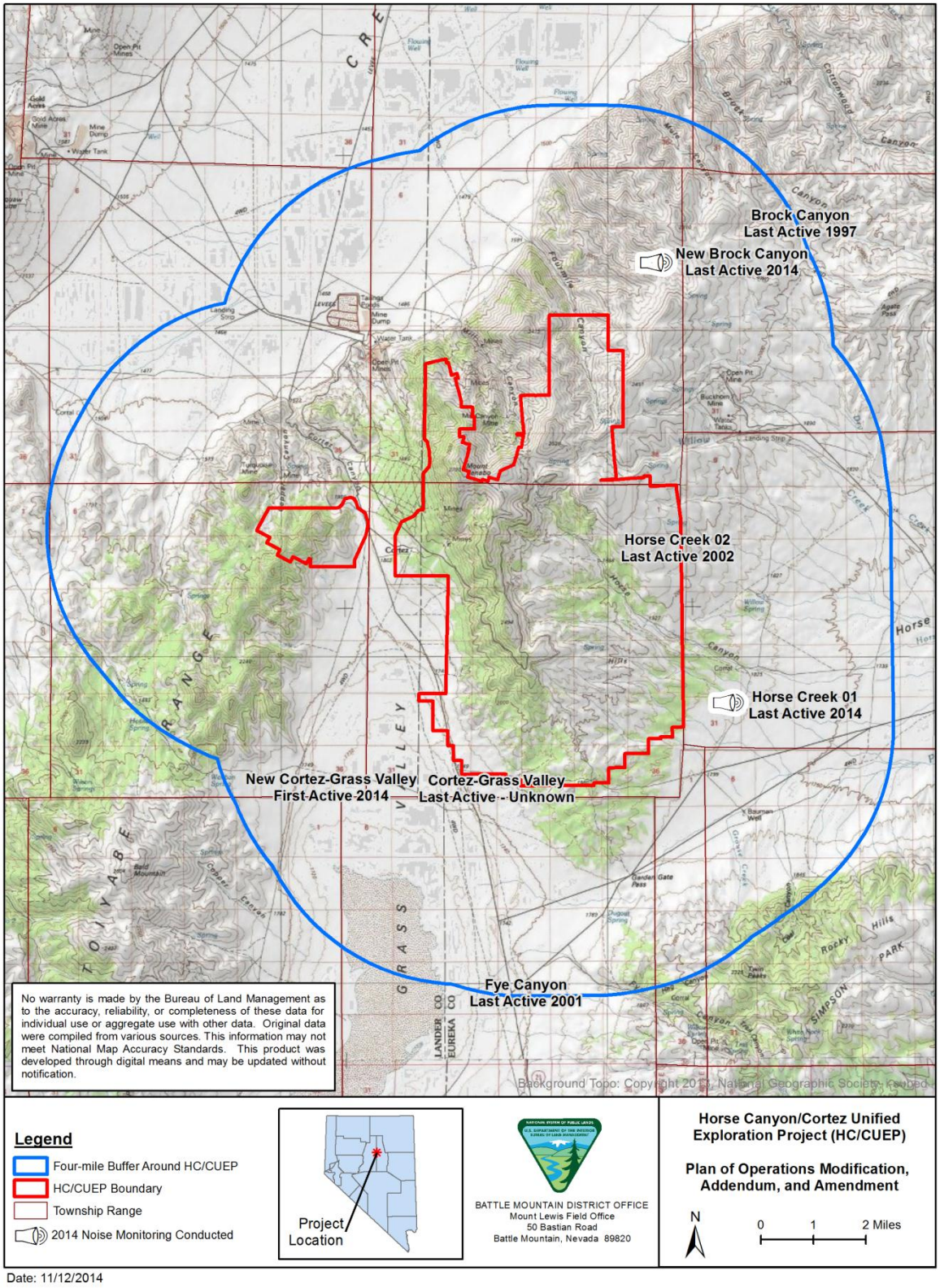
Greater sage-grouse lek activity surveys were conducted in the spring of 2014 in order to document the current status of known leks within four miles of the HC/CUEP area (ARCADIS 2014a). Detail on the survey methodology is included in the Wildlife Report (Tetra Tech 2014). The field surveys determined that Horse Creek 01 and New Brock Canyon leks were active in 2014, with peak male counts of 20 and 22, respectively (ARCADIS 2014a). Cortez-Grass Valley, Fye Canyon, and Horse Creek 02 leks were inactive during the 2014 surveys. A new lek was also documented near the Cortez-Grass Valley lek. It is located within four miles of the HC/CUEP boundary, and is referred to herein as the "New Cortez-Grass Valley Lek" (ARCADIS 2014a). A maximum of six male grouse were documented at this lek. Detailed survey results are provided in the Wildlife Report.

Greater sage-grouse leks located within four miles of the HC/CUEP area are shown on **Figure 3-12.** For active leks, date last active is based on the ARCADIS (2014a) survey. For inactive leks, date last active is from the NDOW GIS database. The specific lek location point is not shown on the map due to the sensitive nature of the data.

In order to assess the potential for noise-related impacts to greater sage-grouse attendance at the leks, a baseline noise monitoring study was completed (ARCADIS 2014a). The objective of the noise study was to characterize and quantify the current noise environment around two active leks located near the HC/CUEP area (Horse Creek 01 and New Brock Canyon) from 4:00 am to 10:00 am. Detail on the monitoring methodology is included in the Wildlife Report (Tetra Tech 2014).

The noise monitoring study found that A-weighted average noise levels during the monitored time period ranged from 21.3 to 41.2 dBA L_{eq} at Horse Creek 01 monitoring site, and 29.3 to 54.2 dBA L_{eq} at the New Brock Canyon monitoring site. Wind and wildlife were the primary noise sources identified at the monitored locations. In addition, at Horse Creek 01 there was a drill rig located approximately 0.75 mile west of the monitoring site, and a county road located 0.25 mile south of the monitoring site. At both monitoring stations, wind-generated noise was documented as the dominant contribution to the rise and fall of the ambient noise levels. At times when there was little to no wind, very low ambient noise values were recorded (ARCADIS 2014a).

Figure 3-12 Greater Sage-grouse Leks within Four Miles of HC/CUEP



3.9.1.2 BLM Sensitive and State-listed Species

Species are listed as BLM sensitive if there is evidence of a downward trend in population numbers, such that viability or a distinct population segment of the species is at risk across all or a significant portion of its range. A species may also be listed if it has a restricted geographic range, or requires specialized or unique habitat that occurs on BLM-administered land, and there is evidence that such areas are threatened such that the species' viability may be at risk. All Nevada state-listed species are also designated as BLM sensitive species.

Table 3-8 lists BLM sensitive and state-listed species that occur or may occur in the HC/CUEP area along with their seasonal use, and associated WAP key habitats that occur within the HC/CUEP area. There are 27 BLM sensitive species that were identified as may occur within the HC/CUEP area, including one amphibian, 11 birds, and 15 mammals. Surveys for pygmy rabbit (*Brachylagus idahoensis*), burrowing owl (*Athene cunicularia hypugaea*), and bat species have been completed. Natural history information for the remaining BLM sensitive and state-listed species is described in the Wildlife Report (Tetra Tech 2014).

Table 3-8 BLM Sensitive and State-listed Species

Species	Status[1]	Seasonal Use	WAP Key Habitat (in HC/CUEP Area)	Rationale for Consideration
Amphibians				
Northern Leopard Frog (*Rana pipiens*)	S, SP	Year-round	Intermountain Rivers and Streams, Springs and Springbrooks (WAPT 2012)	Historically occurred throughout most of Nevada but now occurs in patchy, isolated areas (Rogers and Peacock 2012). Potential habitat may be present in springs, along drainages, and associated upland areas in HC/CUEP.
Birds				
Bald Eagle (*Haliaeetus leucocephalus*)	S, SE, BCC	Winter	Sagebrush, Intermountain Cold Desert Shrub, Intermountain Rivers and Streams (WAPT 2012)	Winter resident in northern Nevada (Floyd et al. 2007). Could forage in the HC/CUEP area.
Black Rosy-finch (*Leucosticte atrata*)	S, BCC	Migration and/or Winter	Lower Montane Woodlands and Chaparral; Grasslands and Meadows; Cliffs and Canyons; Caves and Mines; Sagebrush (Neel 1999, WAPT 2012)	Communal night roosts in winter consist mainly of abandoned mine shafts and adits, and natural caves (GBBO 2010). Suitable habitat exists within the HC/CUEP area.
Brewer's Sparrow (*Spizella breweri*)	S, SS, BCC	Spring - Summer	Sagebrush (WAPT 2012)	One of the most common birds in Nevada's shrublands (Floyd et al. 2007). Suitable habitat exists within the HC/CUEP area.

Table 3-8 BLM Sensitive and State-listed Species

Species	Status[1]	Seasonal Use	WAP Key Habitat (in HC/CUEP Area)	Rationale for Consideration
Ferruginous Hawk (*Buteo regalis*)	S, BCC	Spring, Summer, Fall	Sagebrush, Lower Montane Woodlands and Chaparral, Grasslands and Meadows, Cliffs and Canyons, Intermountain Cold Desert Shrub, Barren Lands (i.e., mine high walls) (WAPT 2012, Neel 1999)	Most commonly found where sagebrush is interspersed with occasional junipers (Floyd et al. 2007). Suitable habitat exists within or near the HC/CUEP area.
Golden Eagle (*Aquila chrysaetos*)	S, BCC	Year-round	Cliffs and Canyons, Barren Lands (i.e., mine high walls) (WAPT 2012)	Widespread in the rugged canyons, sagebrush foothills, and high mountains of Nevada (Floyd et al. 2007). Known to nest in the HC/CUEP area (GBE 2014).
Greater Sage-grouse (*Centrocercus urophasianus*)	C, S, BCC	Year-round	Sagebrush; Intermountain Rivers and Streams (WAPT 2012, Neel 1999)	The sagebrush habitat along the southern foothills of the Cortez range in northern Grass Valley provides habitat for greater sage-grouse (BLM 2004a). Known to occur within the HC/CUEP area (NDOW 2014).
Loggerhead Shrike (*Lanius ludovicianus*)	S, SS, BCC	Year-round	Sagebrush, Lower Montane Woodlands and Chaparral (WAPT 2012)	Widespread in the shrublands of Nevada (Floyd et al. 2007). Suitable habitat exists within the HC/CUEP area.
Northern goshawk (*Accipiter gentilis*)	S	Year-round	Lower Montane Woodlands and Chaparral (GBBO 2010)	Nesting unlikely due to lack of mature forest, but may forage in the HC/CUEP area.
Pinyon Jay (*Gymnorhinus cyanocephalus*)	S, BCC	Year-round	Lower Montane Woodlands and Chaparral (WAPT 2012)	Wide ranging in Nevada and closely tied to pinyon pine trees (Neel 1999). Suitable habitat exists within the HC/CUEP area.
Sage Thrasher (*Oreoscoptes montanus*)	S, SS, BCC	Spring - Summer	Sagebrush (WAPT 2012)	Favors large expanses of undisturbed, tall sagebrush (Floyd et al. 2007). Suitable habitat exists within the HC/CUEP area.
Swainson's Hawk (*Buteo swainsoni*)	S	Spring, Summer, Early Fall	Sagebrush; Sagebrush, Grasslands and Meadows; Lower Montane Woodlands and Chaparral (Neel 1999)	Known to occur in valleys surrounding the HC/CUEP area, suitable foraging habitat exists within HC/CUEP area (Floyd et al. 2007).

Table 3-8 BLM Sensitive and State-listed Species

Species	Status[1]	Seasonal Use	WAP Key Habitat (in HC/CUEP Area)	Rationale for Consideration
Western Burrowing Owl (*Athene cunicullariaa hypugaea*)	S	Spring, Summer	Sagebrush, Grasslands and Meadows, Barren Lands, Intermountain Rivers and Streams (WAPT 2012, Neel 1999)	Found in a wide variety of arid and semi-arid environments, with well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground (Klute et al. 2003). Suitable habitat exists within the HC/CUEP area. Surveys conducted in 2014; burrowing owls not detected.
Mammals				
Big Brown Bat (*Eptesicus fuscus*)	S	Year-round	Lower Montane Woodlands and Chaparral; Sagebrush; and Barren Lands (NBWG 2006).	In Nevada occurs from 300 to 3,000 meters (NBWG 2006). Suitable habitat exists within the HC/CUEP area. Identified in 2014 survey.
Brazilian Free-tailed Bat (*Tadarida brasiliensis*)	S, SP	Summer	Lower Montane Woodlands and Chaparral; Sagebrush; Grassland and Meadows (NBWG 2006).	In Nevada occurs from 210 to 2,550 meters (NBWG 2006). Suitable habitat exists within the HC/CUEP area. Not identified in 2014 survey.
California Myotis (*Myotis californicus*)	S	Year-round	Lower Montane Woodlands and Chaparral; Sagebrush; Grassland and Meadows (foraging), Caves and Mines (roosting) (NBWG 2006).	In Nevada occurs from 210 to 2,730 meters (NBWG 2006). Suitable habitat exists within the HC/CUEP area. Identified in 2014 survey.
Dark Kangaroo Mouse (*Microdipodops megacephalus*)	S, SP	Year-round	Sagebrush; Grasslands and Meadows (WAPT 2012)	Suitable habitat exists within the HC/CUEP area.
Fringed Myotis (*Myotis thysanodes*)	S, SP	Year-round	Lower Montane Woodlands and Chaparral (foraging), Caves and Mines (roosting) (WAPT 2012)	In Nevada occurs from 420 to 2,160 meters (NBWG 2006). Suitable habitat exists within the HC/CUEP area. Identified in 2014 survey.
Hoary Bat (*Lasiurus cinereus*)	S	Year-round	Lower Montane Woodlands and Chaparral (foraging), Caves and Mines (roosting) (WAPT 2012)	Tree-associated species found primarily in forested uplands in Nevada; has also been recorded in juniper stands (NBWG 2006). Juniper woodlands occur in the HC/CUEP area. Not identified in 2014 survey.
Long-eared Myotis	S	Year-round	Lower Montane	In Nevada occurs from 690 to

Table 3-8 BLM Sensitive and State-listed Species

Species	Status[1]	Seasonal Use	WAP Key Habitat (in HC/CUEP Area)	Rationale for Consideration
(*Myotis evotis*)			Woodlands and Chaparral, Sagebrush (foraging); Caves and Mines (roosting) (WAPT 2012)	3,090 meters (NBWG 2006). Suitable habitat exists within the HC/CUEP area. Identified in 2014 survey.
Long-legged Myotis (*Myotis volans*)	S	Year-round	Lower Montane Woodlands and Chaparral; Sagebrush (NBWG 2006).	In Nevada occurs from 930 to 3,420 meters (NBWG 2006). Suitable habitat exists within the HC/CUEP area. Identified in 2014 survey.
Pallid Bat (*Antrozous pallidus*)	S, SP	Year-round	Lower Montane Woodlands and Chaparral; Sagebrush (NBWG 2006).	In Nevada occurs from 420 to 2,580 meters (NBWG 2006). Known to occur within four miles of HC/CUEP (NDOW 2014). Habitat exists within the HC/CUEP area. Not identified in 2014 survey.
Pika (*Ochotona princeps)*	S, SP	Year-round	Cliffs and Canyons (i.e., rock outcrops), Grasslands	In Nevada and California, occurs from 6,000 to 12,750 feet (Millar and Westfall 2010). May occur in talus areas at high elevations in HC/CUEP area, especially where talus and grasslands are adjacent.
Pygmy Rabbit (*Brachylagus idahoensis*)	S	Year-round	Sagebrush (Green and Flinders 1980, WAPT 2012)	Occupied habitat present in the southwestern portion of HC/CUEP.
Spotted Bat (*Euderma maculatum*)	S, ST	Year-round	Lower Montane Woodlands and Chaparral, Barren Lands (foraging); Cliffs and Canyons (roosting) (WAPT 2012)	Not known to occur in central Nevada, however, widely distributed throughout the rest of the state, and suitable habitat exists within HC/CUEP area. Occurs from 540 to 2,130 meters (NBWG 2006). Not identified in 2014 survey.
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	S, SS	Year-round	Lower Montane Woodlands and Chaparral (foraging); Caves and Mines (roosting) (WAPT 2012)	In Nevada occurs between 210 to 2,500 meters (NBWG 2006). This bat has been observed within four miles of the HC/CUEP area (NDOW 2014). Identified in 2014 survey.
Western Pipistrelle (*Pipistrellus Hesperus*)	S	Year-round	Sagebrush; Lower Montane Woodlands and Chaparral (NBWG 2006).	In Nevada occurs from 210 to 2,550 meters (NBWG 2006). Suitable habitat exists within the HC/CUEP area.
Western Small-footed Myotis (*Myotis ciliolabrum*)	S	Year-round	Lower Montane Woodlands and Chaparral (foraging);	In central Nevada commonly found in valley bottoms from 1,050 to 1,800 meters in a

Table 3-8 BLM Sensitive and State-listed Species

Species	Status[1]	Seasonal Use	WAP Key Habitat (in HC/CUEP Area)	Rationale for Consideration
			Caves and Mines (roosting) (WAPT 2012)	variety of habitats (NBWG 2006). Suitable habitat is possible in lower elevation portions of the HC/CUEP area. Identified in 2014 survey.

[1] C = candidate species under ESA (USFWS 2014), S = BLM sensitive species (BLM 2011c), SE = state endangered species; ST=state threatened, SP = state protected; SS = state sensitive species (NAC 503), BCC = USFWS Bird of Conservation Concern (USFWS 2008).

Pygmy Rabbit

The pygmy rabbit is a sagebrush-obligate species. It is endemic to the Great Basin, where its range is centered on Nevada. Its distribution within this range is patchy (Keinath and McGee 2004). It is found on big sagebrush plains and alluvial fans, particularly in clumps of sagebrush that are tall and dense relative to the surrounding sagebrush (Green and Flinders 1980, Larrucea and Brussard 2008). Pygmy rabbits require deep, friable soils (such as loam) for excavating burrows. Its winter diet is almost exclusively sagebrush. In summer, about half of its diet is composed of sagebrush, and also grasses (Green and Flinders 1980). It is slow-moving and susceptible to predation, and therefore dependent on cover for protection (NNHP 2014). Pygmy rabbit populations are at risk from loss and fragmentation of sagebrush habitat, particularly since they are not able to cross large barriers (e.g. playas, mountains) when dispersing (Keinath and McGee 2004).

A pygmy rabbit survey was conducted in 2014 in habitat identified as suitable in HC/CUEP (ARCADIS 2014b). Pygmy rabbit individuals and active burrow systems were observed in five locations in the survey area. These sites were located in or near the valley floor in the southwest portion of the HC/CUEP area. Occupied sites were located in or near dense stands of tall shrubs where soils were deep and friable and slopes were gentle. Some burrow systems contained multiple burrow entrances (10 or more burrows in a 50-foot radius). Areas where no pygmy rabbits were detected were characterized by short and low density shrubs.

Migratory Birds

This section discusses migratory birds that occur or are expected to occur in the HC/CUEP area, with an emphasis on BLM priority birds. In order to focus management efforts, BLM has defined priority birds (BLM 2014c) as including USFWS Birds of Conservation Concern (BCC) (USFWS 2008) and USFWS Game Birds Below Desired Condition (GBBDC) (USFWS 2004). Some BLM priority birds are also listed as BLM sensitive species. These were addressed above in Section 0, and are not discussed again here.

Over 500 bird species may be found inhabiting Nevada for all or portions of the year (NNHP 2014). For an overview list of birds observed or expected to occur in HC/CUEP, see the

Wildlife Report (Tetra Tech 2014). The majority of birds that occur in the HC/CUEP area are protected under the Migratory Bird Treaty Act (MBTA), which prohibits take of a migratory bird or parts, nests, or eggs of such birds. Protected birds are those that annually migrate from summer breeding grounds to a different winter range. Species that are typically encountered in the HC/CUEP area include generalist species and species associated with sagebrush, grassland, pinyon-juniper, and mountain mahogany habitat types. Streamside habitat that would support riparian specialists is limited, and is restricted to patches along a 1.25-mile section of Fourmile Creek, and along Horse Creek in areas mapped as alluvial valley bottom. Cliff and rocky outcrop habitat is also present and supports nesting raptors, and likely other birds associated with rocky habitat.

Based on geographic range and habitat requirements, BCC that occur or are expected to occur in the HC/CUEP area in the spring/summer breeding season include: Calliope hummingbird (*Selasphorus calliope*), green-tailed towhee (*Pipilo chlorurus*), long-billed curlew (*Numenius americanus*), sage sparrow (*Artemisiospiza belli*), and Virginia's warbler (*Oreothlypis virginiae*). Mourning dove (*Zenaida macroura*) is a GBBDC that would occur in the HC/CUEP area year-round.

In addition, 20 species of raptors typically associated with open country and woodland habitat are known or expected to occur in the HC/CUEP area. See the Wildlife Report for a list of raptor species that may use the HC/CUEP area. Golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaeetus leucocephalus*) are BLM sensitive species, and they also receive additional protection under the Bald and Golden Eagle Protection Act (BGEPA). Golden eagles are known to nest in and around HC/CUEP, and bald eagles may forage in the HC/CUEP area in winter months.

Aerial raptor nest surveys have been conducted annually within HC/CUEP and a surrounding 10-mile area since 2012. Within HC/CUEP, there are four raptor nests that have recently been active and fledged young: one golden eagle nest located in the old Horse Canyon Mine satellite pit, two active red-tailed hawk nests in Horse Canyon and Red Hills areas, and one prairie falcon (*Falco mexicanus*) eyrie in the western parcel of HC/CUEP.

Within a one-mile buffer of the HC/CUEP boundary there are two ferruginous hawk nests that have recently been active. Considering a 10-mile area from HC/CUEP for golden eagles, there are an additional nine golden eagle nests, four of which have been active in the past two years. Notably, no raptor nests have been observed on the cliffs of Mount Tenabo. The area has been surveyed three times since 2012. The cliffs are exposed to the west, and subject to high winds and driving snow, which may preclude them from being used by nesting raptors (GBE 2014). See the Wildlife Report for more detail on raptor nests in HC/CUEP.

Burrowing Owl

Within a one-mile buffer of the HC/CUEP boundary there is a burrowing owl burrow that has recently been active. Following a desktop assessment to determine areas of suitable habitat, field surveys were conducted to determine if burrowing owls are presently using the HC/CUEP

area. A pedestrian survey for visual assessment combined with a broadcast-call survey was conducted in HC/CUEP between July 20 and August 11, 2014 (ARCADIS 2014c). No burrowing owls were detected and no occupied burrows were found in HC/CUEP (ARCADIS 2014c). See the Wildlife Report for more detail on the burrowing owl survey conducted at HC/CUEP.

Bats

Field surveys were conducted to identify species of bats using the HC/CUEP area (ARCADIS 2014d). Following a desktop assessment to determine where potential bat foraging and roosting habitat could exist in the HC/CUEP area, two acoustical bat monitoring stations were established. Site A was near a historical adit and perennial water sources within sagebrush. Site B was near a pit wall with rocky outcrops and cliffs nearby in pinyon-juniper vegetation; historical adits and shafts were also identified as occurring in the vicinity.

Data was collected from dusk to dawn for two consecutive days during three monitoring events (July, August, and October). Eight species were positively identified based on bat call analysis. Relative percent of total passes was also recorded. One BLM special status bat species detected, little brown myotis (*Myotis lucifugus*) was not previously identified as having the potential to occur in the HC/CUEP area based on the desktop assessment. Additional bat species group determinations were made of those results that could not be identified to the species level. The species groups were based on call frequencies.

Results by species are as follows:

- Big brown bat 3%
- Townsend's big-eared bat 1.5%
- California myotis 1.5%
- Western small-footed myotis 16%
- Long-eared myotis 16%
- Little brown myotis 28.5%
- Fringed myotis 5%
- Long-legged myotis 3%

Site A yielded higher results than Site B, which was concluded to be due to Site A's proximity to water. See the Wildlife Report for more detail on the bat survey conducted at HC/CUEP.

3.9.2 Affected Environment Special Status Plant Species

There are no plant species federally listed or proposed for listing for Eureka and Lander counties. The Nevada Natural Heritage Program (NNHP) was contacted to obtain the most current species data maintained in their database for Nevada's at-risk, rare, endangered, and threatened species. A response was received on March 18, 2014. Based on the GIS data

received, there was one special status plant species occurrence in the HC/CUEP area: Beatley buckwheat (*Eriogonum beatleyae*). This is a BLM sensitive species for the BMD (BLM 2011c) and has been documented in upper Horse Canyon.

The BLM lists 27 sensitive plant species for the BMD and 19 for the Elko District (BLM 2011c). Of these, six species have been considered for occurrence in recent surveys of HC/CUEP. Only the Beatley buckwheat has been found (Buckner 2014).

Beatley buckwheat has been found in native and reclaimed areas as recently as 2013 (Buckner 2014). It is known to occur in rocky areas of shrubland and chaparral habitats (Natureserve 2014). Several similar species of *Eriogonum* have also been documented. Beatley buckwheat has been encountered at scattered locations throughout HC/CUEP while conducting general vegetation inventories. It appears to do well in disturbed areas (including the extensive burned areas within HC/CUEP), which is typical of many other buckwheat species. It has been encountered elsewhere in the Cortez Mountains in Eureka County (Buckner 2014).

3.9.3 Environmental Consequences Special Status Species

3.9.3.1 Proposed Action

General impacts to wildlife that may occur as a result of the Proposed Action are described in Section 3.8.2.1.

Procedures to minimize impacts to specific wildlife species and/or particular wildlife habitat features are included in the applicant-committed EPMs as part of the Proposed Action (Section 2.2.3.4). These include annual activity surveys. These also include seasonal and/or spatial restrictions around active migratory bird nests, active raptor nests, greater sage-grouse leks, and springs. There are spatial restrictions for bats near mine adits, shafts, and caves. These measures are discussed in more detail below by species.

Migratory Birds

A total of 409 acres have been disturbed (250 acres of which have been recontoured and seeded; however, none of this acreage has been released from the reclamation assurance by BLM or the NDEP). The surface disturbance has resulted in a reduction of migratory bird nesting and foraging habitat. The Proposed Action for an additional 140 acres would result in an additional reduction of migratory bird nesting and foraging habitat.

Habitat loss would persist until reclamation has been completed. To minimize disturbance impacts to breeding birds, Barrick has committed to conducting pre-disturbance migratory bird nest surveys in the spring and establishing exclusion zones around active nests as part of the applicant-committed EPMs. Based on the localized and incremental nature of the Proposed Action, the ability of birds to move to other areas of HC/CUEP, the overall availability of sagebrush, woodland and grassland habitat in other portions of the Cortez Mountains, and implementation of applicant-committed EPMs, it is unlikely that habitat reductions, noise, or human presence resulting from the Proposed Action would have a measurable impact on migratory bird populations in the area.

The proposed pinyon-juniper greater sage-grouse EPM may result in short-term, temporary disturbance to wildlife during the implementation phase. As outlined in section 2.2.3.4, to minimize impacts to migratory birds, site surveys would be conducted (from March 1st through July 31st) by a qualified biologist to determine the presence of nesting birds. Crew members would be trained to identify nesting bird behavior and instructed to inspect trees for nests before cutting. (To date this has been the most effective strategy for avoiding impacts to tree nesting birds.)

Raptors

The primary impact to raptor species in HC/CUEP has been and would be from disturbance of nest sites and loss of foraging habitat. Seasonal and spatial restrictions on drilling and surface disturbing activities around active raptor nests are included in the applicant-committed EPMs, and would minimize noise and human presence around nests. Loss of foraging habitat would be temporary, as disturbed areas will be reclaimed. Furthermore, reclamation activities in areas that have previously burned may improve habitat for prey species, thus having an indirect, positive effect on raptors. For the reasons stated above, effects of the Proposed Action on raptor populations are not anticipated.

No threatened or endangered species occur in the HC/CUEP area; therefore, there would be no impacts to these species. One candidate species, the greater sage-grouse, may be affected, as discussed below.

Greater Sage-grouse

Greater sage-grouse PPH and PGH occurs in the HC/CUEP area. The Proposed Action for an additional 140 acres of surface disturbance could result in impacts to PPH or PGH habitat, depending on the location of future drilling and drill road construction. Loss of sage grouse habitat as a result of the Proposed Action for the additional 140 acres would be localized, and reclamation would restore vegetation following disturbance. In areas burned by the wildfire, habitat may be improved, resulting in a positive impact to greater sage-grouse habitat.

The proposed EPM to minimize effects on greater sage-grouse includes options for pinyon-juniper treatment, placement of flight deterrents on fences, placement of exclosures around springs, meadows, and riparian areas, and payments according to the Greater Sage-grouse MOU (see Section 2.2.3.4 and **Appendix E**).

Treatment of encroaching pinyon-juniper stands to improve greater sage-grouse habitat could be implemented to account for past disturbance in PPH/PGH. Treatment of encroaching pinyon-juniper stands to improve greater sage-grouse habitat could also be implemented to account for the proposed additional 140 acres of disturbance. For the purpose of estimating sage grouse improvement acreage, the 159 acres of disturbance in exceedance of the level authorized (Modification and Addendum), and the140 acres of proposed additional exploration (Amendment) area is assumed to all occur in PPH habitat.

The PPH disturbance acreage is accounted for at a 3:1 ratio. This is the level outlined in the Greater Sage-grouse MOU (BLM et al. 2013) signed by BLM and Barrick. Implementing the pinyon-juniper treatment option of the EPM could result in approximately 900 acres of habitat improvement activity [159 (acres of exceedance disturbance) + 140 (additional exploration disturbance) * 3 = 897 acres total]. Pinyon-juniper treatment would not occur within a 4-mile buffer from active leks from March 1 through June 30 to minimize the potential for impacts to breeding and nesting sage grouse. Migratory bird surveys would be conducted between March 1 and July 31 to minimize impacts to breeding migratory birds including raptors.

This is a conservative approach because past disturbance may not have occurred within sage grouse habitat and potential future disturbance may not occur in sage grouse habitat. The BLM may elect to conduct field verifications of on the ground conditions, especially in areas where there is not concurrence of non-habitat for sage grouse according to the BLM Preliminary Habitat Map and the ESCO field investigation map. Actual sage grouse improvement acreage may be adjusted based on those BLM field investigations. The BLM would commit to conducting any such sage grouse habitat field investigations prior to the initiation of surface disturbing activities.

Measurements of ambient noise collected during the lekking period documented that increases in noise levels occurred as wind speeds increased. Sound generated by birds at the leks was noted as the second most common factor for increases in noise levels. The objective of the noise study was to characterize and quantify the current noise environment around two active leks located near the HC/CUEP area (Horse Creek 01 and New Brock Canyon). The existing level of exploration activity at HC/CUEP was considered part of ambient conditions. Exploration-related noise has not been identified as contributing to increases in ambient noise. Increases in ambient levels were primarily attributed to increases in wind speed. Noise effects are expected to be localized and appear to be generated by wind and bird activity. Implementation of the applicant-committed EPMs that limit an increase in ambient noise would minimize potential noise-related impacts due to exploration activities (Section 2.2.3.4).

Based on results of noise monitoring, and the applicant-committed EPMs and reclamation plans in place, no long-term population-level impacts or lek abandonment is expected as a result of the Proposed Action.

Pygmy Rabbit

The existing 409 acres of surface disturbance have not impacted known pygmy rabbit habitat. The Proposed Action of an additional 140 acres could potentially impact pygmy rabbit habitat if surface disturbance were to occur in the southwestern area of HC/CUEP. Suitable habitat and occupied burrow systems are present in this portion of the HC/CUEP area (ARCADIS 2014b).

Since pygmy rabbits are not able to disperse across large areas of non-habitat, loss and fragmentation of suitable sagebrush habitat within HC/CUEP may individuals. Avoidance of areas surrounding occupied burrows would provide mitigation to avoid impacting this species.

Burrowing Owl

This species was not detected during baseline surveys. It is not likely this species would be affected by exploration activities.

Bats

Applicant-committed EPMs include avoiding drilling within 50 feet of adits, shaft openings, or caves and avoidance of seeps/springs and wetlands. No direct impacts have occurred or would occur to roosting habitat and seep/spring/wetland foraging habitat, and indirect impacts caused by noise and human presence would be minimized by the 50-foot set-back. Other shrubland, woodland, and grassland foraging habitat have been or would be incrementally reduced during exploration, but reclamation would eliminate residual effects. Lighting occurring during nighttime operations may temporarily attract insects, and thus foraging bats, but lighting systems at the drill pads are relatively small and localized. Since roosting sites have been avoided, it is unlikely that night lighting has impacted roosting sites or interfered with circadian rhythms. The bat survey found several bat species are using the HC/CUEP area during current levels of exploration activity. Of the two bat survey locations, the detector closest to a water source yielded the most bat use. Given the widespread availability of suitable foraging habitat and applicant-committed EPMs, the existing 409 acres of surface disturbance has not had measurable impacts on bat species.

For the Proposed Action of an additional 140 acres of surface disturbance, roosting sites would continue to be avoided. It is unlikely that night lighting would impact roosting sites or interfere with circadian rhythms. Given the widespread availability of suitable foraging habitat and applicant-committed EPMs, the Proposed Action of the additional 140 acres of surface disturbance would not have measurable impacts on bat species.

Special Status Plant Species

There are no federally listed plant species known to occur in HC/CUEP. Of the Nevada listed and BLM sensitive species, Beatley buckwheat has been found in HC/CUEP. It is reported as occurring in several locations, including native and reclaimed areas. Given its seeming tolerance of disturbance and apparent affinity for low competition sites associated with disturbance (including reclamation) (Buckner 2014), the existing 409 acres of disturbance has not resulted in a negative impact on the Beatley buckwheat.

The Proposed Action of an additional 140 acres of disturbance is not anticipated to result in a negative impact on the Beatley buckwheat. The Proposed Action would have no effect on special status plants.

The proposed EPM to minimize effects on greater sage-grouse includes the option for removal of encroaching pinyon-juniper stands. This activity would not likely affect Beatley buckwheat, as thinning would be done by hand. Impacts to special status plants would not occur.

3.9.3.2 No Action

Under the No Action Alternative, exploration and reclamation activities would occur only in open and active areas. The Proposed Action would not be approved. There would be no additional loss of habitats. Ongoing impacts to special status wildlife would be limited to disturbance associated with noise and human presence. The applicant-committed EPMs for wildlife would continue to be implemented, which would minimize the effects from noise and human disturbance. Reclamation would continue, which would replace habitat affected by past exploration activities, and improve areas where habitat was lost due to past fire events.

No additional surface disturbance would be authorized under the No Action Alternative. Open and active areas would be reclaimed once exploration activities are completed. Special status plants would not be affected, as no new disturbance would occur. Noxious and invasive weed control measures would continue to be implemented to prevent habitat loss. The No Action Alternative would not result in impacts to special status plant species.

3.9.3.3 Cumulative Effects

Proposed Action

Wildlife would likely avoid localized areas within HC/CUEP during exploration activities. Other past, present, and RFFAs have likely caused or would cause the same behavioral effect. Species that are mobile and able to live in a variety of habitats could adapt and population-level effects or long-term impacts would not occur. Habitat alteration and the increase in human presence and noise would occur for 10 years, plus two additional years for reclamation. Once exploration is complete, and areas are reclaimed, habitats would be restored and species would likely return. Cumulative effects to these species would not be anticipated.

Based on the field investigation of sage grouse habitat done by ESCO, there has been PPH or PGH habitat disturbed in HC/CUEP as a result of the 409 acres of existing disturbance. Additional PPH and PGH could be affected as a result of the Proposed Action for an additional 140 acres depending upon the location of exploration activities. The proposed sage grouse habitat improvement EPM would reduce effects to PPH/PGH. Active leks are known to occur in the HC/CUEP vicinity; however, noise and human presence does not appear to affect lek use at HC/CUEP. The proposed sage grouse EPM would minimize effects of noise and human presence. Therefore, based on the above analysis and findings, incremental impacts to special status wildlife species and their habitat as a result of the Proposed Action, when combined with the impacts from the past and present actions and RFFAs, and with the implementation of the BMPs and EPMs, are expected to be minimal and not significant.

The Proposed Action is not anticipated to affect special status plant species. The Proposed Action for HC/CUEP includes reclamation, which would prevent long-term, residual effects. Cumulative impacts to special status plants are not anticipated.

No Action

No additional habitat loss would occur under the No Action Alternative, and reclamation would gradually restore habitats as exploration is completed. Noise and human presence may cause wildlife to disperse into other areas, but this effect would diminish as exploration is terminated. Cumulative effects to special status wildlife species are not anticipated.

The No Action Alternative would not result in impacts to special status plants. Cumulative effects to special status plants would not occur.

3.10 Grazing Management

This section presents resources related to grazing management, which include allotments and associated acreages found in HC/CUEP, and the permitted (active) animal-unit months (AUMs) associated with each allotment. The analysis area for direct and indirect impacts to rangeland resources is the HC/CUEP Plan boundary. The cumulative assessment area includes the allotments and associated AUMs that occur within and extend beyond the HC/CUEP Plan boundary.

3.10.1 Affected Environment Grazing Management

BLM livestock management objectives for the HC/CUEP area provide direction for maintenance or improvement of the condition of the public rangelands to enhance productivity for all rangeland values (BLM 1987). The HC/CUEP area includes three grazing allotments; the allotment boundaries extend beyond the HC/CUEP boundary (**Figure 3-13**). Allotment details are shown in **Table 3-9** Grazing Allotments

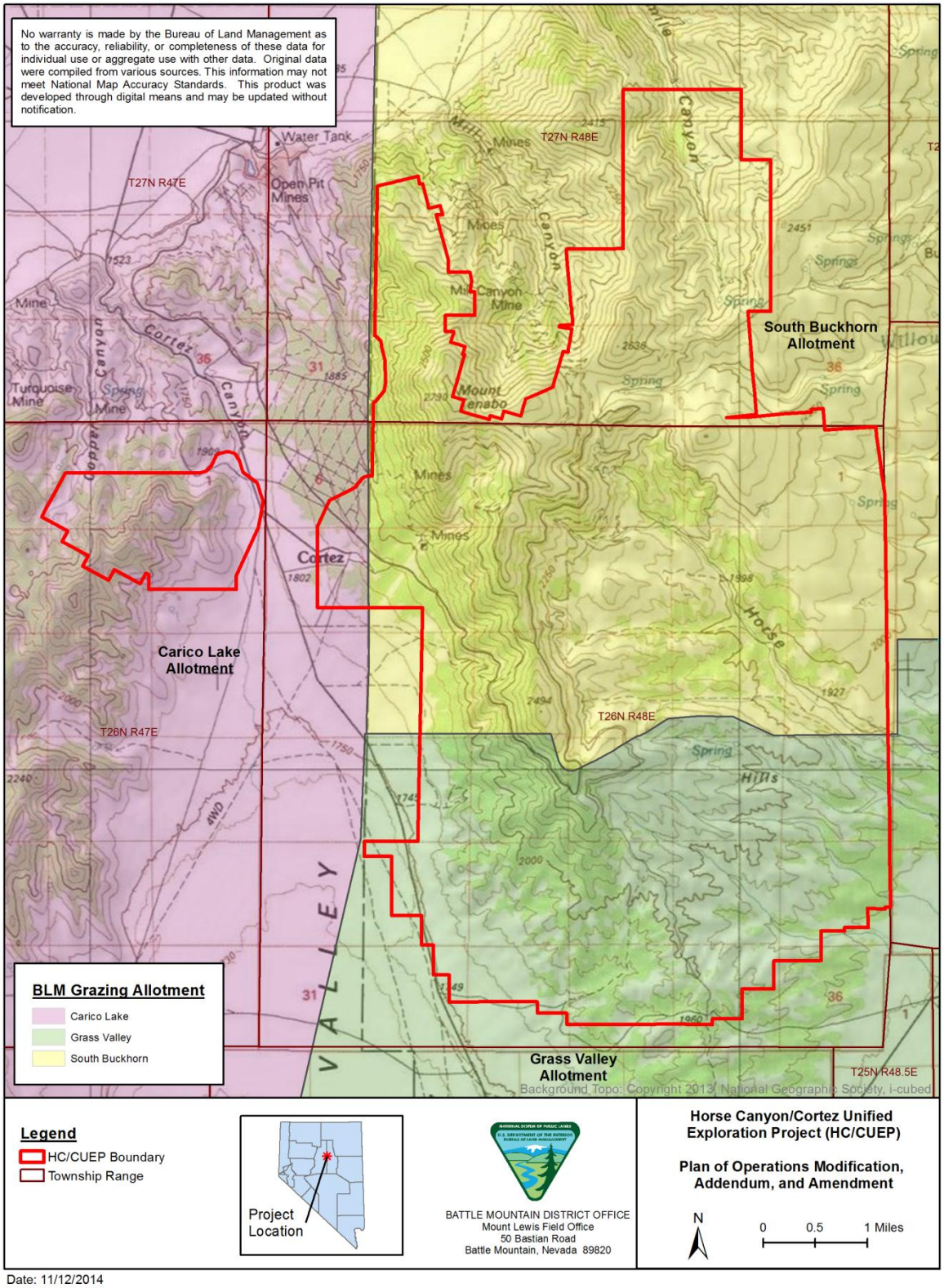
Table 3-9 Grazing Allotments

Allotment (BLM Management District)	Total Acres (Public and Private) / Total Permitted AUMs	Allotment Acres within HC/CUEP/ Permitted AUMs within HC/CUEP[1]	Percent of Allotment in HC/CUEP
Grass Valley (Battle Mountain BLM)	296,304 (282,854 public land and 13,450 private land) / 17,701 AUMs (public land)	7,241 acres / 482.7 AUMs	2.44
Carico Lake (Battle Mountain BLM)	599,304 (562,352 public land and 36,952 private land)/ 24,954 AUMs (public land)	1,586 acres / 105.7 AUMs	0.26
South Buckhorn (Elko BLM)	296,313 (222,822 public land and 73,491 private land)/ 19,689 AUMs (public	13,481 acres / 898.7 AUMs	4.55

	land)		
Total	**1,191,921** (1,068,028 public land and 123,893 private land)/ **62,344 AUMs**	**22,308/ 1,487 AUMs**	**7.25**

[1]Permitted (Active) AUMs within HC/CUEP calculated as 15 acres per AUM (BLM 2004a).

Figure 3-13 Grazing Allotments



Date: 11/12/2014

3.10.2 Environmental Consequences Grazing Management

3.10.2.1 Proposed Action

The existing surface disturbance of 409 acres has reduced surface grazing capacity that would support 27 AUMs, using the standard of 15 acres per AUM (BLM 2004a). There are 1,487 total AUMs available within the HC/CUEP Plan boundary. The surface grazing capacity reduction of 27 AUMs is 1.8 percent of the total AUMs within HC/CUEP. The existing surface disturbance of 409 acres has not required issuance of grazing waivers by BLM. No changes to current grazing management or livestock improvements have been required. The applicant-committed EPMs for livestock and range allotments (Section 2.2.3.6) have been followed. Permittees have voluntarily not released livestock into reclaimed areas in Horse Canyon.

The Proposed Action for an additional 140 acres of surface disturbance would reduce surface grazing capacity which would support 10 AUMs. This would not require issuance of waivers or require changes to current grazing management practices or livestock improvements. The surface grazing capacity reduction of 10 AUMs is a 0.7 percent of the total AUMs within HC/CUEP. The change in area available to livestock would be negligible. Reclamation would return disturbed areas to the pre-development land uses, which include livestock grazing. Changes to rangeland resources as a result of the Proposed Action would last for 12 years. Impacts to rangeland resources are anticipated to be minimal.

As part of the Proposed Action, implementation of the greater sage-grouse EPM of treating pinyon-juniper sites would result in vegetation understories that are largely intact. Dramatic changes in understory plant composition or productivity are not anticipated and have not been observed on similar treated sites in the past. Moreover, since ground disturbance by foot crews with chainsaws is minimal, and since little change in post treatment livestock use is anticipated, significant increases in weedy annuals are not expected. Grazing management following juniper control should be adaptive to changing environmental and resource conditions. Past experience with similar pinyon-juniper treatments suggests that marked increase in livestock use of the treated area or distribution of livestock would not occur (Bates 2005). Any marginal increase in use of the treatment site by livestock following pinyon-juniper removal would likely be offset by the effect of the toppled trees in creating microsites for protection of understory plants. Consequently, the need for post-treatment closure of treatment sites to livestock is not anticipated.

Implementation of the EPM to improve sage grouse habitat through the placement of exclosures around springs, meadows, and riparian areas may require further site-specific analysis at the time of implementation.

3.10.2.2 No Action

Exploration would occur in open and active areas only under current permits and approvals. Changes to grazing management or livestock improvements would not occur. As exploration activities are completed, reclamation would return disturbed areas to pre-development land uses, which include livestock grazing. Impacts to grazing management would be minimal.

3.10.2.3 Cumulative Effects

Proposed Action

The allotment boundaries of Carico Lake, Grass Valley, and South Buckhorn extend beyond the HC/CUEP boundary. Past, present, and RFFAs shown in **Table 2-6** have caused surface disturbance and therefore, have likely affected or may affect grazing management. Impacts to grazing management from exploration activities associated with the existing 409 acres of surface disturbance have affected approximately 0.03 percent of the total allotment area (i.e., Carico Lake Allotment: 599,304 acres, Grass Valley Allotment: 296,304 acres, and South Buckhorn Allotment: 296,313 acres).

Impacts to grazing management under the Proposed Action of an additional 140 acres of surface disturbance would affect an additional 0.02 percent of the total allotment area. The cumulative effect when considered relative to other past, present, and RFFAs; and combined with the implementation of EPMs and reclamation practices, would not be significant.

No Action

Past, present, and RFFAs shown in **Table 2-6** have affected or may affect grazing management in the allotments which occur across the boundary of HC/CUEP. Impacts to grazing management under the No Action would affect up to 409 acres (0.03 percent) of the total allotment area (i.e., Carico Lake Allotment: 599,304 acres, Grass Valley Allotment: 296,304 acres, and South Buckhorn Allotment: 296,313 acres). The cumulative effect when considered relative to other past, present, and RFFAs; combined with the implementation of EPMs and reclamation practices, would not be significant.

3.11 Cultural Resources

This section presents the cultural resources of the HC/CUEP area, including the archaeological and ethnographic history. The analysis area for direct, indirect, and cumulative effects includes the area within the HC/CUEP Plan boundary.

3.11.1 Affected Environment Cultural Resources

Seventy-one cultural resource inventories have been completed from 1981-2014, resulting in 84 percent coverage of the HCCUEP area. These inventories have documented 439 cultural resources, of which 144 resources are eligible, pending eligible, or unevaluated for NRHP.

Eligible cultural resources span the entire history of human occupation in the area. Native American sites indicate occupation of the area up to 9,000 years ago. Archaeological sites in the HC/CUEP area show the transition from large, dart sized projectile points to the bow and arrow, and the introduction of milling stone implements and brownware ceramics. Basketry and pinyon pine nut harvesting are attested to in both the archaeological and ethnographic record. Native Americans were living in the area when silver was discovered in 1863.

Historic archaeological sites are largely associated with creation of the Cortez Mining District in 1863. The HC/CUEP area contains what were historically the District's most productive

mines, including the Garrison, St. Louis, and Arctic, as well as the ruins of two of the District's mills and the ghost town of Cortez. The hills surrounding the mines have evidence of charcoal production, woodcutting, prospecting, and lime production. Work in the District was performed by various ethnic groups including Chinese, Mexican, and Italian. The historic mining landscape contains 150 years of mining adaptation. Horse Canyon derives from Horse Ranch, a property in the canyon that captured and bred horses for out of state markets in the 1880s.

The Cortez Mining District has been proposed as a Historic District for the NRHP. The Cortez Mining District is eligible for inclusion under criterion (a): its association with events that have made a significant contribution to broad patterns of U.S. history, including settlement and ethnic heritage; criterion (b): its association with people that have made a significant contribution to broad patterns of history, specifically Simeon Wenban (Wenban was one of the original prospectors and played the most important role in developing the mines of the Cortez Mining District); criterion (c): it is representative of a significant and distinguishable entity whose components may lack individual distinction; and criterion (d): it has yielded or is likely to yield information important to U.S. history. The Cortez Mining District has several mills representing a nearly complete record of the evolution of precious metal milling technology in the west, and contains archaeological sites that can address topics of landscape transformation, migration and diaspora, and industrial capitalism. The BLM and Nevada SHPO consider the district eligible under all four criteria (BLM 2008c).

3.11.1.1 Properties of Cultural or Religious Importance

In 1992, the NHPA was amended to allow for properties of traditional religious and cultural importance to an Indian tribe to be determined as eligible for inclusion on the NRHP. Coordination between BLM and local Indian tribes has resulted in the identification of two Properties of Cultural and Religious Importance (PCRIs) in the HC/CUEP area: Mount Tenabo/White Cliffs and Horse Canyon (BLM 2004c).

Mount Tenabo is eligible for inclusion under criterion (a): its association with events that have made a significant contribution to broad patterns of Western Shoshone and U.S. history; and criterion (c): it is representative of a significant and distinguishable entity whose components may lack individual distinction (BLM 2004c). There had been roads, drill pads and communications sites established within the area defined as the Mount Tenabo/White Cliffs PCRI prior to the inclusion of the site on the NRHP in 2004.

Horse Canyon is eligible for inclusion under criterion (b): association with people that have made a significant contribution to broad patterns of history; and criterion (c): it is representative of a significant and distinguishable entity whose components may lack individual distinction (BLM 2004c). There had been roads and drill pads established within the area defined as the Horse Canyon PCRI prior to the inclusion of the site on the NRHP in 2004. A small portion of the open pit and waste rock disposal facility for the South Silicified Pit (permitted under the Horse Canyon Mine Plan of Operations NVN 66896) were constructed within the area defined as the Horse Canyon PCRI prior to the inclusion of the site on the NRHP in 2004.

3.11.2 Environmental Consequences Cultural Resources

3.11.2.1 Proposed Action

The activities associated with the existing 409 acres of surface disturbance occurred under the current applicant-committed EPMs listed in Section 2.2.3.7. Pre-disturbance cultural inventories were conducted and cultural resources were avoided. By incorporating these measures, there were no significant impacts to cultural resources.

The Proposed Action for an additional 140 acres of surface disturbance would be conducted under adherence to the current protection measures detailed in Section 2.2.3.7. By incorporating these measures, significant impacts to cultural resources are not anticipated.

Implementation of the EPM to improve sage grouse habitat through the removal of encroaching pinyon-juniper stands would not result in surface disturbance. Treatment would be done by hand.

3.11.2.2 No Action

The current surface disturbance of 409 acres occurred following the applicant-committed EPMs listed in Section 2.2.3.7. Pre-disturbance cultural inventories were conducted. Under the No Action Alternative, exploration would only occur in open and active areas. No new disturbance would be allowed. By incorporating the protection measures detailed in Section 2.2.3.7, significant impacts to cultural resources would not occur.

3.11.2.3 Cumulative Effects

Pre-disturbance cultural inventories have been conducted and cultural resources have been and would be avoided. By incorporating the protection measures detailed in Section 2.2.3.7, significant cumulative impacts to cultural resources have not occurred and are not anticipated.

3.12 Native American Cultural Concerns

Federal law and agency guidance require BLM to consult with Native American tribes concerning the identification of cultural values and traditional practices of Native American people that may be affected by actions on BLM-administered lands. This consultation includes the identification of places (i.e., physical locations) of traditional cultural importance to Native American tribes. Places that may be of traditional cultural importance to Native American people include, but are not limited to, locations associated with the traditional beliefs concerning tribal origins, cultural history, or the nature of the world; locations where religious practitioners go, either in the past or the present, to perform ceremonial activities based on traditional cultural rules or practice; ancestral habitation sites; trails; burial sites; and places from which plants, animals, minerals, and waters possessing healing powers or used for other subsistence purposes, may be taken. Some of these locations may be considered sacred to particular Native American individuals or tribes.

BLM has been engaged in Native American consultation regarding exploration activities in the HC/CUEP area since the initial HC/CUEP Plan was proposed in 2000; consultation is ongoing. In compliance with the National Historic Preservation Act (NHPA), as amended, the BLM

initiated NHPA and government-to-government consultation for the HC/CUEP Plan Modification, Addendum, and Amendment EA on October 31, 2014 by sending letters to the following tribal groups: Battle Mountain Band of the Te-Moak Tribe of Western Shoshone, Duckwater Shoshone Tribe, Elko Band of the Te-Moak Tribe of Western Shoshone, Te-Moak Tribe of Western Shoshone, and Yomba Shoshone Tribe. The consultation for the HC/CUEP Plan Modification, Addendum, and Amendment EA is ongoing.

3.12.1 Affected Environment Native American Cultural Concerns

The potential impacts from mining and exploration in the Cortez Mountains have been extensively analyzed in the Cortez Hills Final Environmental Impact Statement (FEIS) (BLM 2008c). The Native American traditional values regional cumulative effects study area analyzed in the Cortez Hills FEIS included the HC/CUEP Plan area; that analysis is incorporated by reference.

3.12.2 Environmental Consequences Native American Cultural Concerns

3.12.2.1 Proposed Action

There was an incident of noncompliance with the applicant-committed EPMs concerning the Mount Tenabo/White Cliffs PCRI. Barrick had constructed a new pad and installed a communication facility near the location of an existing radio repeater tower on the top of Mount Tenabo. Barrick did not provide prior notice to BLM of the activity, and the pad construction occurred without a BLM qualified archeologist and Native American observer on site during the new surface disturbance. BLM issued a Notice of Noncompliance Order to Barrick dated September 19, 2013 concerning the pad construction. Barrick has removed the communication facility and submitted a grading and reclamation plan, which has been approved by the BLM. This Notice of Noncompliance Order was lifted by the BLM letter dated March 14, 2014.

Exploration activities associated with the existing 409 acres of surface disturbance have impacted the Mount Tenabo/White Cliffs PCRI. The applicant-committed EPMs (Section 2.2.3.8) have minimized effects to the elements that contribute to the cultural characteristics of the Mount Tenabo/White Cliffs PCRI and the Horse Canyon PCRI.

The Proposed Action for an additional 140 acres of surface disturbance may result in future exploration activities within the Mount Tenabo/White Cliffs PCRI and the Horse Canyon PCRI. The applicant-committed EPMs (Section 2.2.3.8) would remain in effect under the Proposed Action. Access to these areas would not be restricted. By incorporating these measures, potential effects to the elements that contribute to the cultural characteristics of the Mount Tenabo/White Cliffs PCRI and the Horse Canyon PCRI would be minimized and no significant impacts relative to Native American cultural concerns are anticipated.

Implementation of the EPM to improve sage grouse habitat through the treatment of encroaching pinyon-juniper stands would not result in surface disturbance. Treatment removal would be done by hand. With the implementation of EPMs outlined in Section 2.2.3, no significant impacts to the elements that contribute to the cultural characteristics of the PCRI areas are anticipated.

3.12.2.2 No Action

The applicant-committed EPMs would remain in effect under the No Action Alternative. Exploration and reclamation would occur in open and active areas only. Potential direct effects to the Mount Tenabo/White Cliffs PCRI would be avoided. The applicant-committed EPMs (Section 2.2.3.8) would remain in effect under the No Action alternative. By incorporating these measures, potential effects to the elements that contribute to the cultural characteristics of the Mount Tenabo/White Cliffs PCRI and the Horse Canyon PCRI would be minimized and no significant impacts relative to Native American cultural concerns are anticipated.

3.12.2.3 Cumulative Effects

The Native American traditional values regional cumulative effects study area analyzed in the Cortez Hills FEIS included the HC/CUEP Plan area; that analysis is incorporated by reference (BLM 2008c). Within the regional cumulative effects study area, cumulative impacts have occurred within Western Shoshone aboriginal lands that have provided, and continue to provide, sustenance, as well as spiritual and religious renewal, for the indigenous people. Native Americans believe the power that emanates from the land, water, plants, and animals fuels their cultural identity and heritage. Mining-related activities, cattle grazing, construction of transmission lines, wildfires, transportation corridors, and other actions in the regional cumulative effects study area cumulatively have affected, or would affect, these resources and Western Shoshone culture, tradition, and lifeways. Some Western Shoshone believe that these impacts cannot be satisfactorily mitigated. Direct impacts to prehistoric and ethnohistoric sites and burials as a result of activities associated with past, present, and reasonably foreseeable future actions have been, or would be, mitigated in compliance with federal and state laws. However, some Western Shoshone believe that these impacts cannot be satisfactorily mitigated. These actions have cumulatively impacted, and would continue to impact, their heritage and lifeways (BLM 2008c).

Roads, transmission lines, mines and mine-related facilities, agriculture, and infrastructure and human settlement have created cumulative visual impacts in a landscape that has been part of the Western Shoshone aboriginal lands for centuries. Some of the landmarks traditionally used by Native Americans have been, or would be, visually impacted by development-related activities. As a result, Native Americans view their original use and sacredness as having been devalued (BLM 2008c).

Direct impacts to Native American religious concerns would be avoided with implementation of the applicant-committed EPMs. Following reclamation, the area would be returned to a pre-disturbance land use condition.

In summary, the Western Shoshone believe that areas once unaffected by development and encompassing the Puha 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 (BLM 2008c).

3.13 Air Resources

This section describes the air resources analysis area and effects to air quality. The analysis area for potential direct and indirect impacts to air quality includes the HC/CUEP Plan boundary. The cumulative analysis considers the airshed associated with the three hydrographic areas: Crescent Valley, Grass Valley, and Pine Valley.

HC/CUEP activities that would result in air emissions include surface disturbance associated with exploration drilling activities, vehicle and equipment travel, reclamation work, and use of diesel-powered equipment. Sources of air emissions associated with these exploration activities include diesel exhaust, and ground disturbance activities, including road construction, maintenance, and vehicle traffic (fugitive dust).

Comparions between ambient air quality and national and state Ambient Air Quality Standards (AAQS) are used to assess air quality. **Table 3-10** includes national and Nevada AAQS.

Table 3-10 National and State of Nevada Air Quality Standards

		Nevada Standards	**National Standards**	
Pollutant	**Averaging Time**	**Concentration ($\mu g/m^3$)[1]**	**Primary ($\mu g/m^3$)**	**Secondary ($\mu g/m^3$)**
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	NA	196	None
	3-hour	1,300	None	1,300
	24-hour	365	365	None
	Annual average	80	80	None
Nitrogen dioxide (NO_2)	1-hour	--	189	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	12	12	15

Table 3-10 National and State of Nevada Air Quality Standards

Pollutant	Averaging Time	Nevada Standards	National Standards	
		Concentration ($\mu g/m^3$)[1]	Primary ($\mu g/m^3$)	Secondary ($\mu g/m^3$)
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	--	--

[1] $\mu g/m^3$ – micrograms per cubic meter.

Source: NAC 445B.22097 Standards of Quality for Ambient Air (NRS 445B.210, 445B.300); USEPA 2013.

FLPMA provides BLM's basic authority as a mulitple use land management agency. FLPMA also places the responsibility on BLM to provide for compliance with applicable state and federal pollution control laws (air, water, noise, and other pollution standards) under BLM land use plans, and to take actions necessary to prevent unecessary or undue degradation of the public lands.

The BLM Manual 7300 provides direction for air resource management under the BLM administration. The current Shoshone-Eureka RMP (BLM 1986a) does not provide further management guidance on air quality.

The NDEP BAPC issues the air quality permits and provides the oversight for compliance with the permit as prescribed in the NAC 445B regulations. The state of Nevada uses the federal hazardous air pollutant (HAP) list for emission standards.

3.13.1 Affected Environment Air Resources

3.13.1.1 Climate and Meteorology

The Project Area is located at the southern end of the Cortez Mountains. The elevations within the Project Area range from 5,700 feet amsl to 9,150 feet amsl. According to the Western Regional Climate Center (WRCC), the average maximum temperature at the Beowawe University of Nevada Ranch, located approximately 12 miles south of the Project Area, is approximately 88 degrees (°) Fahrenheit (F) in July, and the average minimum temperature is approximately 13° F in January. The average annual precipitation is approximately ten inches and tends to peak in May (WRCC 2013).

Current Conditions

The 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.

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 regime. 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 pinyon-juniper encroachment as well as downy brome (cheatgrass).

Greenhouse Gas Emissions

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

Gases exhibiting greenhouse properties come from both natural and human sources. Water vapor, carbon dioxide, methane, and nitrous oxide are examples of greenhouse gases that have both natural and man-made sources, while other greenhouse gases, such as chlorofluorocarbons, are exclusively man-made.

Sources of greenhouse gas emissions vicinity of the Project Area are wildfires and prescribed burns, vehicles (including OHVs), construction and operation for mineral and energy development, and grazing livestock, wild horses, and burros. To the extent that these activities increase, greenhouse gas emissions are also likely to increase.

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 water bodies and their currents.

Warmer and more arid conditions, coupled with a shorter snow season, have led to limited water supplies and severe drought in parts of the state. By 2100, the average temperature in Nevada is predicted to increase by 3°F to 4°F in the spring and fall and by 5°F 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 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 significant 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 Project on climate change are beyond the scope of this EA and are not further analyzed in this EA.

The NDEP-BAPC does not currently monitor ambient air quality in the HC/CUEP area; the area is therefore considered unclassified for all pollutants having an air quality standard (40 CFR 81.329). However, the air quality in the HC/CUEP region is considered typical for undeveloped regions of the western U.S. For regulatory and planning purposes, HC/CUEP is considered to be in an attainment/unclassified area, meaning it meets air quality standards.

Barrick operates the current HC/CUEP Plan activities under a Class II Air Quality Operating Permit (AP1041-3336), last authorized by the NDEP-BAPC in February 2014 (NDEP 2014b). The Class II permit is for facilities that emit less than 100 tons per year for any one regulated pollutant and emit less than 25 tons per year total HAP, and emit less than 10 tons per year of any one HAP. Under the Class II Air Permit, Barrick submits yearly reports to the NDEP BAPC to document all emissions units/systems specified.

Barrick conducted an emissions inventory for the Class II Air Quality Operating Permit (Barrick 2013d). The inventory included two existing diesel generators, two emergency diesel generators, and a 5,000 gallon gasoline fueling tank. The facility-wide (stationary source) potential to emit values are shown in **Table 3-11**.

Table 3-11 Activity Emissions Summary

Pollutants	Pounds/ Hour	Tons/Year
PM	0.13	0.32
PM10	0.13	0.32

Table 3-11 Activity Emissions Summary

Pollutants	Pounds/ Hour	Tons/Year
PM2.5	0.13	0.32
NOx	3.66	8.53
SO2	0.22	0.51
CO	1.07	2.62
VOC	1.74	4.36
HAPs		
Benzene	1.48E-03	3.39E-03
Toluene	6.50E-04	1.48E-03
Xylene	4.53E-04	1.03E-03
Formaldehyde	1.88E-03	4.28E-03
Acetaldehyde	1.22E-03	2.78E-03
Acrolein	1.47E-04	3.36E-04
Naphthalene	1.35E-04	3.08E-04

Source: Barrick 2013d

3.13.1.2 Fugutive Dust Management

All exploration activities with surface disturbance exceeding 20 acres are required to obtain a surface area disturbance (SAD) permit from the NDEP-BAPC. Barrick has instituted fugutive dust control measures as per the HC/CUEP fugitive dust control plan in the SAD under NAC 445B.22037. The HC/CUEP fugitive dust control plan is implemented under the Air Quality Operating Permit. BMPs to prevent particulate matter (PM) from becoming airborne include: speed limits posted and vehicle speeds reduced in areas of disturbance to minimize the potential for fugitive dust emissions, protect wildlife and livestock, and maintain operational safety; speed limits enforced; access and drill roads maintained and watered; wet drilling methods are used. Barrick requires that vehicles will be maintained regularly to ensure they are operating in a manner to minimize vehicle emissions (NDEP 2014b).

3.13.2 Environmental Consequences Air Resources

3.13.2.1 Proposed Action

The activities associated with the existing 409 acres of surface disturbance were conducted under the Class II permit issued by NDEP. Barrick instituted the fugitive dust control plan to minimize dust emissions from roads, drill pads and other areas. Speed limits were posted and enforced to reduce fugitive dust from vehicular traffic; the access roads and drill roads were watered. Wet drill methods were used which minimized dust emissions from drilling activities. Barrick has recontoured and seeded 250 acres of surface disturbance which reduces the

potential for windblown dust from exposed surfaces. The applicant-committed EPMs and adherence to the requirements in the Class II permit have minimized the effects to air quality.

The Proposed Action for an additional 140 acres would increase the surface disturbance to 549 acres. The maximum number of drill rigs at any one time would remain at 15 rigs. Exploration would continue for an additional 10 years, plus two years for reclamation. During this time, there would be emissions from diesel equipment and surface disturbance. Emissions would be reported and tracked as per the Class II Air Permit. The applicant-committed EPMs and the fugitive dust control plan and associated BMPs would remain in place to minimize airborne particulates. Barrick would continue the reclamation program to recontour and seed disturbed areas reducing the potential for windblown dust from exposed surfaces. Air emissions would occur, but effects to air quality would be minimized.

3.13.2.2 No Action

Under the No Action Alternative, exploration would continue under current permits and approvals in open and active areas only. New surface disturbance would not occur. Reclamation work would be conducted following completion of drilling operations. The applicant-committed EPMs, fugitive dust control plan, and associated BMPs would remain in place to minimize airborne particulates.

3.13.2.3 Cumulative Effects

The cumulative effects analysis for air quality considers air emissions from past, present, and RFFAs occurring within the airshed associated with three hydrographic areas: the Crescent Valley, Grass Valley, and Pine Valley. The projects that have contributed to air emissions in these areas, primarily from surface disturbance activities and associated equipment use, are shown **Table 2-6**. This is a largely undeveloped region characterized by wide-open basins. HC/CUEP emissions are regulated under a Class II Air Permit, and are minimized with implementation of a dust control plan, BMPs, and reclamation of disturbed areas to reduce the potential for windblown dust. Emissions from HC/CUEP activities would occur, but regulated levels would dissipate and would not combine with those from other actions to result in significant cumulative effects.

3.14 Wastes

This section considers potential direct, indirect, and cumulative impacts associated with handling and disposal of wastes, including hazardous wastes, which may be used or generated at HC/CUEP. The analysis area includes the HC/CUEP Plan boundary and transportation routes used to dispose of solid wastes.

Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. According to the EPA, a material must first be classified as solid to be considered a hazardous waste. The EPA further defines a solid waste as any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility; and other discarded material, including solid, liquid, semi-solid, or contained gaseous material

resulting from industrial, commercial, mining, and agricultural operations, and community activities (USEPA 2014).

3.14.1 Affected Environment Wastes

The affected environment includes people and the natural resources who may come in contact with or which may be harmed by wastes generated at HC/CUEP. Natural resources include: water, air, soils, and biological resources. HC/CUEP activities do not generate, nor use or dispose of any hazardous waste. Petroleum products would be used on-site. The HC/CUEP spill contingency plan provides standard operating procedures to minimize the potential for harmful materials to interact with vulnerable natural resources. Solid waste (garbage, human) has been and would be generated from HC/CUEP activities, with the solid waste transported to off-site disposal facilities.

3.14.2 Environmental Consequences Wastes

3.14.2.1 Proposed Action

The exploration activities associated with the 409 acres of surface disturbance did not generate hazardous wastes. Solid, non-hazardous waste, including garbage and human wastes, has been transported to off-site authorized disposal facilities. The potential for spills to occur have minimized through prevention measures outlined in the spill contingency plan.

The Proposed Action of an additional 140 acres would not change current waste management. No hazardous wastes would be generated and proper off-site disposal of garbage and human wastes would continue. The spill contingency plan would remain in place, and as such, impacts associated with wastes are not anticipated.

3.14.2.2 No Action

Under the No Action Alternative, there would be no change in current waste management and spill prevention practices. The spill contingency plan would remain in place, and as such, impacts associated with wastes are not anticipated.

3.14.2.3 Cumulative Effects

Potential direct and indirect impacts associated with wastes are not anticipated. Therefore, cumulative effects are not anticipated.

3.15 Visual Resources

This section defines the visual resources for the HC/CUEP area and analyzes potential direct, indirect, and cumulative impacts to visual resources from HC/CUEP activities. The BLM Visual Resource Management (VRM) system provides a way to identify and evaluate visual values in order to determine appropriate levels of management. VRM classes are assigned to areas during resource management planning. The VRM system also provides a way to analyze the potential visual impacts and apply visual design techniques to ensure that surface-disturbing activities or developments are in harmony with their surroundings. A visual resource inventory (VRI) was most recently completed for the Battle Mountain District in 2011.

The analysis considers key locations where the HC/CUEP area would be visible to the public and considers the potential for impacts based on VRM classes. Direct and indirect effects consider the viewshed of the HC/CUEP Plan boundary area. Cumulative effects consider the past, present, and RFFAs of the Cortez Mountains.

3.15.1 Affected Environment Visual Resources

The HC/CUEP area is within VRM Class III and IV, as described in the Shoshone-Eureka RMP (1986a).

The management objectives for VRM Class III and Class IV are as follows (BLM 1986b):

VRM Class III Objective: "…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."

VRM Class IV Objective: "… 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 elements."

The HC/CUEP area is located in the northern Great Basin section of the Basin and Range Physiographic Province (BLM 2004a). The Great Basin is characterized by a rhythmic pattern of isolated mountain ranges and broad sweeping basins. Clear skies and broad open vistas characterize this landscape (BLM 2001). The HC/CUEP area includes rolling to angular hills and ridges with steep side slopes. The area is covered with a pattern of sagebrush and grasses at lower elevations and juniper and mixed shrubs at higher elevations. Evidence of past fire events appears as a change in texture and color to the otherwise homogenous vegetation patterns on the landscape. Soil colors range from beige to a chalky off-white which, when exposed, contrast highly with the surrounding vegetation. Rock colors vary from light to dark brown to burnt orange (BLM 2004a).

Man-made features are mostly linear; predominately consisting of roads, fences, and power lines. Drill pads, reclamation areas, communication sites, and the exploration office are also visual features of the landscape. The features create weak to moderate contrasts with the gentle sloping lines of the Cortez Mountains.

3.15.2 Environmental Consequences Visual Resources

3.15.2.1 Proposed Action

From a distance, Horse Canyon is visible to travelers on State Highway 278. However, the area is in the background and the foothills and canyons of the Cortez Mountains hide complete views from any one vantage point. The resulting view is a blending of the individual disturbance

features within the natural landscape. Human visitation is low and the disturbance activities are not within view of large population centers. The visual effects of mining and exploration activities in this area are minor and are consistent with VRM class objectives.

Surface disturbance of 409 acres from exploration activities has altered the elements of line and color in the HC/CUEP area, particularly in Horse Canyon. As reclamation has been completed and contrasts in line reduced, the overall visual effect has diminished. However, effects to line and color continue.

Under the Proposed Action for an additional 140 acres of surface disturbance, allowable surface disturbance would increase to a total of 549 acres. Additional effects to line and color would occur.

To conform to the VRM standards discussed above, during any pinyon-juniper treatment greater sage-grouse EPM implementation, the edges of treated areas would be "feathered" and would follow the contours of the landscape, in order to avoid the appearance of obvious human influence. Experience with similar pinyon-juniper thinning projects in the past has shown that the visual impacts are relatively unobtrusive in the short term and almost unnoticeable after two years, when needles have fallen from downed trees. In the long term, greater sage-grouse EPM implementation may result in a visual aspect preferable to one dominated and obscured by dense stands of conifers that may result without the greater sage-grouse EPM.

Visual resources have been and would continue to be affected by exploration activities. Reclamation would reduce effects to line and color over time. Impacts of the Proposed Action would be minimized with reclamation activities that mimic the basic elements of the characteristic landscape. With successful reclamation and revegetation of the exploration roads and drill sites, long-term visual impacts would be minimized. Effects would not result in significant impacts to visual resources or visual resource management objectives.

3.15.2.2 No Action

Under the No Action Alternative, exploration and reclamation would continue in open and active areas only. Additional surface disturbance would not occur. Reclamation would reduce the changes in line and color over time. Under the No Action Alternative, impacts to visual resources from HC/CUEP activities would be minimized over time.

3.15.2.3 Cumulative Effects

With successful reclamation and revegetation of the exploration roads and drill sites, long-term visual impacts would be minimized, and the VRM management objectives in the HC/CUEP area would be met. Significant cumulative effects from HC/CUEP exploration activities would not occur.

3.16 Recreational Resources

This section presents recreational opportunities of the HC/CUEP area. The analysis for potential direct and indirect effects to recreational resources considers effects to those

opportunities identified as occurring within the HC/CUEP Plan boundary. The cumulative analysis considers the surrounding Cortez Mountains.

3.16.1 Affected Environment Recreational Resources

The HC/CUEP area is isolated and undeveloped. The Elko RMP ROD designated a portion of the HC/CUEP area as "open" to off-road vehicle use (BLM 1987). There are no recreational facilities within the HC/CUEP area; and in this part of Nevada, developed recreational opportunities are relatively sparse. In the HC/CUEP area, opportunities for public recreation primarily include off-highway vehicle (OHV) use, hunting, and camping. Mountain biking, horseback riding, sightseeing, outdoor photography, nature study, wildlife viewing, bird watching, and rock collecting may also occur.

3.16.2 Environmental Consequences Recreational Resources

3.16.2.1 Proposed Action

The Proposed Action would not change existing access to public lands within the HC/CUEP area for recreational uses. Construction of new roads could temporarily improve access for some types of recreation activities. Exploration activities associated with the 409 acres of surface disturbance have reduced recreation opportunities, particularly in Horse Canyon. OHV users, hunters, and campers are likely the most affected groups. The HC/CUEP area is not known as a popular destination for public use and no annual commercial or competitive permitted events occur in the area. Access roads and other disturbed areas would be reclaimed.

The Proposed Action for an additional 140 acres would result in allowable surface disturbance of 549 acres. The duration of the exploration activities and reclamation would continue for 12 years. The HC/CUEP area in Eureka County lies in the NDOW Management Unit 144 (MU 144). There are 17 commercial outfitter guides permitted to operate in the BMD, of which MU 144 is a part. Access roads and other disturbed areas would be reclaimed. Under the Proposed Action for an additional 140 acres, minimal impacts to recreation would occur for an estimated 12 years.

The implementation of the pinyon-juniper treatment option of the greater sage-grouse EPM as part of the Proposed Action, with its associated potential chain saw noise, could have immediate effects upon recreational opportunities in the proposed Project Area during implementation by detracting from the naturalness of the experience. Following treatment and in the long term, however, recreational opportunities such as hiking, horseback riding, wildlife viewing, and hunting would be enhanced by the preservation of plant, wildlife, and aesthetic diversity.

3.16.2.2 No Action

Under the No Action Alternative, exploration and reclamation activities would continue in open and active areas only. Recreation opportunities would continue to be reduced until reclamation is complete. The area is not known as a popular destination for public use and no annual commercial or competitive permitted events occur in the area. The duration would be shorter than under the Proposed Action. Effects to recreational resources would be negligible.

3.16.2.3 Cumulative Effects

Other past, present, and RFFA mining and exploration projects in the Cortez Mountains have reduced recreational opportunities by changing the natural characteristics of the landscape, thus potentially reducing hunting opportunities. Wildfires have reduced recreational opportunities by altering wildlife habitats. Exploration activities associated with existing 409 acres of surface disturbance have also reduced recreational opportunities. The Proposed Action for an additional 140 acres of surface disturbance would continue to reduce these opportunities for another 12 years. Exploration activities associated with HC/CUEP would result in a short-term, temporary reduction of recreation opportunities. However, areas near the HC/CUEP area offer similar recreational opportunities. In the long-term reclamation would return the acreage to recreational uses. The combined effect of other projects is not anticipated to result in a significant cumulative effect to recreational resources.

3.17 Social and Economic Values

HC/CUEP is located in Eureka and Lander counties approximately 70 miles southwest of Elko, Nevada, and is accessed via Nevada State Route 306 or Nevada State Route 278. Eureka and Lander counties are located in north central Nevada and encompass approximately 4,180 square miles and 5,519 square miles, respectively. The study area for direct, indirect, and cumulative effects for social and economic values includes Elko, Eureka, and Lander Counties. The rationale for including Elko County within the social and economic study area is that the majority of the workers employed by Barrick for the exploration activities at HC/CUEP live in the city of Elko.

3.17.1 Affected Environment Social and Economic Values

Elko County is the largest of the three counties in the analysis area. Lander County is the second largest. **Table 3-12** presents the population levels and growth rates for the entire State of Nevada, Elko, Eureka and Lander counties, and the largest communities within each of these three counties from 1980 through 2010.

Table 3-12 Population Characteristics

State/County/ Major Community	1980	1990	2000	2010	Annual Percent Growth Rate for 1980-1990	Annual Percent Growth Rate for 1990-2000	Annual Percent Growth Rate for 2000-2010
Nevada	800,508	1,201,833	1,998,257	2,700,551	4.1	5.2	3.1
Elko County	17,269	33,530	45,291	48,818	6.9	3.1	0.8
Elko City	8,758	14,736	16,708	18,297	5.3	1.3	0.9
Spring Creek CDP[1]	NA	5,866	10,548	12,361	NA	6.0	1.6
Carlin City	1,232	2,220	2,161	2,368	6.1	-0.3	0.9

Table 3-12 Population Characteristics

Eureka County	1,198	1,547	1,651	1,987	2.6	0.7	1.9
Eureka CDP[1]	NA	NA	NA	610	NA	NA	NA
Lander County	4,076	6,266	5,794	5,775	4.4	-0.8	0.0
Battle Mountain CDP[1]	2,749	3,542	2,871	3,635	2.6	-2.1	2.4

[1]CDP – Census Designated Place

Source: U.S. Census Bureau 2010, 2000a, 2000b, 1990a, 1990b, and 1981

Employment and Income

In Elko County, more than 50 percent of the people work in the following industries: Leisure and Hospitality; Trade, Transportation and Utilities; Government; and Natural Resources and Mining. The majority of people within Eureka County work in the Natural Resources and Mining Industry (NDETR 2013a). In Lander County, more than 50 percent of the people work in the Natural Resources and Mining Industry (NDETR 2013a).

Table 3-13 presents the 2013 Annual Labor Force, Employment, and Unemployment for the State of Nevada, Elko County, Eureka County, and Lander County.

Table 3-13 Annual Labor Force and Employment Rates 2013

Location	Labor Force	Employment	Unemployment	Unemployment Rate (percent)
Nevada	1,369,800	1,240,600	129,200	9.4
Elko County	30,550	28,850	1,700	5.6
Eureka County	1,120	1,050	70	5.9
Lander County	4,940	4,690	250	5.0

Source: NDETR 2013b

The average annual unemployment rates for 2013 for Elko, Eureka, and Lander Counties were 5.6, 5.9, and 5.0, respectively, compared to 9.4 percent for the entire State of Nevada. The total unemployment in the study area averaged 2,020 people for the year, which is above historical lows, but is much lower than the statewide average (NDETR 2013b).

The median household income from 2008-2012 for the State of Nevada, Elko, Eureka, and Lander Counties, Elko City, and Spring Creek Census Designated Place (CDP) are shown in **Table 3-14**. The median household income was not available for Carlin City, Eureka CDP, or Battle Mountain CDP. The median household income for Elko, Eureka, and Lander Counties, Elko City, and Spring Creek CDP is higher than the State of Nevada's median household income.

Table 3-14 Median Household Income 2008-2012

Location	Median Household Income

Table 3-14 Median Household Income 2008-2012

Nevada	$54,083
Elko County	$70,411
Elko City	$71,297
Spring Creek CDP[1]	$90,900
Eureka County	$61,311
Lander County	$70,341

Source: U.S. Census Bureau 2012

3.17.2 Environmental Consequences Social and Economic Values

3.17.2.1 Proposed Action

Unemployment in Elko, Eureka, and Lander counties is lower than the statewide average and median household incomes are higher. HC/CUEP exploration activities for the 409 acres have used the local workforce of Elko, Eureka, and Lander counties, and have supported the local economy. The social and economic impact has been beneficial.

The Proposed Action for an additional 140 acres of surface disturbance would not result in an increase in the workforce at HC/CUEP. The maximum drill rig count would remain at 15 rigs. Some of the exploration workforce is housed at a Barrick-owned facility in Pine Valley; lodging and meals are provided. The Proposed Action for an additional 140 acres of surface disturbance would not result in measurable changes to social infrastructure such as housing demand, public facilities and services, emergency health care services, and public education, since it is anticipated that the existing workforce would provide sufficient staff.

Implementing the pinyon-juniper option of the greater sage-grouse EPM would provide seasonal work for a relatively small crew for up to 10 years and would not affect population growth in the area, nor would it create or provide any infrastructure, which would indirectly induce substantial population growth. The crews would help to support local economies through the purchase of fuel, groceries, tools and equipment. This spending activity associated with the proposed Project would have a small but positive effect on local businesses in Eureka/Lander Counties but would not measurably contribute to the economic benefits described from the exploration activities.

3.17.2.2 No Action

Under the No Action Alternative, exploration and reclamation would continue to have a positive social and economic effect on the workforce in Elko, Eureka, and Lander counties. The benefit would be short-term, as exploration would be limited to open and active areas.

3.17.2.3 Cumulative Effects

Proposed Action

Exploration activities at HC/CUEP have added to the current demand on the workforce, which is also used to support other present and future foreseeable mining and exploration projects in the affected counties of Elko, Eureka, and Lander. The Proposed Action of an additional 140 acres of surface disturbance would extend the duration of this need for workers for 10 years; however, the demand would not increase the number of workers needed, and would therefore not place additional burden on social infrastructure. The Proposed Action does 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. It is expected that the cumulative and incremental socioeconomic effects of the Proposed Action would be beneficial and not significant.

No Action

Exploration activities at HC/CUEP would continue to add to the current demand on the workforce, which is also used to support other present and future foreseeable mining and exploration projects in the affected counties of Elko, Eureka, and Lander. Under the No Action Alternative, the effects would be less than under the Proposed Action. The timeframe of demand on the workforce would be short-term, as exploration would only occur in open and active areas.

4.0 Consultation and Coordination

4.1 Introduction

This EA was prepared at the direction of the BLM Mount Lewis Field Office, BMD by Tetra Tech, Inc. under a contract with Barrick. Following is a list of persons, groups, organizations, and agencies consulted, as well as a list of individuals responsible for the preparation/review of this EA.

4.2 Persons, Groups, Organizations, and Agencies Consulted

Federal Agencies

USFWS

State Agencies

Chet Van Dellen	NDOW, GIS Coordinator
Lindsey Lesmeister	NDOW, Mining Biologist
Timothy M. Herrick	NDOW, Biologist
Eric S. Miskow	NNHP, Biologist/Data Manager

Native Americans

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

4.3 List of Preparers/Reviewers

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Ethan Ellsworth/ William O'Neill	Wildlife Resources (including Migratory Birds and Special Status Animal Species)
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Appendix A HC/CUEP Surface Disturbance and Reclamation Survey Protocol (Barrick 2013a)

Horse Canyon/Cortez Unified Exploration Project Surface Disturbance and Reclamation Survey Protocol

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Horse Canyon/Cortez Unified Exploration Project Surface Disturbance and Reclamation Survey Protocol

This protocol addresses general survey procedures for disturbance activities conducted within the HC/CUEP Plan boundary related to construction and reclamation activities performed by BGEI.

- New surface disturbance is requested by drill services and Project Geologist to drill services surveyor.
- Drill services surveyor plots surface disturbance on map and gets approval from Environmental Compliance Representative about disturbance location.
- Environmentally sensitive areas are identified in the field and avoidance zones noted on the disturbance permit, and if needed flagged in the field.
- Construction activities are monitored by drill services supervisors and or designated representative to ensure compliance to the plan.
- Monthly disturbance data are collected with Trimble GeoExplorer 6000 Series (GeoXH) handhelds or similar survey equipment by the Drill Services surveyors and sent to the GIS database manager.
- Data are surveyed in WGS 84 and then converted to the Barrick Regional Survey Grid which is a local grid reference to NAD 83.
- The perimeters of the disturbance areas are walked with GPS units; a point is collected every second and the cumulative point data are then converted into polylines in a GIS platform.
- The data are post-processed with a Trimble GPS Pathfinder Office software or similar processing software to obtain ≤10-centimeter accuracy.
- The GIS database manager compiles the active and open disturbance acreage and submits the monthly disturbance report summarizing acreage disturbance for the month, total project disturbance, and reclaimed acres to the Chief Geologist, project managers and senior drill supervision.
- Road dimensions are captured in the field as polylines with a GPS measuring from the crest of the cut to the toe of the fill. Pad/sump dimensions and total fill area are surveyed in the field.
    - The number of open holes and pads are collected each month.
    - The number of culverts is verified each month.
    - BGEI conducts an annual reconciliation of disturbance using aerial photography to ensure that all disturbances have been captured.
    - Disturbance is reported on an annual basis to the BLM and NDEP by April 15 of each year.

Appendix B Best Management Practices

Specific Erosion Controls

BMPs for erosion control used at the project area include preservation of existing vegetation, to the extent possible, recontouring, revegetation, riprap, velocity dissipation devices, and ditches. Specific erosion BMPs for the project area include:

- Waste rock piles at the project area have been recontoured and revegetated;
- Roads in the project area are canted toward ditches which run the length of the road;
- Water used for dust control is sprayed over roads and disturbed areas at a rate that moistens the soil but does not cause run-off, preventing wind erosion;
- Velocity dissipation devices (berm cutouts) are used throughout the roads at the project area to divert storm water into natural drainages and minimize exposure to disturbed soil;
- Silt fences, straw bales, ditches, and sediment basins, for all down slope boundaries of construction areas and side slopes as deemed appropriate by individual site conditions are installed and will maximize the amount of sediment that is trapped;
- Storm water is diverted away from material storage areas;
- Concurrent reclamation of drill roads and pads is practiced.
- Reclamation of the Horse Canyon Cortez Unified Exploration Project is performed pursuant to Permit #0159 issued by the Nevada Division of Environmental Protection-Bureau of Mining and Reclamation and the Bureau of Land Management. Reclamation of the West Pine Valley Exploration Plan is performed pursuant to Permit #0229

Elko Exploration Best Management Practices
Erosion and Sediment Control

BMP	Description and Use
Slope Terracing and Tracking	Terracing and soil roughening or tracking of slopes reduces erosion by creating stair-steps, furrows across slopes and serrations in the soil. Uneven bare soil surfaces capture raindrops, decrease the velocity of run-off, trap sediments, increase infiltration, and aid in the establishment of vegetation. Terracing and soil roughening or tracking of slopes may be necessary on the 3:1 slopes in the southern portion of the project site.
Wind Erosion and Dust Control	Dust control measures will be provided *as necessary* to prevent or alleviate dust nuisance and comply with regulations. Control may consist of applying water, soil stabilizers, or dust palliatives (SS-5). The application of water via a water truck is a typical dust control measure. Caution must be taken to prevent water applications in excess of soil absorption rates. Otherwise, the excess water could result in sediment-laden run-off.
Riprap	Riprap measures are to be provided at the storm drain outlet for soil stabilization, and to prevent soil erosion in areas of concentrated run-off.
Silt Fence	Silt fences slow and detain sediment laden sheet flow from disturbed areas and allow settlement of sediment prior to discharge off-site. However, silt fences require more maintenance and must be removed upon completion of the project. A silt fence may be installed to protect the existing basin and drainages.
Stockpile Management	Stockpiles must be located 100 feet away from stream inlets and water courses that can convey sediment. Sediment logs should be placed around the perimeter of each and every stockpile to prevent sediment movement from designated areas.
Solid and Demolition Waste	Designate on-site waste collection areas away from stream inlets. Cover dumpsters at all times. Collect construction site litter and debris daily.
Spill Prevention	Discharges of non-hazardous and hazardous materials can be eliminated by preventing and controlling spills. Contractors are responsible for utilizing drip pans or absorbent material under equipment when it is not in use, maintaining a stockpile of spill clean-up materials located where it will be readily accessible, and for immediate clean-up of spills and proper disposal of soils and materials.

BMP	Description and Use
Vehicle & Equipment Maintenance & Fueling	Fueling and maintenance areas should be located at least 100 feet from any waterway, protected from any ability of conveyance of pollutants, located on a level grade. Washing, fueling, and any major maintenance should be conducted off site whenever possible.
Material Delivery and Storage	Within the construction staging area, the contractor will designate a storage area away from a storm water conveyance, for the delivery, handling, and storage of materials. Materials subject to wind erosion and weather will be stored within a covered container.
Paints and Liquid Materials	A specific storage and cleaning area should be designated to minimize or eliminate the transport of paint, adhesives, solvents, and cleaning products to storm drains or watercourses.
Sanitary / Septic Waste Management	All sanitary septic waste facilities (portable restrooms) must be placed at least 100 feet from surface water. The facility must be located in an area, where if tipped over, it will not allow conveyance of septic fluids and waste into the surface water system. The facility should be anchored down to prevent them from overturning during periods of high wind. Fiber rolls should be placed around the facility. The facility should be discharged into a sanitary sewer, not the storm drain system. The facility should be monitored for leaks and good working order at least once a week.
Landscape Management	A specific storage area for plant storage, landscaping topsoil, and chemicals, should be designated to limit the discharge of soils, fertilizers, and chemicals into storm drains and gutters, drainages, and water courses.
Noxious Weed Control	Many invasive plants are listed as noxious weeds in the Nevada Revised Statutes. Consequently, their control or management is mandated by law. Construction practices are a known cause of the spread of invasive weeds. Should the site have invasive weeds, application of herbicide or manually uprooting the infestation is recommended. Great care should be taken to (1) stay out of infested areas with vehicles and (2) make sure vehicles are free of dirt and debris when entering and exiting the site to not carry seeds and plant pieces to or from the construction site.
Sediment Basins	Sediment basins will be utilized to catch sediment leaving the site. Basins are existing structures that will be cleaned out of accumulated sediment and emergency spillways will be constructed for each structure.

Appendix C
Water Resources
Tables B-1, B-2, B-3

Table B-1. All 2013 Seep/Spring Monitoring and Sampling Sites

Site ID	Site ID	UTM Easting	UTM Northing	Sample collected in 2013/ 2013 Physical and Analytical Sample results (HDR 2014)
Dry Hills (9 seep/spring sites)				
	26-48-23-211A	539894	4440606	No water present; no sample collected
	26-48-23-211B	539988	4440565	No water present; no sample collected
	26-48-23-242	540498	4440151	No water present; no sample collected
	26-48-23-313A	539016	4439706	No water present; no sample collected
	26-48-23-313B	539046	4439673	No water present; no sample collected
	26-48-24-133	540675	4440070	No water present; no sample collected
	26-48-24-134	540818	4439991	No water present; no sample collected
	26-48-26-123A	539518	4438802	No water present; no sample collected
	26-48-26-123B	539478	4438843	No water present; no sample collected
Fourmile Canyon (3 seep/spring sites)				
	27-48-22-222A	538848	4450203	Physical parameters measured did not exceed NDEP reference values and were consistent with the physical parameters of other monitoring locations in this area. All concentrations of anions and cations at this location were detected within NDEP reference values. The following dissolved metals exceeded their respective reference limit: dissolved arsenic 0.073 mg/L; dissolved iron 1.10 mg/L; Total recoverable iron 2.66 mg/L; all other total recoverable metals were reported within reference values.
	27-48-23-234	540081	4449548	No water present; no sample collected
	27-48-35-112	538979	4446871	Water flow was too low to be measured. All concentrations of anions, cations, and dissolved metals were reported within NDEP Profile II reference values. The following constituents of total recoverable metals exceeded reference values: total recoverable aluminum 0.82 mg/L; total recoverable iron 1.46 mg/L; and total recoverable manganese 0.10 mg/L.
	27-48-14-343	539549	4450385	Not added to monitoring program (not a wetland)

Site ID	Site ID	UTM Easting	UTM Northing	Sample collected in 2013/ 2013 Physical and Analytical Sample results (HDR 2014)
	27-48-23-133	539073	4449556	Not added to monitoring program (not a wetland)
	27-48-23-143	539463	4449546	Not added to monitoring program (not a wetland)
	27-48-23-144	539615	4449580	Not added to monitoring program (not a wetland)
	27-48-23-144A	539553	4449574	Not added to monitoring program (not a wetland)
	27-48-23-424	540372	4449119	Not added to monitoring program (not a wetland)
	27-48-23-441	540286	4448984	Not added to monitoring program (not a wetland)
	27-48-26-143	539482	4448017	Not added to monitoring program (not a wetland)
	27-48-26-312	539238	4447858	Not added to monitoring program (not a wetland)
	27-48-26-312A	539210	4447810	Not added to monitoring program (not a wetland)
	27-48-26-314	539223	4447620	Not added to monitoring program (not a wetland)
	27-48-26-324	539612	4447506	Not added to monitoring program (not a wetland)
	27-48-26-324A	539624	4447514	Not added to monitoring program (not a wetland)
	27-48-26-324B	539634	4447553	Not added to monitoring program (not a wetland)
	27-48-26-324C	539636	4447558	Not added to monitoring program (not a wetland)
	27-48-26-324D	539631	4447564	Not added to monitoring program (not a wetland)
	27-48-26-342	539653	4447442	Not added to monitoring program (not a wetland)
	27-48-26-411	539759	4447740	Not added to monitoring program (not a wetland)
	27-48-27-423	538741	4447660	Not added to monitoring program (not a wetland)
	27-48-27-423A	538719	4447629	Not added to monitoring program (not a wetland)
	27-48-27-424	538835	4447673	Not added to monitoring program (not a wetland)
	27-48-27-424A	538840	4447651	Not added to monitoring program (not a wetland)
Horse Creek (35 seep/spring sites)				
	26-48-02-322	539752	4444692	No water present; no sample collected

Site ID	Site ID	UTM Easting	UTM Northing	Sample collected in 2013/ 2013 Physical and Analytical Sample results (HDR 2014)
	26-48-02-423A	540270	4444287	All physical parameters were detected within NDEP reference values. Water flow was measured at 1.79 gallons per minute (gpm). All concentrations of anions, cations, dissolved metals, and total recoverable metals were reported within NDEP reference values.
	26-48-02-423B	540306	4444308	All physical parameters were detected within NDEP reference values. Water flow was measured at 0.45 gpm. All concentrations of anions, cations, dissolved metals, and total recoverable metals were reported within NDEP reference values and were comparable to the concentrations of other constituents in the area.
	26-48-03-114	537749	4445131	Not sampled due to access limitations
	26-48-03-134	537836	4444877	No water present; no sample collected
	26-48-03-143	537927	4444726	No water present; no sample collected
	26-48-03-213	538428	4445155	No water present; no sample collected
	26-48-03-221	538728	4445377	No water present; no sample collected
	26-48-03-321	538021	4444516	Water flow was measured at 8.96 gpm. All physical parameters were detected within NDEP reference values. All concentrations of anions and cations were reported within NDEP reference values. Dissolved arsenic was reported at 0.011 mg/L, above the reference limit. Concentrations of all other dissolved metals and total recoverable metals were detected within NDEP reference values.
	26-48-03-413A	538239	4444487	No water present; no sample collected
	26-48-03-413B	538254	4444461	No water present; no sample collected
	26-48-03-443	538718	4443956	No water present; no sample collected
	26-48-03-444	538959	4443948	No water present; no sample collected
	26-48-10-142	538066	4443427	The level of TDS detected was 780 mg/L, exceeding the NDEP reference limit. All other physical parameters were within reference values. All concentrations of anions, cations, dissolved metals, and total recoverable metals were reported within NDEP reference values.
	26-48-10-232	538326	4443382	No water present; no sample collected
	26-48-10-344	538113	4442357	No sample collected (spring discharge feature not found, removing and replacing with 26-48-10-433)

Site ID	Site ID	UTM Easting	UTM Northing	Sample collected in 2013/ 2013 Physical and Analytical Sample results (HDR 2014)
	26-48-10-433	538163	4442349	There was no significant water flow at the time of monitoring, standing surface water present to collect field parameters and water samples. All physical parameters were detected within NDEP reference values. All concentrations of dissolved metals, total recoverable metals, cations, and anions were reported within NDEP reference values.
	26-48-10-441	538806	4442595	No water present; no sample collected
	26-48-10-442	538878	4442546	No water present; no sample collected
	26-48-10-444	538964	4442428	No water present; no sample collected
	26-48-11-142	539843	4443518	No water present; no sample collected
	26-48-11-144A	540497	4443317	TDS were detected at 510 mg/L, exceeding the NDEP reference limit. No other physical parameters exceeded reference values. All concentrations of anions, cations, and dissolved metals were detected within NDEP Profile II reference values. Dissolved manganese exceeded reference values at 0.28 mg/L. The following constituents of total recoverable metals exceeded reference values: total recoverable aluminum 0.28 mg/L; total recoverable iron 0.35 mg/L; total recoverable manganese 0.25 mg/L.
	26-48-11-144B	540456	4443295	Water flow was too low to be measured; no physical parameters were measured above NDEP reference values. All concentrations of anions, cations, dissolved metals, and total recoverable metals were reported within NDEP Profile II reference values.
	26-48-11-312	539176	4443169	No water present; no sample collected
	26-48-11-422	540521	4442562	No water present; no sample collected
	26-48-12-324	541358	4442817	Water flow was measured at 0.45 gpm, and all physical parameters were detected within NDEP reference values. All concentrations of anions and cations were reported within NDEP reference values. The following dissolved metals exceeded reference values: dissolved aluminum 0.64 mg/L; dissolved iron 2.00 mg/L; dissolved manganese 1.84 mg/L. The following total recoverable metals exceeded reference values: total recoverable aluminum 2.98 mg/L; total recoverable iron 3.95 mg/L; total recoverable manganese

Site ID	Site ID	UTM Easting	UTM Northing	Sample collected in 2013/ 2013 Physical and Analytical Sample results (HDR 2014)
				1.98 mg/L.
	26-48-12-341	541303	4442787	Water flow was too low to be measured at this location; all physical parameters were detected within NDEP reference values. All concentrations of anions and cations were reported within NDEP reference values. Dissolved arsenic exceeded the NDEP reference limit at 0.014 mg/L. All other concentrations of dissolved metals were detected within NDEP reference values. All concentrations of total recoverable metals were detected within NDEP reference values.
	26-48-12-414	541816	4442778	Water flow was measured at 0.45 gpm. TDS was detected at 760 mg/L, exceeding NDEP reference values. All concentrations of anions and cations were reported within NDEP Profile II reference values. Dissolved manganese exceeded reference values at 0.58 mg/L. The following total recoverable metals exceeded NDEP Profile II reference values: total recoverable aluminum 0.88 mg/L; total recoverable iron 1.73 mg/L; total recoverable manganese 0.70 mg/L.
	26-48-12-432	541648	4442708	No water present; no sample collected
	26-48-13-323	541243	4441171	No water present; no sample collected
	26-48-13-324	541337	4441184	Water flow was measured at 0.45 gpm. All physical parameters were within NDEP reference values. All concentrations of anions and cations were reported within NDEP reference values. The level of dissolved arsenic reported was 0.031 mg/L and exceeded reference values. All concentrations of total recoverable metals that were reported were within reference values.
	26-48-13-342	541411	4440946	Water flow was measured at 0.04 gpm. TDS exceeded NDEP reference values, measuring 512 mg/L. All other physical parameters were within the reference values. All concentrations of anions, cations, and total recoverable metals were reported within NDEP reference values for these constituents. Dissolved arsenic was reported at 0.026 mg/L, which exceeded the NDEP reference limit.
	26-48-13-431	541500	4441030	Water flow was too low to be measured. TDS was measured at 1,050 mg/L, exceeding the NDEP reference limit. All other physical parameters were within reference values. All concentrations of anions, cations, and total recoverable

Site ID	Site ID	UTM Easting	UTM Northing	Sample collected in 2013/ 2013 Physical and Analytical Sample results (HDR 2014)
				metals were reported within NDEP reference values. The concentration of dissolved arsenic was detected at 0.078 mg/L, exceeding the NDEP reference values. All other constituents of dissolved metals were within reference values.
	26-48-13-432	541858	4441074	No water present; no sample collected
	26-48-24-221	541953	4440698	No water present; no sample collected
Mill Canyon (2 seep/spring sites)				
	27-48-27-134	537769	4447920	Water flow was too low to be measured; all other field parameters were detected within NDEP reference values. All concentrations of anions and cations were detected within NDEP Profile II reference values. The concentration of dissolved arsenic exceeded the reference limit at 0.064 mg/L. All other concentrations of dissolved metals were reported within reference values. The following total recoverable metals exceeded reference values: total recoverable aluminum 0.77 mg/L; total recoverable iron 0.82 mg/L.
	27-48-27-134A	537735	4447980	Water flow was too low to be measured. All concentrations of anions and cations were detected within NDEP Profile II reference values. The concentration of dissolved arsenic exceeded the reference limit and was reported at 0.066 mg/L. All other concentrations of dissolved metals were reported within reference values. The following total recoverable metals exceeded reference values: total recoverable aluminum 4.66 mg/L; total recoverable iron 5.23 mg/L; total recoverable manganese 0.11 mg/L.
	27-48-27-131	537538	4448151	Not added to monitoring program (not a wetland)
	27-48-27-131A	537568	4448105	Not added to monitoring program (not a wetland)
North Toiyabe Range West (1 sampling site)				
	26-47-11-121	529709	4443797	No sample collected (site confirmed to not be a water feature)
Willow Creek (13 sampling sites)				
	26-48-01-131	540859	4445063	No water present; no sample collected
	26-48-01-141	541179	4444967	No water present; no sample collected
	26-48-01-212	541713	4445369	No water present; no sample collected

Site ID	Site ID	UTM Easting	UTM Northing	Sample collected in 2013/ 2013 Physical and Analytical Sample results (HDR 2014)
	26-48-01-212B	541782	4445320	No water present; no sample collected
	26-48-01-223	541985	4445163	No water present; no sample collected
	26-48-01-234	541796	4444829	No water present; no sample collected
	26-48-02-224	540558	4445180	No water present; no sample collected
	27-48-34-322A	538263	4446041	TDS exceeded reference values and was detected at 2,250 mg/L, and all other physical parameters were detected within NDEP reference values. Magnesium and sulfate levels were detected above NDEP Profile II reference values, measuring 189 mg/L and 1,370 mg/L, respectively. All other concentrations of anions and cations were detected within reference values. All constituents of dissolved metals were reported within reference values. The following constituents of total recoverable metals were detected above reference values: total recoverable aluminum 0.36 mg/L; total recoverable iron 1.12 mg/L; total recoverable manganese 0.11 mg/L.
	27-48-34-322B	538366	4446058	No water present; no sample collected
	27-48-34-412	538532	4446043	No water present; no sample collected
	27-48-34-421	538664	4446079	No water present; no sample collected
	27-48-35-234	539960	4446330	Water flow was too low to be measured. TDS exceeded reference values at 1,140 mg/L; all other physical parameters were detected within NDEP reference values. The concentration of sulfate detected at this location exceeded NDEP Profile II reference values at 657 mg/L. All other anion and cation concentrations were detected within reference values. All constituents of dissolved metals and total recoverable metals were detected within reference values.
	27-48-35-311	539078	4446149	Water flow was recorded at 0.45 gpm. TDS exceeded the reference limit and was detected at 1,950 mg/L, and all other physical parameters were detected within NDEP reference values. The concentration of sulfate detected at this location exceeded NDEP Profile II reference values at 1,240 mg/L. All other anion and cation concentrations were detected within reference values. All constituents of dissolved metals and total recoverable metals were detected within reference values.

Site ID	Site ID	UTM Easting	UTM Northing	Sample collected in 2013/ 2013 Physical and Analytical Sample results (HDR 2014)
Willow Springs (2 sampling sites)				
	26-48-01-313B	540883	4444464	No water present; no sample collected
	26-48-01-323	541090	4444442	No water present; no sample collected

Table B-2. HC/CUEP Wetland Areas[1]

Group	Wetland Site ID	Acres
Dry Hills (8 wetland areas confirmed in 2013)	26-48-23-211A	0.015
	26-48-23-211B	0.01
	26-48-23-242	0.018
	26-48-23-313A	0.009
	26-48-23-313B	0.021
	26-48-24-133	0.006
	26-48-24-134	0.007
	26-48-26-123A / 26-48-26-123B	0.02
Fourmile Canyon (3 wetland areas confirmed in 2013)	27-48-22-222A	0.063
	27-48-23-234	0.078
	27-48-35-112	0.021
Horse Creek (29 total wetland areas confirmed in 2013)	26-48-02-322	0.014
	26-48-02-423A	0.61
	26-48-02-423B	0.314
	26-48-03-114[#]	ND
	26-48-03-134	0.009
	26-48-03-143[#]	ND
	26-48-03-213	2.173
	26-48-03-221	0.039
	26-48-03-321	0.023

Group	Wetland Site ID	Acres
	26-48-03-413A	0.068
	26-48-03-413B	0.066
	26-48-03-443	0.272
	26-48-03-444	0.519
	26-48-10-142	0.124
	26-48-10-232	0.033
	26-48-10-344 / 26-48-10-433	0.535
	26-48-10-441	0.019
	26-48-10-442	0.028
	26-48-10-444	0.016
	26-48-11-142	0.019
	26-48-11-144A/ 26-48-11-144B	0.385
	26-48-11-312	0.142
	26-48-11-422	0.215
	26-48-12-324	0.168
	26-48-12-341	0.047
	26-48-12-414	0.726
	26-48-12-432	0.027
	26-48-13-323/ 26-48-13-324/ 26-48-13-342/ 26-48-13-431/ 26-48-24-221	20.896

Group	Wetland Site ID	Acres
	26-48-13-432	0.426
Mill Canyon (2 wetlands confirmed present in 2013)	27-48-27-134	0.03
	27-48-27-134A	0.012
North Toiyabe Range West (confirmed no wetlands present in 2013)		NA
Willow Creek (13 wetlands confirmed present in 2013)	26-48-01-131	0.75
	26-48-01-141	0.016
	26-48-01-212#	ND
	26-48-01-212B	0.014
	26-48-01-223	0.015
	26-48-01-234	0.01
	26-48-02-224	0.005
	27-48-34-322A#	ND
	27-48-34-322B#	ND
	27-48-34-412#	ND
	27-48-34-421#	ND
	27-48-35-234#	ND
	27-48-35-311#	ND
Willow Springs	26-48-01-313B	0.292

Group	Wetland Site ID	Acres
(2 wetlands confirmed present in 2013)	26-48-01-323	0.152

[1] A wetland area may contain more than one seep/spring sampling/monitoring site. Table shows results from 2013 comprehensive HC/CUEP area wetland delineation effort.

[#] GIS polygons of wetland boundaries not available; site too small to delineate.

Table B-3. Groundwater Monitoring Wells and Piezometers

Well/Piezometer ID	Transducer Name	Coordinates		Formation*
		X	Y	
Carbonate Hydrogeologic Unit				
GRC-0050D	P1	540394	4441643	Dw
GRC-0050D	P2	540389	4441643	Dw
GRC-0050D	P3	540383	4441643	Dw
GRC-0058G	P1	539400	4442394	Dw
GRC-0058G	P2	539388	4442390	Dw
GRC-0141G	P1	539925	4443944	Dw
GRGT-006	P1	540081	4443769	Dw
GRGT-006	P2	540109	4443777	Dhc
GRGT-008	P1	539941	4442277	Dw
GRGT-008	P2	539966	4442291	Dw
GRMW-06	STEEL	539053	4442219	Dw
GRMW-10	STEEL	538792	4440145	Dhc
GRPZ-01	STEEL	537288	4446023	Srm
GRPZ-02	STEEL	537631	4444419	Srm
GRPZ-04	STEEL	538828	4444610	Dw
GRPZ-06	STEEL	538918	4443719	Dw
GRPZ-06	P2	538910	4443764	Dw
GRPZ-06	P3	538908	4443786	Dhc
GRPZ-08	STEEL	539984	4444260	Dw
GRPZ-11	STEEL	540451	4443228	Dw
GRPZ-12	PVC	539569	4442136	Dw

GRPZ-12	P1	539573	4442137	Dw
GRPZ-12	P2	539582	4442141	Dw
GRPZ-13	STEEL	540260	4442382	Dw
GRPZ-16	STEEL	540475	4441870	Dw
GRPZ-21	STEEL	541134	4440812	Dw
GRPZ-23	STEEL	541902	4440113	Dw
GRW-03	STEEL	540109	4442847	Dw
HCPZ-01	PVC	538301	4443749	
HCPZ-01	P1	538301	4443749	
HCPZ-03	PVC	540961	4441307	Dw
HCPZ-03	P1	540951	4441294	Dw
RHD12-142	P1	539648	4444192	Dw
RHD12-142	P2	539648	4444207	Dw
RHD12-142	P3	539647	4444244	Dw
RHMW-02	PVC	538890	4443009	Dw
RHMW-02	P2	538942	4443069	Dw
RHMW-04	PVC	540113	4442844	Dw
RHPZ-06	PVC	539800	4442920	Dw
RHPZ-06	P1	539811	4442917	Dw
RHPZ-07	PVC	539181	4443274	Dw
RHPZ-08	PVC	540316	4442840	Dw
RHPZ-09	PVC	540094	4443241	
RHPZ-10	PVC	539251	4443604	Srm
RHPZ-10	P3	539166	4443691	Dw
SS-01	STEEL	537556	4443594	

SS-02	STEEL	537758	4443334	
Basin Fill Hydrogeologic Unit				
RHPZ-08	P2	540297	4442838	Tc
GRMW-08	STEEL	539353	4441110	Tvc & Tg
GRMW-11	STEEL	541546	4440680	Tqa
GRPZ-12	P3	539597	4442144	Tg
GRPZ-13	P3	540257	4442380	Tg
GRPZ-16	P2	540461	4441875	Tg
GRPZ-21	P1	541133	4440776	Tvc
HCPZ-03	P3	540941	4441266	Tvc
HCPZ-03	P4	540945	4441254	Tvc
RHMW-04	P1	540110	4442844	Tqa
RHPZ-06	P2	539839	4442903	Tqa
Siliceous Hydrogeologic Unit				
GRGT-006	P3	540147	4443786	Ovi
GRPZ-36	P1	539474	4443868	Ovi
HCPZ-03	P2	540946	4441281	Ovi
RHPZ-08	P1	540309	4442842	Ovi

* Dw = Devonian Wenban Limestone; Dhc = Devonian Horse Canyon Member; Srm = Silurian Roberts Mountains Formation;; Tg = clay-altered volcanics; Tqa = Tertiary - Quaternary alluviums; Ovi =Ordovician Vinini Formation

Appendix D Greater Sage-grouse Habitat Field Investigation Report (ESCO 2014b)

Greater Sage Grouse Habitat Suitability Ratings for HC/CUEP

Horse Canyon/Cortez Unified Exploration Project Plan of Operations (NVN-066621) and Reclamation Permit No. 0159

Prepared for:

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293 Spruce Road
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November 2014

ESCO Associates Inc.

Executive Summary

Based on quantitative vegetation data collected in the Horse Canyon/Cortez Unified Exploration Project (HC/CUEP) area between 2009 and 2014, and in consideration of guidance received from NDOW and BLM during a 5/27/14 field tour of the site, as well as literature available on the subject, a map of the HC/CUEP area showing categories of habitat suitability for Greater Sage Grouse (GSG) has been produced. In summary, Preliminary Priority Habitat (PPH) totals 3,263 acres (no acres of Essential / Irreplaceable Habitat and 3263 acres of Important Habitat), Preliminary General Habitat (PGH) totals 5,110 acres, Low Value / Transitional Range 5,313 acres, Unsuitable Habitat totals 8,338 acres and Non-habitat totals 282 acres.

Greater Sage Grouse Habitat Suitability Ratings for HC/CUEP

Five Nevada Department of Wildlife (NDOW) rating categories (NDOW 2013) are used to characterize the habitats within the HC/CUEP area in Eureka County, NV with regard to suitability for GSG. Extensive quantitative data collection and field familiarity in the HC/CUEP study area have provided the basis for these ratings. A field review with NDOW and BLM on 5/27/14 provided insights into criteria for habitat quality beyond those in the literature (e.g. Stiver et al. 2010) and especially how they were viewed in the particular context of the Horse Canyon area.

For purposes of general planning (but not project –specific evaluation), BLM (2012) redefined the five NDOW categories across Nevada. In this BLM three-category system, NDOW Categories 1 and 2 are combined to form Preliminary Priority Habitat (PPH) and Category 3 is recognized as Preliminary General Habitat (PGH). The results of application of both systems of categorization to the HC/CUEP area based on site-specific quantitative data collected by ESCO are graphically displayed in Appendix A.

Vegetation information referenced here was collected over the period of 2009 through May 2014 and was documented using quantitative methods described in Appendix B.

Data from this sampling (summarized for the HC/CUEP study area in Appendix C) include percent cover by species as well as accounting of species richness and density. Note that the data in Appendix C are summarized by vegetation mapping unit; the number of individual samples involved in the average cover values shown for a given mapping unit are shown at the bottom of the table. Locations at which the sampling that produced these data occurred are shown in Appendix D.

A portion of a state-wide map previously completed by Nevada Division of Wildlife showing ratings of habitat suitability within HC/CUEP using the 5-category system is attached as Appendix E. Another map (based on NDOW data) was produced by the U.S. Bureau of Land Management for most of Nevada including the present study area using the three-category system for rating GSG habitat suitability. A generalized map reflecting that information for HC/CUEP (Titled Figure 3.1) is present in Appendix F.

1. **NDOW Essential / Irreplaceable Habitat** (BLM PPH category)

There are no areas within HC/CUEP that are regarded as Essential / Irreplaceable habitat. Some areas have sagebrush cover (see Important Habitat below) that is close to the suitable range, and are located within exposed open areas, but the presence of suitable forbs is limited. There is very limited evidence of the use of these areas by GSG.

2. NDOW Important Habitat. (BLM PPH category)

These are lands in which structural and biological needs of GSG may be met, though there is limited evidence that they are occupied to any significant degree, possibly because large areas of lands less suitable surround them. Structural needs of GSG include open terrain, especially ridges as well as areas in general without tall woody plants (Photos 1, 2, 3, and 4). The HC/CUEP Important Habitat areas are high and exposed and (virtually) devoid of the tall woody plant species [Utah juniper (*Juniperus osteosperma*), singleleaf pinyon pine (*Pinus monophylla*), and curlleaf mountain mahogany (*Cercocarpus ledifolius*)] that would so strongly diminish habitat suitability were they present in substantial numbers.

The presence of sagebrush of course is both a biological and a structural requirement. The bulk of sagebrush present is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with some Wyoming big sagebrush (*A. t*. ssp. *wyomingensis*). Much of the sagebrush community occurrence in HC/CUEP Important Habitat is on soils with clay-rich subsoils, sometimes smectitic (swelling clay) soils at higher elevation on convex sites (Appendix C, Column 1, Table 1). On wind-exposed ridges, in the Mountain Ridge sagebrush community, black sagebrush (*A. nova*) is typically predominant (Appendix C, Column 2, Table 1). Both mountain and Wyoming sagebrush may also be present but tend to be dwarfed by wind exposure. High winds during winter cause snow to accumulate in lee areas to form snow meadows (Photo 2; Appendix C, Column 3, Table 1). These areas are usually heavily covered by forbs (see below) and have sagebrush around the edge. Along the east-central boundary of HC/CUEP lies a small area of sagebrush occurring on basalt flows. These areas are rated as Important Habitat because sagebrush cover (19%) is high (Appendix C, Column 15, Table 1) and grass cover is moderate (6.0 %). Forb cover is however, low (average 1%). But taken together, the prevalence of sagebrush and even modest grass cover in conjunction with the high, open nature of these basalt sagebrush landscapes are regarded as favorable for GSG habitat. These areas are also known to connect to GSG-occupied areas to the north and west, according to information provided by NDOW during the 5/27/14 field tour.

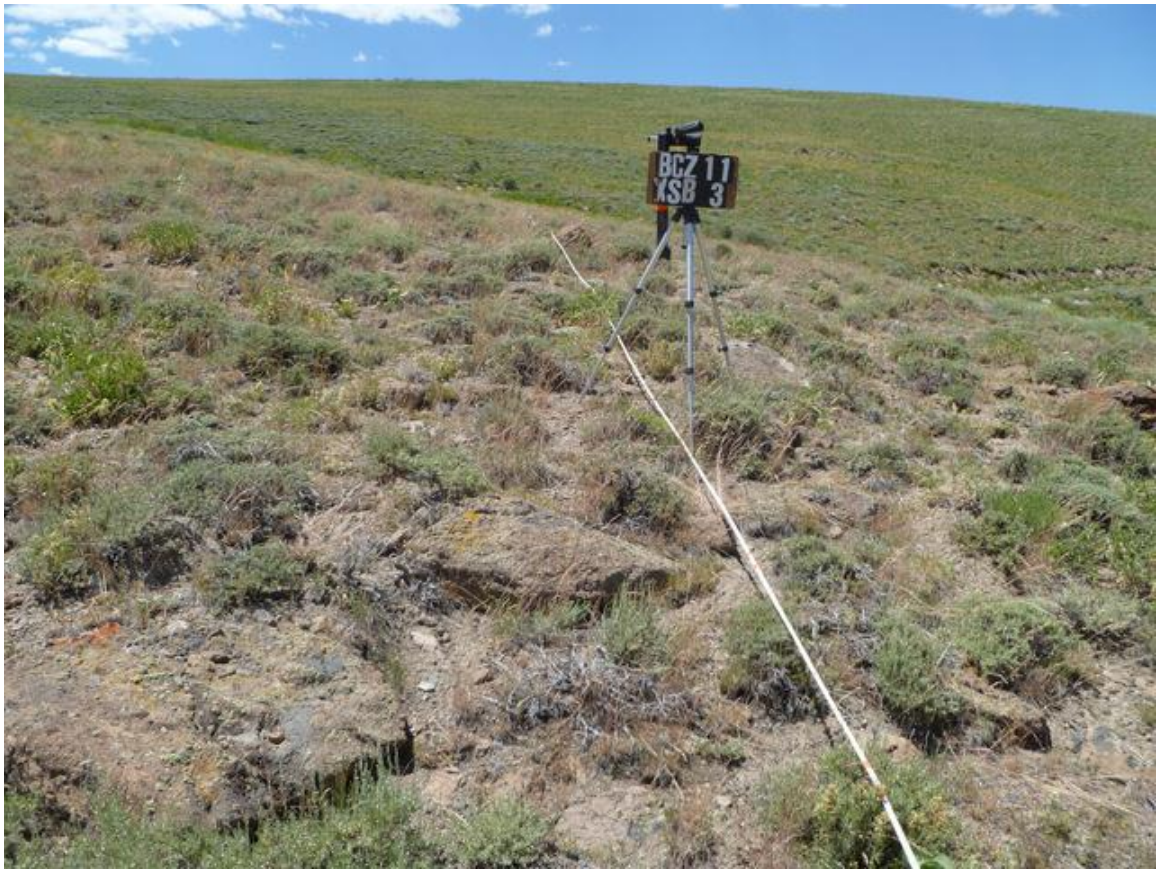

Photo 1.

Photo 2.

Photo 3.

Photo 4

Some areas of HC/CUEP that are rated as Important Habitat are on average somewhat low in sagebrush cover (between 3% and about 5% in the Swelling Clay and Snow Meadow Sagebrush (while the lower limit according to Stiver et al (2010) is 15%). Note however that sagebrush cover averages15% in the Mountain Ridge Sagebrush unit which is included in Important Habitat here. Certain of the HC/CUEP Important Habitat areas have a strong presence of forbs (averaging 30 to 50% cover in the Swelling Clay and Snow Meadow areas). Despite the fact that about 3/4 of that forb cover in these latter vegetation types is provided by mules ear (*Wyethia amplexicaulis*) and arrowleaf balsamroot (*Balsamorhiza sagittata*) both of which are of low to negligible value to GSG (Knick and Connelly 2011), the remaining ¼ of forb cover (over 10% absolute cover and well above the minimum cited by Stiver et al. (2010) of 5%) is comprised of species that are useful forage to GSG. Thus, in consideration of the high open topographic position and, taken altogether, at least somewhat favorable vegetation conditions, these are the areas within HC/CUEP that, at least on a relative scale, comprise Important Habitat. It

should be noted that these high and open areas were remarked upon by NDOW and BLM as characterizing very suitable habitat during the 5/27/14 field tour.

The sub-irrigated bottomland along Horse Creek (Appendix C, Column 4, Table 1) is also included as Important Habitat (Photo 5). Although it is devoid of sagebrush, tussocks of basin wildrye (*Leymus cinereus*) offer similar structure and the abundance of herbaceous ground layer growth on a fairly open expanse is thought to provide potential brood rearing forage resources.

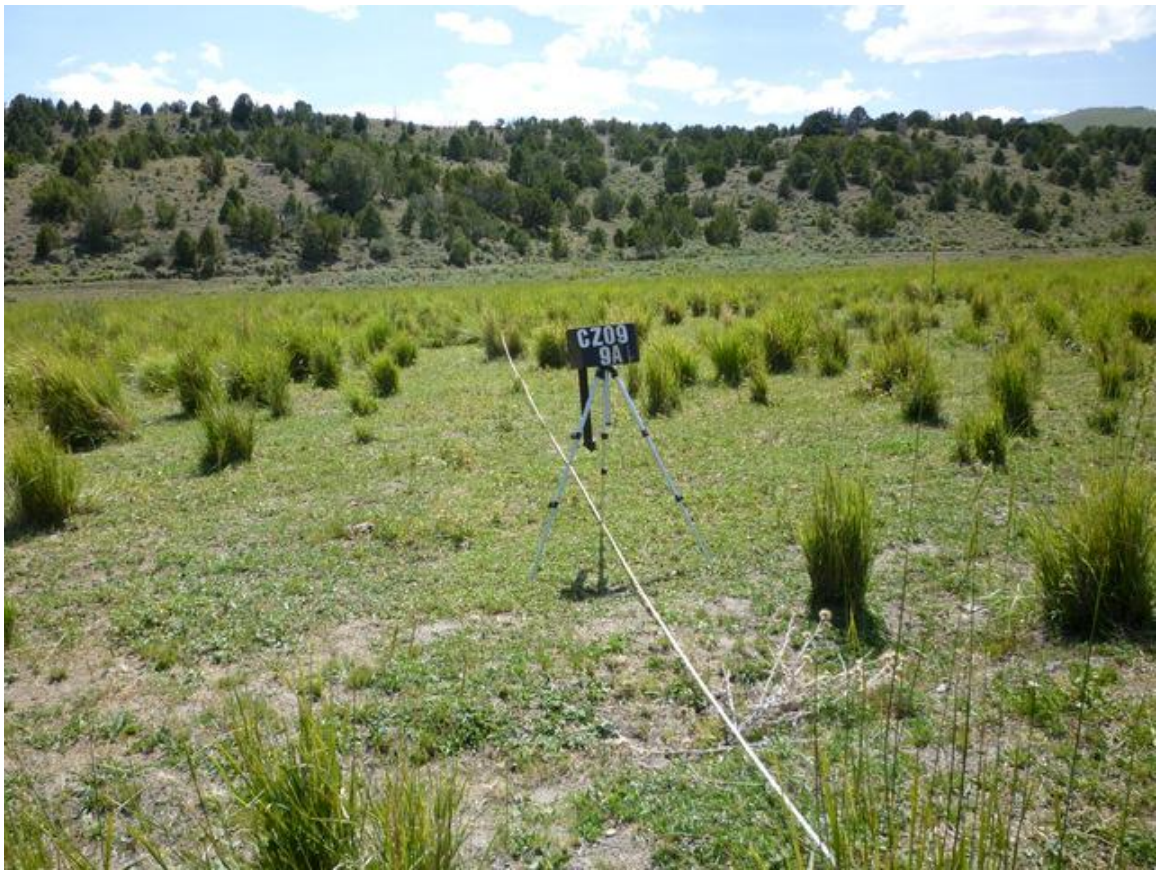

Photo 5

3. **NDOW Habitat of Moderate Importance** (BLM PGH category)

These are lands within HC/CUEP which are partly (like the Important Habitat-) located on clay-rich soils but by contrast are in generally concave (Horse Canyon valley) positions. In addition they were burned in the 1999 fire and so sagebrush cover is much lower (<2% cover). Perhaps also related to the fire is greater abundance of the non-palatable forb species especially mules ears and arrowleaf balsamroot (Photo 6).

Although trees and tall shrubs were killed by the fire, their hulks (standing dead boles) remain in varying amounts (Photo 7). These areas are at high enough elevation with slightly greater precipitation so that perennial herbaceous cover (especially mules ear and balsamroot) developing after the fire has prevailed over cheatgrass, the latter averaging only about 1% cover. Perennial grass cover averages about 7% (Appendix C, Column 5, Table 1).

Photo 6

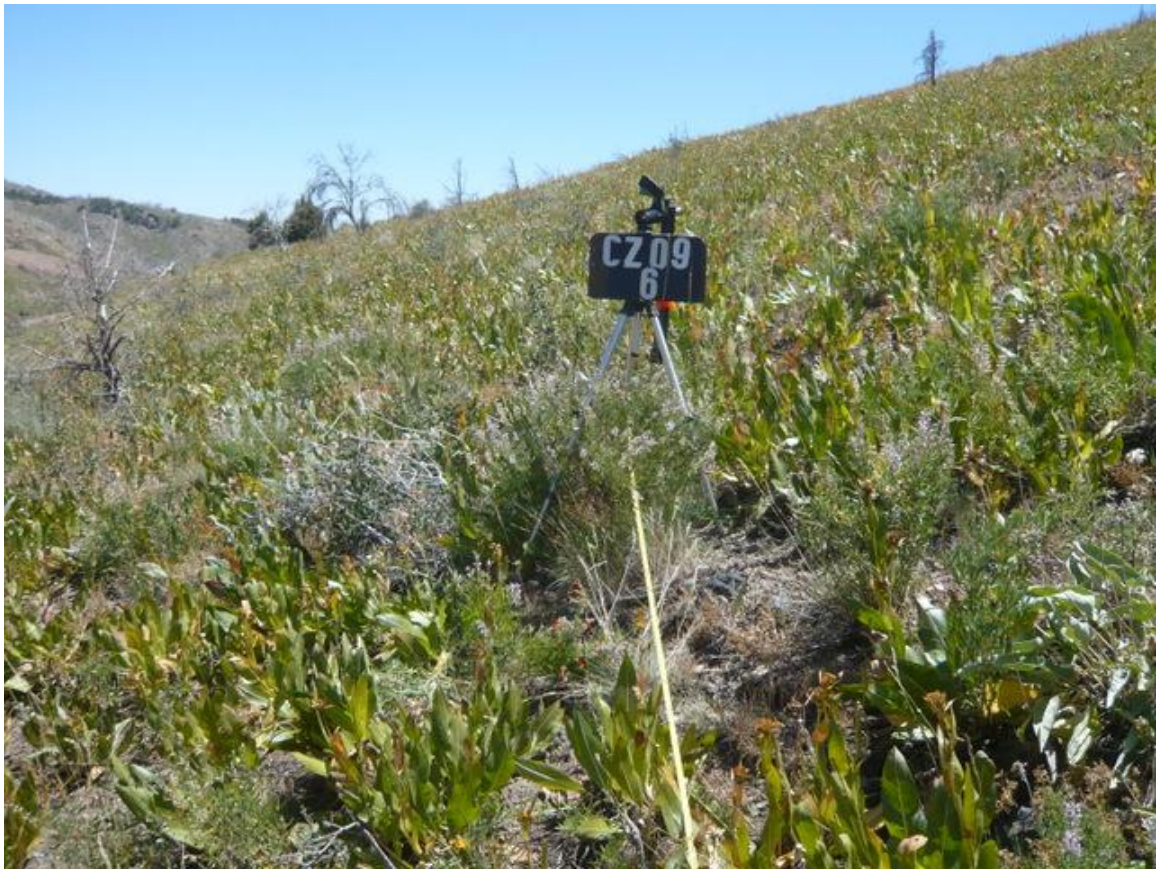

Photo 7

In addition to the swelling clay areas described above, the Habitat of Moderate Importance category within HC/CUEP includes sagebrush occurring on low-slope alluvium in the southeast corner of the study area and some sagebrush on low elevation dissected terrain on the north end. In the former areas (Photo 8; Appendix C, Column 6, Table 1) sagebrush cover is in the range of 10 to 15% (average 12%) and perennial grass cover averages 5%, while forb cover averages 1.3%. Prevalence of cheatgrass is limited (1.3%).

Sagebrush of dissected terrain at the north end (Photo 9) is well-covered by sagebrush, (mostly Wyoming big sagebrush but with occasional basin big sagebrush). Total sagebrush cover averaged 26% (Appendix C, Column 7, Table 1). Cover by cheatgrass is high (29%). Perennial grass cover is very limited, averaging 3%, while perennial forb cover is moderate (average 6%), largely tailcup lupine (*Lupinus caudatus*). It should be noted that in this dissected terrain, much of the area is located in concave settings

(valleys), comparatively poorly suited to GSG use. Those parts near the ridge tops may offer better suitability to GSG

Photo 9

4. NDOW Low Value / Transitional Range

These lands within HC/CUEP are mostly at lower elevations and to a large degree include lands that were burned in 1999. Before the fire, some of the area was occupied by sagebrush stands and some areas had stands of pygmy conifers, either Utah juniper (*Juniperus osteosperma*) or that species plus singleleaf pinyon pine (*Pinus monophylla*). Standing dead boles of these trees continue to be present in areas that were formerly wooded (Photo 10). In the burned juniper woodlands (Appendix C, Column 8, Table 1) shrub cover is very low (0.5% average); sagebrush cover is essentially non-existent. Perennial grass and perennial forb cover each are less than 5%. Cheatgrass cover averages over 41%.

In burned pinyon-juniper woodland, total cover by shrubs average somewhat greater at 6.4% (Appendix C, Column 9, Table 1), but of this total only 0.4% is sagebrush cover and the remainder is rubber rabbitbrush (*Chrysothamnus nauseosus*). Cover by perennial grass averaged 5.2% and native perennial forbs cover was 19.4%. Cover by cheatgrass averaged 8.8%.

In areas where sagebrush occurred prior to the fires, remaining or regenerating sagebrush cover (<0.2%) is very sparse (Appendix C, Columns 10 and 11, Table 1). In their current (post-fire) condition these lands are heavily covered by cheatgrass (*Bromus tectorum)*; 29.7% on south, west and east-facing slopes (Appendix C, Column 10, Table 1) and 12.0% on north aspects (Appendix C, Column 11, Table 1). Cheatgrass comprises over half of total vegetation cover on south, west and east-facing slopes (Photo 11) in these areas, and is about 1/5 of total vegetation cover on north-facing slopes (Photo 12) where competition from recovering cool season perennial grass cover is much greater.

Photo 10

Photo 11

Photo 12

5. NDOW Unsuitable Habitat.

Lands designated as Unsuitable Habitat within HC/CUEP are heavily wooded lands; some are dominated by Utah juniper (Appendix C, Column 13, Table 1; Photo 13), some are combinations of juniper and singleleaf pinyon (Appendix C, Column 13, Table 1; Photo 14) and some combine curlleaf mountain mahogany with juniper and singleleaf pinyon (Appendix C, Column 14, Table 1; Photo 15). Within the HC/CUEP study area, stands of trees and tall shrubs are largely found on sites that are likely to be "natural" sites for woodland occurrence as opposed to those in which expansion of the large woody plants has occurred in historic time onto deeper soils that were likely historically grass or sagebrush - covered. Heavily wooded sites in HC/CUEP are steep and rocky with shallow and poorly developed soils (mostly Entisols and some Aridosols) that are likely to have supported trees and tall shrubs for long periods. The understory in these sites is sparse with both limited sagebrush presence (< 5% cover in juniper woodland

(Column 12, Table 1) and < 2% in pinyon –juniper woodland (Appendix C, Column 13, Table 1)) and very limited cover by herbaceous species (less than 2.5% cover by forbs or by perennial grasses). Tree cover averages slightly greater than 10% in juniper woodland, about 25% in pinyon –juniper woodland and about 20% for mountain mahogany (including this very tall shrub/tree). Taken altogether, the prevalence of tall woody cover and the sparse herbaceous cover render these sites unsuitable as GSG habitat.

Photo 13

Photo 14

Photo 15

Non-Habitat

Areas mapped as “Non-habitat” are areas disturbed by previous mineral extraction. These are mostly open pits of exposed raw rock faces, devoid of soil and vegetation cover.

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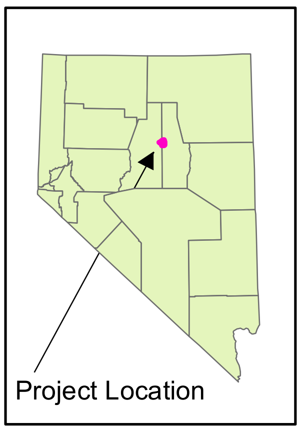

HC/CUEP PoO

Sage Grouse Habitat Categories (ESCO)

Preliminary Priority Habitat (PPH) (1 & 2)

- 1 - Essential / Irreplaceable Habitat (0 ac)
- 2 - Important Habitat (3,263 ac)

Preliminary General Habitat (PGH) (3)

- 3 - Habitat of Moderate Importance (5,110 ac)

4 - Low Value Habitat / Transitional Range (5,313 ac)

5 - Unsuitable Habitat (8,338 ac)

N/A – Non-Habitat (283 ac)

1 in = 1 mile

0 0.5 1 Mile

Imagery Sources:
2013 Barrick Aerial Imagery
2013 NAIP Imagery (1 meter resolution)

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Barrick HC/CUEP PoO Project

Proposed Sage Grouse Habitat Categories (ESCO) HC/CUEP PoO

ESCO Associates Inc.

APPENDIX
A

11/11/2014 CD

Appendix B. Methods Used in HC/CUEP Vegetation Studies

Methods

The HC/CUEP area was examined during the growing seasons of 2009, 2011, 2012, 2013 and May 2014. A combination of field exploration and aerial image interpretation allowed progressive development of vegetation maps of the study area. Throughout the field work, areas newly visited were documented with quantitative samples as detailed below.

At each such sample site, cover data were collected using a point-intercept method in which data were tabulated as interceptions of a projected point with either plant species, bare ground, litter, standing dead, or rock. The cover sampling points were optically projected using a Cover-Point Optical Point Projection Device. Sampling occurred along randomly located and randomly oriented 50m transects. At each meter from one to fifty along the transect, a point was vertically projected from a location 50 cm to the left of the transect and a point was vertically projected from a location 50 cm to the right of the transect (avoiding trampled vegetation along the tape itself). Thus, data from a total of 2 x 50, or 100 points were recorded. Plant interceptions were tallied by species upon interception of the projected point with any attached plant part produced during the current growing season. Litter was considered to be any organic material that had fallen, or had begun to fall to the soil surface. Standing dead was any dead plant material that was produced in previous years but which was still standing and had not lodged or broken off to become litter. Rock was considered to be any inorganic fragment with a diameter greater than or equal to 1 cm. Bare soil was considered to be inorganic fragments with a diameter less than 1 cm or organic debris too small to be of readily identifiable origin.

In addition to "first hit" data (the first interception of any of the above materials as a point projected from above), "additional hit" data (any additional live species intercepted between the first hit and the ground) were collected. First hit interceptions were used to calculate absolute top layer (first hit) foliar cover by dividing the number of interceptions for a particular species or material by the total number of points taken (100). First hit

relative vegetation cover was calculated by dividing first hit absolute cover for each species by the total first hit vegetation cover. All-layer absolute cover was calculated by dividing all hits for particular species by the total number of points taken (100). In addition, all-layer relative cover was calculated using all hits for particular species divided by the total vegetation hits accumulated during sampling of the transect.

A full accounting of all plant species encountered along each transect sampled for cover was compiled. Species presence was noted within the area to one meter on either side of the transect (50 m x 2 m = 100 m^2). These presence data along with point-intercept data were used to produce values for species density expressed on a per-100 sq.m. basis.

Plants encountered that are reported here follow nomenclature of the Flora of North America (NAFEC 1993 to 2010) for plant species in families covered as of 2012, and follow the Intermountain Flora (NYBG 1972 to 2005) for others. Geologic information was gathered with reference to USGS (1964 and 1965) and Nevada Bureau of Mines (1967, 1971, and 1976). Soils information from the Natural Resource Conservation Service (NRCS) were reviewed for use in the discussions attached here (NRCS website 2011).

Table 1. Vegetation of All Areas by Percent Absolute Cover, HC/CUEP, Eureka and Lander Counties, NV - Barrick Gold Exploration, Inc.

COLUMN #	1	2	3	4	5	6	7	8
	High Elevation Swelling Clay	Mountain Ridge Sagebrush	Snow Meadow	Valley Bottom Meadow	Valley Swelling Clay	Alluvial Sagebrush	Sagebrush of Dissected Slopes	Burned Juniper Woodland
PLANT SPECIES	---------- AVERAGE ABSOLUTE COVER (%) ----------							
NATIVE ANNUAL & BIENNIAL FORBS								
Aliciella sp								
Amsinckia tessellata								
Boechera holboellii								
Ceratocephala testiculata								
Chaenactis stevioides								
Chenopodium fremontii								
Cirsium scariosum								
Collinsia parviflora		P	P			P		
Collomia grandiflora			0.25					
Collomia linearis								
Collomia tinctoria			1.00					
Cordylanthus ramosus	1.00	P	P					
Cryptantha barbigera								
Cryptantha torreyana			0.25					P
Descurainia pinnata						P		
Descurainia richardsonii		P		P				
Epilobium brachycarpum			P	P	P		P	
Eriogonum cernuum								
Galium aparine								
Gayophytum diffusum								P
Gayophytum ramosissimum								
Ipomopsis aggregata			P		P			
Ipomopsis congesta								
Ipomopsis pumila								
Lappula occidentalis var. cupulata					0.2			
Lepidium densiflorum								
Leptosiphon septentrionalis								
Lupinus pusillus		P	P					P
Lupinus uncialis						P		
Madia glomerata								
Mentzelia dispersa								
Microsteris gracilis						P	1.00	
Montia perfoliata								
Polygonum douglasii			P					
Polygonum ramosissimum				P				
Ranunculus testiculatus					P			
Silene sp.			P					
Streptanthella longirostris								
TOTAL NATIVE ANN. & BIEN. FORBS	1.0	0.0	1.5	0.0	0	0.0	1.00	0.0

*P= Present within 1m of either side of the cover transect, but not quantitatively encountered.

Table 1. Vegetation of All Areas by Percent Absolute Cover, HC/CUEP, Eureka and Lander Counties, NV - Barrick Gold Exploration, Inc.

COLUMN #	1	2	3	4	5	6	7	8
	High Elevation Swelling Clay	Mountain Ridge Sagebrush	Snow Meadow	Valley Bottom Meadow	Valley Swelling Clay	Alluvial Sagebrush	Sagebrush of Dissected Slopes	Burned Juniper Woodland
INTRODUCED ANNUAL & BIENNIAL FORBS								
Alyssum alyssoides						P		
Alyssum desertorum				P				2.00
Alyssum simplex						P		
Carduus nutans				5.67				
Ceratocephala testiculata						1.33		
Chorispora tenella				2.33				
Erodium cicutarium								0.50
Lactuca serriola		P			P			P
Polygonum aviculare				0.67				
Salsola tragus								
Sisymbrium altissimum			P					
Thlaspi arvense				P				
Tragopogon dubius								P
TOTAL INTRO. ANN. & BIEN. FORBS		0.0	0.0	8.7	0.2	1.3		2.5
NATIVE ANNUAL GRASSES								
Deschampsia danthonioides			1.75					
TOTAL NATIVE ANN. GRASSES			1.8					
INTRODUCED ANNUAL GRASSES								
Bromus japonicus								
Bromus tectorum		P	0.25	1.00	1.20	1.33	29.00	41.50
TOTAL INTRO. ANN. GRASSES		0.0	0.3	1.0	1.2	1.3	29.00	41.5
NATIVE PERENNIAL FORBS								
Achillea millefolium				0.33				
Agastache urticifolia			0.25					
Agoseris glauca			P					
Allium anceps						P		
Allium atrorubens								
Allium nevadense								
Antennaria sp.								
Artemisia ludoviciana				P				
Asclepias spp.								
Aster falcatus				P				
Astragalus calycosus								P
Astragalus curvicarpus					P			0.50
Astragalus eremiticus					P			

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Table 1. Vegetation of All Areas by Percent Absolute Cover, HC/CUEP, Eureka and Lander Counties, NV - Barrick Gold Exploration, Inc.

COLUMN #	1	2	3	4	5	6	7	8
	High Elevation Swelling Clay	Mountain Ridge Sagebrush	Snow Meadow	Valley Bottom Meadow	Valley Swelling Clay	Alluvial Sagebrush	Sagebrush of Dissected Slopes	Burned Juniper Woodland
NATIVE PERENNIAL FORBS								
Astragalus flexuosus								
Astragalus iodanthus		P						0.50
Astragalus kentrophyta								
Astragalus lentiginosus			1.25		P			
Astragalus newberryi								
Astragalus purshii		0.40			P			
Astragalus sp.		P				P		
Astragalus tenellus			P					
Astragalus whitneyi var whitneyi					P			
Balsamorhiza hookeri								
Balsamorhiza sagittata	13.00	P	11.75		9.80			1.00
Calochortus nuttallii		P			P			
Castilleja angustifolia			P					
Castilleja angustifolia var. flavescens		P						
Castilleja linariifolia			P					
Castilleja pallescens var. inverta		0.20						
Caulanthus crassicaulis		P			P			
Cirsium subniveum								
Crepis acuminata	P	0.40	1.75					
Crepis intermedia								
Crepis occidentalis		0.20			P	P	1.00	P
Cymopterus longipes		P						
Delphinium nuttallianum					P			
Eremogone capillaris		1.80	P					
Eremogone kingii								
Erigeron bloomeri		P				0.67		
Erigeron jonesii					0.40			
Eriogonum lonchophyllum			P		0.20			
Eriogonum ovalifilium						P		
Eriogonum ovalifolium var. depressum		0.60						P
Eriogonum ovalifolium var. nivale		P	P					
Erigeron pumilus var. intermedius								
Eriogonum ovalifolium var. nivale								
Eriogonum umbellatum	1.00		0.25		P			
Eriogonum umbellatum ssp majus					P			
Eriophyllum lanatum								
Fritillaria atropurpurea								
Galium multiflorum			P					
Hackelia patens								

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NATIVE PERENNIAL FORBS								
Helianthella uniflora	1.00		1.00		1.40			
Hymenoxys cooperi var. canescens		P						
Iliamna rivularis				P				
Ionactis alpina								
Iva axillaris				3.33	P			
Leptodactylon pungens	P	0.80				P		
Lewisia rediviva		P						
Linum lewisii					P			
Lithospermum multiflorum								
Lithospermum ruderale	P		P		0.20			
Lomatium dissectum	P	P	1.25		3.00			
Lomatium foeniculaceum						P		
Lupinus arbustus		P	1.00					
Lupinus argenteus	2.00		5.25		1.60			2.00
Lupinus caudatus							5.50	
Lygodesmia juncea							0.00	
Machaeranthera canescens			P					
Machaeranthera grindelioides								
Mertensia lanceolata		0.60			0.20			
Microseris nutans						P		
Nothocalais cuspidata					P			
Oreocarya flavoculata		P	P					
Oreocarya sp.								
Oreostemma alpigenum var. haydenii	P	0.80	1.25					
Paeonia brownii			P					
Penstemon deustus						P		
Penstemon humilis	P							P
Penstemon sp.								
Penstemon speciosus			0.25		0.20			
Perideridia bolanderi								
Phacelia hastata								
Phlox hoodii		1.00						
Phlox longifolia			0.25		1.00	0.33	0.00	
Phlox multiflora		P				P		0.50
Phlox pulvinata		P						
Pleiacanthus spinosus		P						
Ranunculus sp.				P				
Scutellaria angustifolia								
Senecio integerrimus	P	P	P		0.20	0.33		

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NATIVE PERENNIAL FORBS								
Senecio multilobtus					P			
Sphaeralcea ambigua								P
Sphaeralcea coccinea						P		
Sphaeralcea grossulariifolia					P			
Stenotus armerioides		0.20						
Symphyotrichum sp.					0.20			
Viola vallicola			0.25					
Wyethia amplexicaulis			26.50		15.20			
Zigadenus venenosus								
TOTAL NATIVE PERENNIAL FORBS	17.0	7.0	52.3	3.7	33.6	1.3	6.00	4.5
INTRODUCED PERENNIAL FORBS								
Cardaria draba				8.33				
Taraxacum officinale								
TOTAL INTRO. PERENNIAL FORBS				8.3				
NATIVE PERENNIAL GRASSES (cool)								
Achnatherum hymenoides	P	P	P			P		0.50
Achnatherum lettermanii					0.80	0.67		
Achnatherum nelsonii			0.50		P			
Achnatherum thurberianum		0.20	1.00					0.50
Achnatherum webberi								
Agropyron scribneri								
Bromelica bulbosa			P		P			
Bromelica specatilis					0.20			
Bromus marginatus			P					
Ceratochloa marginata					P			
Elymus elymoides	P	1.00	0.75		1.20	0.67		0.50
Elymus lanceolatus var. albicans					P			
Elymus lanceolatus var griffithsii								
Elymus lanceolatus var lanceolatus		P		0.67				
Elymus lanceolatus ssp. riparius								0.50
Elymus longifolius					0.60			
Elymus smithii								
Elymus trachycaulus			P					
Festuca idahoensis		P	0.25					
Festuca saximontana	16.00	0.40						
Festuca sororia					3.00		3.00	
Hesperostipa comata		P						

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NATIVE PERENNIAL GRASSES (cool)								
Leymus cinereus				7.67	P			
Leymus triticoides	1.00		1.00					
Oryzopsis hymenoides				1.00				
Poa agassizensis				1.33				
Poa fendleriana								
Poa secunda var. juncifolia			P			P		
Poa secunda ssp secunda		7.00	1.25		1.20	3.33		0.50
Pseudoroegneria spicata		0.20	P		0.40			1.50
Pseudoroegneria spicatus ssp spicatus								
TOTAL NATIVE PERENNIAL GRASSES (c)	17.0	8.8	4.8	10.7	7.4	4.7	3.00	4.0
INTRODUCED PERENNIAL GRASSES (cool)								
Agropyron cristatum								
Bromus inermis				7.67				
Elymus junceus				8.33				
Poa pratensis			0.25					
Thinopyrum intermedium					P			
TOTAL INTRO. PERENNIAL GRASSES (c)			0.3	16.0	0.0			
NATIVE SUBSHRUBS								
Eriogonum brevicaule			P					
Eriogonum microthecum		P					0.00	
Gutierrezia sarothrae						0.33		
Leptodactylon caespitosum								4.00
Penstemon deustus var pedicellatus								
TOTAL NATIVE SUBSHRUBS		0.0	0.0			0.3	0.0	4.0
NATIVE SHRUBS								
Amelanchier alnifolia					P			
Amelanchier utahensis	1.00		P		0.40			
Artemisia nova	2.00	15.40	0.25					
Artemisia tridentata ssp. undetermined	12.00	P	2.75		2.60		26.00	
Artemisia tridentata ssp. wyomingensis						11.00		
Artemisia tridentata ssp. vaseyana						1.00		
Atriplex canescens						P		
Cercocarpus ledifolius								
Chrysothamnus depressus		0.60	P					
Chrysothamnus greenei								
Chrysothamnus nauseosus					P			

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COLUMN #	1	2	3	4	5	6	7	8
	High Elevation Swelling Clay	**Mountain Ridge Sagebrush**	**Snow Meadow**	**Valley Bottom Meadow**	**Valley Swelling Clay**	**Alluvial Sagebrush**	**Sagebrush of Dissected Slopes**	**Burned Juniper Woodland**
NATIVE SHRUBS								
Chrysothamnus viscidiflorus	1.00	P	0.50		0.80	0.33	0.00	0.50
Ephedra viridis								
Kochia prostrata								
Lycium sp.		0.20			0.20			
Prunus andersonii							0.00	
Ribes inerme								
Ribes velutinum		0.20	P					
Symphoricarpos longiflorus	P		2.00					
Tetradymia canescens					P			
TOTAL NATIVE SHRUBS	16.0	16.4	5.5		4.0	12.3	26.00	0.5
NATIVE TREES								
Juniperus osteosperma								
Pinus monophylla					0.80			
TOTAL NATIVE TREES					0.8			
SUCCULENTS								
Opuntia phaeacantha								
TOTAL SUCCULENTS								
PARASITE								
Orobanche fasciculata					P			
TOTAL PARASITE					0.0			

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	High Elevation Swelling Clay	Mountain Ridge Sagebrush	Snow Meadow	Valley Bottom Meadow	Valley Swelling Clay	Alluvial Sagebrush	Sagebrush of Dissected Slopes	Burned Juniper Woodland
MUSHROOMS								
Fungus								
TOTAL MUSHROOMS								
Standing dead	5.00	2.60	0.75	0.67	0.80	6.67	1.00	1.00
Litter	11.00	13.00	14.00	33.00	18.00	15.00	26.50	20.50
Bare ground	31.00	36.60	14.75	17.00	23.80	48.67	2.50	19.00
Rock	2.00	15.60	4.25	1.00	10.20	8.33	5.00	2.50
TOTALS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL VEGETATION COVER	51	32	66	48	47	21	65.00	57
GROUND COVER (Litter+Rock+Veg+St.Dead)	69.0	63.4	85.3	83.0	76.2	51.3	97.5	81.0
SPECIES DENSITY (# of species/100 sq.m.)	21.0	17.8	24.8	10.3	22.4	14.7	9.0	21.0
Standard Deviation	0.0	3.9	8.4	0.6	5.0	6.0		1.4
Number of Samples	1	5	4	3	5	3	2	2

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COLUMN #	9	10	11	12	13	14	15
	Burned Pinyon-Juniper Woodland	Burned Sagebrush of Dissected Slopes (E, W, S Aspects)	Burned Sagebrush of Dissected Slopes (N Aspects)	Juniper Woodland	Pinyon-Juniper Woodland	Mountain Mahogany Woodland	Basalt Sagebrush
PLANT SPECIES	---------- AVERAGE ABSOLUTE COVER (%) ----------						
NATIVE ANNUAL & BIENNIAL FORBS							
Aliciella sp		P					
Amsinckia tessellata			P				
Boechera holboellii			P	P		P	
Ceratocephala testiculata							
Chaenactis stevioides					P	P	
Chenopodium fremontii						P	
Cirsium scariosum	P						
Collinsia parviflora		P	0.17			0.50	
Collomia grandiflora	P		P			0.67	
Collomia linearis			P				P
Collomia tinctoria					P	0.17	
Cordylanthus ramosus						P	
Cryptantha barbigera				P	P		
Cryptantha torreyana			0.17			0.17	
Descurainia pinnata	P			P	P	P	
Descurainia richardsonii							
Epilobium brachycarpum	0.60	0.14	P	P	P	P	
Eriogonum cernuum						P	
Galium aparine					P	0.17	
Gayophytum diffusum							
Gayophytum ramosissimum		0.43	P	P			
Ipomopsis aggregata							
Ipomopsis congesta	0.40				P	P	
Ipomopsis pumila				P	P	P	
Lappula occidentalis var. cupulata	0.20		P				
Lepidium densiflorum			0.17				
Leptosiphon septentrionalis				P	P		
Lupinus pusillus	P			P	0.13		
Lupinus uncialis		P		P			P
Madia glomerata		P					
Mentzelia dispersa			P				
Microsteris gracilis		P	0.17		P		
Montia perfoliata						P	
Polygonum douglasii						P	
Polygonum ramosissimum							
Ranunculus testiculatus							
Silene sp.							
Streptanthella longirostris					P		
TOTAL NATIVE ANN. & BIEN. FORBS	1.2	0.6	0.7	0.0	0.1	1.7	0.0

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INTRODUCED ANNUAL & BIENNIAL FORBS							
Alyssum alyssoides	0.40		P		P		
Alyssum desertorum		3.00		0.50	0.25		P
Alyssum simplex							
Carduus nutans							
Ceratocephala testiculata							
Chorispora tenella							
Erodium cicutarium		0.57					
Lactuca serriola	0.40		P		P		
Polygonum aviculare							
Salsola tragus	P						
Sisymbrium altissimum	P	P					
Thlaspi arvense							
Tragopogon dubius	0.20	P	P		P		
TOTAL INTRO. ANN. & BIEN. FORBS	1.0	3.6	0.0	0.5	0.3		0.0
NATIVE ANNUAL GRASSES							
Deschampsia danthonioides							
TOTAL NATIVE ANN. GRASSES							
INTRODUCED ANNUAL GRASSES							
Bromus japonicus	0.20						
Bromus tectorum	8.60	29.71	12.00	0.25	0.13	0.33	P
TOTAL INTRO. ANN. GRASSES	8.8	29.7	12.0	0.3	0.1	0.3	0.0
NATIVE PERENNIAL FORBS							
Achillea millefolium							
Agastache urticifolia							
Agoseris glauca			P				P
Allium anceps							
Allium atrorubens					P		
Allium nevadense		P				P	
Antennaria sp.							P
Artemisia ludoviciana							
Asclepias spp.	P						
Aster falcatus							
Astragalus calycosus							
Astragalus curvicarpus	0.20	P	P				
Astragalus eremiticus	P	P		P	P		

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NATIVE PERENNIAL FORBS							
Astragalus flexuosus				0.25	0.13		P
Astragalus iodanthus		0.43	P	P	P	P	
Astragalus kentrophyta	1.00						
Astragalus lentiginosus	P						
Astragalus newberryi				P	P		
Astragalus purshii	P	P	P	P	P		
Astragalus sp.					P		
Astragalus tenellus							
Astragalus whitneyi var whitneyi							
Balsamorhiza hookeri		P					P
Balsamorhiza sagittata	4.40	P	1.83		0.25	14.00	
Calochortus nuttallii			P	P	P	P	
Castilleja angustifolia							P
Castilleja angustifolia var. flavescens							
Castilleja linariifolia						P	
Castilleja pallescens var. inverta							
Caulanthus crassicaulis						P	
Cirsium subniveum				P			
Crepis acuminata			0.17			0.17	
Crepis intermedia		0.29					1.00
Crepis occidentalis	0.40	0.29	0.33	P	P	0.17	P
Cymopterus longipes		P	P	P		0.17	
Delphinium nuttallianum					P	P	
Eremogone capillaris			0.33				
Eremogone kingii					P		
Erigeron bloomeri		P					
Erigeron jonesii					P		
Eriogonum lonchophyllum	0.20						
Eriogonum ovalifilium					P		
Eriogonum ovalifolium var. depressum				P			
Eriogonum ovalifolium var. nivale		P		0.75	P		
Erigeron pumilus var. intermedius			P				
Eriogonum ovalifolium var. nivale			0.17				
Eriogonum umbellatum				P		0.33	
Eriogonum umbellatum ssp majus					P		
Eriophyllum lanatum						0.17	
Fritillaria atropurpurea			P			P	
Galium multiflorum					P	P	
Hackelia patens						P	

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NATIVE PERENNIAL FORBS							
Helianthella uniflora					P	1.33	
Hymenoxys cooperi var. canescens					P		
Iliamna rivularis							
Ionactis alpina				0.25			
Iva axillaris	5.00	P					
Leptodactylon pungens				P	P	0.17	
Lewisia rediviva							
Linum lewisii							
Lithospermum multiflorum	P						
Lithospermum ruderale	P	0.43	0.17		P	0.17	
Lomatium dissectum	P	0.14	P	0.50	P	1.17	P
Lomatium foeniculaceum	P						
Lupinus arbustus	0.20					0.33	
Lupinus argenteus	5.80	1.86	8.83		P		
Lupinus caudatus					P		
Lygodesmia juncea	0.20						
Machaeranthera canescens					P	P	
Machaeranthera grindelioides						P	
Mertensia lanceolata					P		
Microseris nutans	P	0.14	0.33				P
Nothocalais cuspidata							
Oreocarya flavoculata	P			P	P	0.50	
Oreocarya sp.		P					
Oreostemma alpigenum var. haydenii			0.50	P			
Paeonia brownii							
Penstemon deustus							
Penstemon humilis							P
Penstemon sp.					P		
Penstemon speciosus	P			P	P	P	
Perideridia bolanderi			P			P	
Phacelia hastata						P	
Phlox hoodii	0.40				P		
Phlox longifolia	1.60	P	0.17			P	P
Phlox multiflora		1.14	2.50	P	P	0.17	P
Phlox pulvinata		0.43				P	
Pleiacanthus spinosus		P	0.50				
Ranunculus sp.							
Scutellaria angustifolia		P					
Senecio integerrimus	P				P	0.33	

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NATIVE PERENNIAL FORBS							
Senecio multilobtus	P				P	P	
Sphaeralcea ambigua	P	P	P	P			
Sphaeralcea coccinea							
Sphaeralcea grossulariifolia	P						
Stenotus armerioides				P	P		
Symphyotrichum sp.							
Viola vallicola	P					P	
Wyethia amplexicaulis	P				0.13	0.17	
Zigadenus venenosus		P					
TOTAL NATIVE PERENNIAL FORBS	19.4	5.1	15.8	1.8	0.5	19.3	1.0
INTRODUCED PERENNIAL FORBS							
Cardaria draba							
Taraxacum officinale		P					
TOTAL INTRO. PERENNIAL FORBS		0.0					
NATIVE PERENNIAL GRASSES (cool)							
Achnatherum hymenoides	1.20	P		0.25	P	0.17	
Achnatherum lettermanii	0.20						
Achnatherum nelsonii						P	
Achnatherum thurberianum		0.86	2.17	0.25			3.00
Achnatherum webberi		0.14					
Agropyron scribneri		0.29	P				
Bromelica bulbosa							
Bromelica specatilis							
Bromus marginatus						P	
Ceratochloa marginata							
Elymus elymoides	0.20	1.57	1.83	P	0.38	0.17	3.00
Elymus lanceolatus var. albicans	0.40	P	P				
Elymus lanceolatus var griffithsii	0.20						
Elymus lanceolatus var lanceolatus	0.60				P		
Elymus lanceolatus ssp. riparius							
Elymus longifolius	0.20						
Elymus smithii	P						
Elymus trachycaulus							
Festuca idahoensis							
Festuca saximontana			3.33				
Festuca sororia	0.20				0.13		
Hesperostipa comata							

*P= Present within 1m of either side of the cover transect, but not quantitatively encountered.

Table 1. Vegetation of All Areas by Percent Absolute Cover, HC/CUEP, Eureka and Lander Counties, NV - Barrick Gold Exploration, Inc.

COLUMN #	9	10	11	12	13	14	15
	Burned Pinyon-Juniper Woodland	Burned Sagebrush of Dissected Slopes (E, W, S Aspects)	Burned Sagebrush of Dissected Slopes (N Aspects)	Juniper Woodland	Pinyon-Juniper Woodland	Mountain Mahogany Woodland	Basalt Sagebrush
NATIVE PERENNIAL GRASSES (cool)							
Leymus cinereus	0.60						
Leymus triticoides	0.20	0.86	2.17	P	0.13	1.00	
Oryzopsis hymenoides							
Poa agassizensis							P
Poa fendleriana					P		
Poa secunda var. juncifolia					0.25	0.17	
Poa secunda ssp secunda	0.60	1.86	9.00	0.75	1.25	P	P
Pseudoroegneria spicata	0.20	2.43	0.50		P	0.33	
Pseudoroegneria spicatus ssp spicatus	0.40						
TOTAL NATIVE PERENNIAL GRASSES (c)	5.2	8.0	19.0	1.3	2.1	1.8	6.0
INTRODUCED PERENNIAL GRASSES (cool)							
Agropyron cristatum	0.20						
Bromus inermis							
Elymus junceus							
Poa pratensis							
Thinopyrum intermedium							
TOTAL INTRO. PERENNIAL GRASSES (c)	0.2						
NATIVE SUBSHRUBS							
Eriogonum brevicaule			P				
Eriogonum microthecum				P	P	P	
Gutierrezia sarothrae							
Leptodactylon caespitosum		0.29	0.33	0.75	P		
Penstemon deustus var pedicellatus						P	
TOTAL NATIVE SUBSHRUBS		0.3	0.3	0.8	0.0	0.0	
NATIVE SHRUBS							
Amelanchier alnifolia							
Amelanchier utahensis					P	0.50	
Artemisia nova				1.25	P		
Artemisia tridentata ssp. undetermined		0.14	0.17	2.50	1.50	1.83	19.00
Artemisia tridentata ssp. wyomingensis					P		
Artemisia tridentata ssp. vaseyana							
Atriplex canescens							
Cercocarpus ledifolius					0.25	16.00	
Chrysothamnus depressus				P	P		
Chrysothamnus greenei				P			
Chrysothamnus nauseosus		0.57					

*P= Present within 1m of either side of the cover transect, but not quantitatively encountered.

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NATIVE SHRUBS							
Chrysothamnus viscidiflorus	5.20	2.57	10.50		P	P	1.00
Ephedra viridis				0.25	P		
Kochia prostrata		2.43					
Lycium sp.							
Prunus andersonii	P						
Ribes inerme					P		
Ribes velutinum			P			0.50	
Symphoricarpos longiflorus					P	2.67	
Tetradymia canescens							
TOTAL NATIVE SHRUBS	5.2	5.7	10.7	4.0	1.8	21.5	20.0
NATIVE TREES							
Juniperus osteosperma				10.50	9.63	0.50	
Pinus monophylla				P	11.75	2.83	
TOTAL NATIVE TREES				10.5	21.4	3.3	
SUCCULENTS							
Opuntia phaeacantha					P		
TOTAL SUCCULENTS					0.0		
PARASITE							
Orobanche fasciculata							
TOTAL PARASITE							

*P= Present within 1m of either side of the cover transect, but not quantitatively encountered.

Table 1. Vegetation of All Areas by Percent Absolute Cover, HC/CUEP, Eureka and Lander Counties, NV - Barrick Gold Exploration, Inc.

COLUMN #	9	10	11	12	13	14	15
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MUSHROOMS							
Fungus				P			
TOTAL MUSHROOMS				0.0			
Standing dead	1.60	0.86	2.17	4.75	1.50	2.50	5.00
Litter	32.60	18.71	20.17	14.75	23.50	18.83	4P
Bare ground	20.40	21.29	18.00	34.25	23.50	13.67	22.00
Rock	4.40	6.14	1.17	27.25	25.25	17.00	6.00
TOTALS	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL VEGETATION COVER	41	53	59	19	26	48	27
GROUND COVER (Litter+Rock+Veg+St.Dead)	79.6	78.7	82.0	65.8	76.5	86.3	78.0
SPECIES DENSITY (# of species/100 sq.m.)	20.0	16.4	21.2	23.3	19.3	29.5	
Standard Deviation	3.5	2.9	3.1	3.9	4.1	4.8	22
Number of Samples	5	7	6	4	8	6	1

*P= Present within 1m of either side of the cover transect, but not quantitatively encountered.

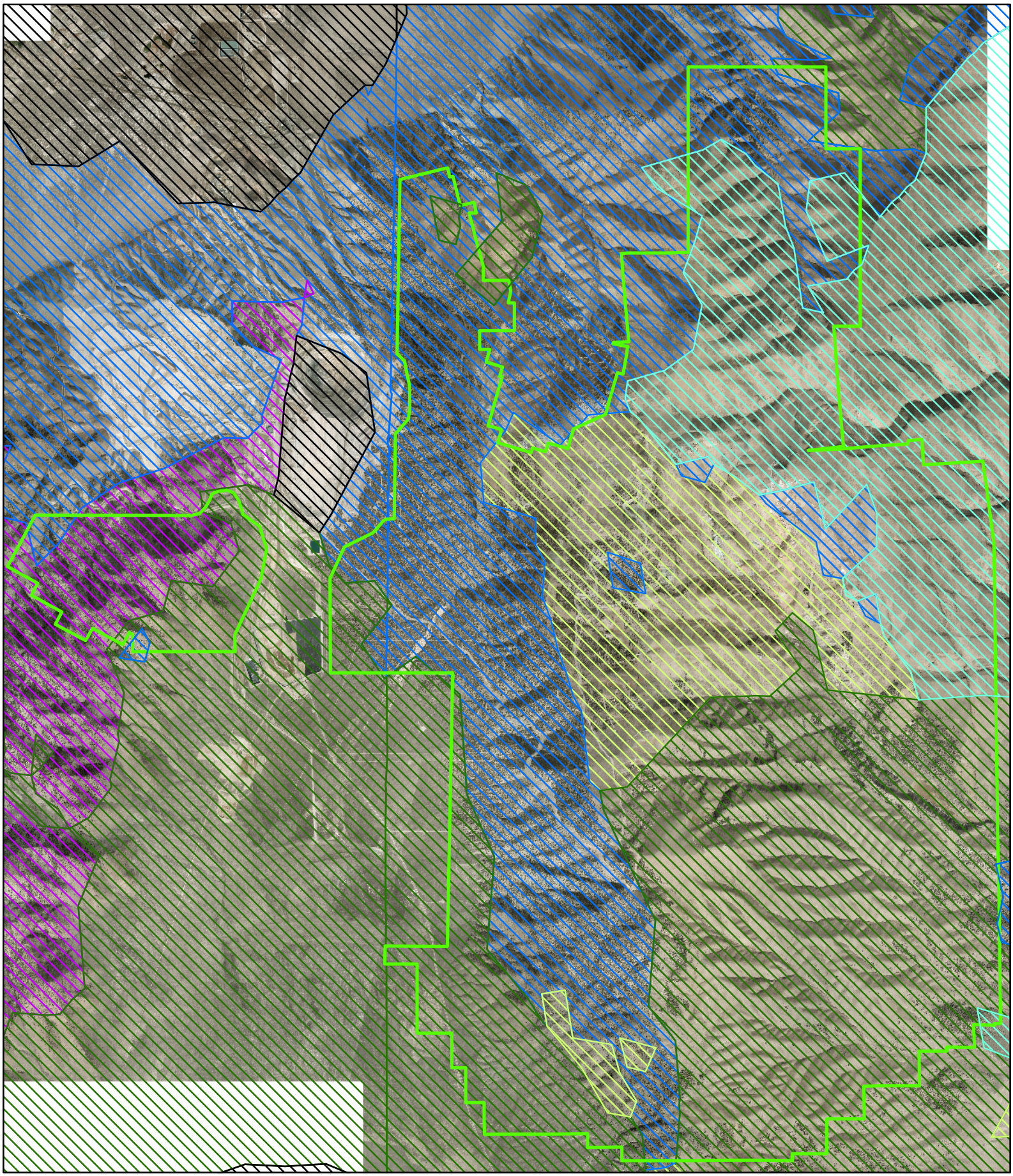
0 0.7 1.4 Kilometers

N

W E

S

ESCO Associates Inc.



Appendix E.
Sage Grouse Habitat Categories
(NV Department of Wildlife)
HC/CUEP PoO

Barrick HC/CUEP
Eureka and Lander Counties, NV

Project Boundaries
- HCCUEP PoO

Habitat Categories
- Essential/Irreplaceable Habitat, 1
- Important Habitat, 2
- Habitat of Moderate Importance, 3
- Low Value Habitat/Transitional Range, 4
- Unsuitable Habitat, 5
- Non-Habitat, N/A

2013 Aerial Imagery Provided by Barrick

0 2,000 Meters

N
W E
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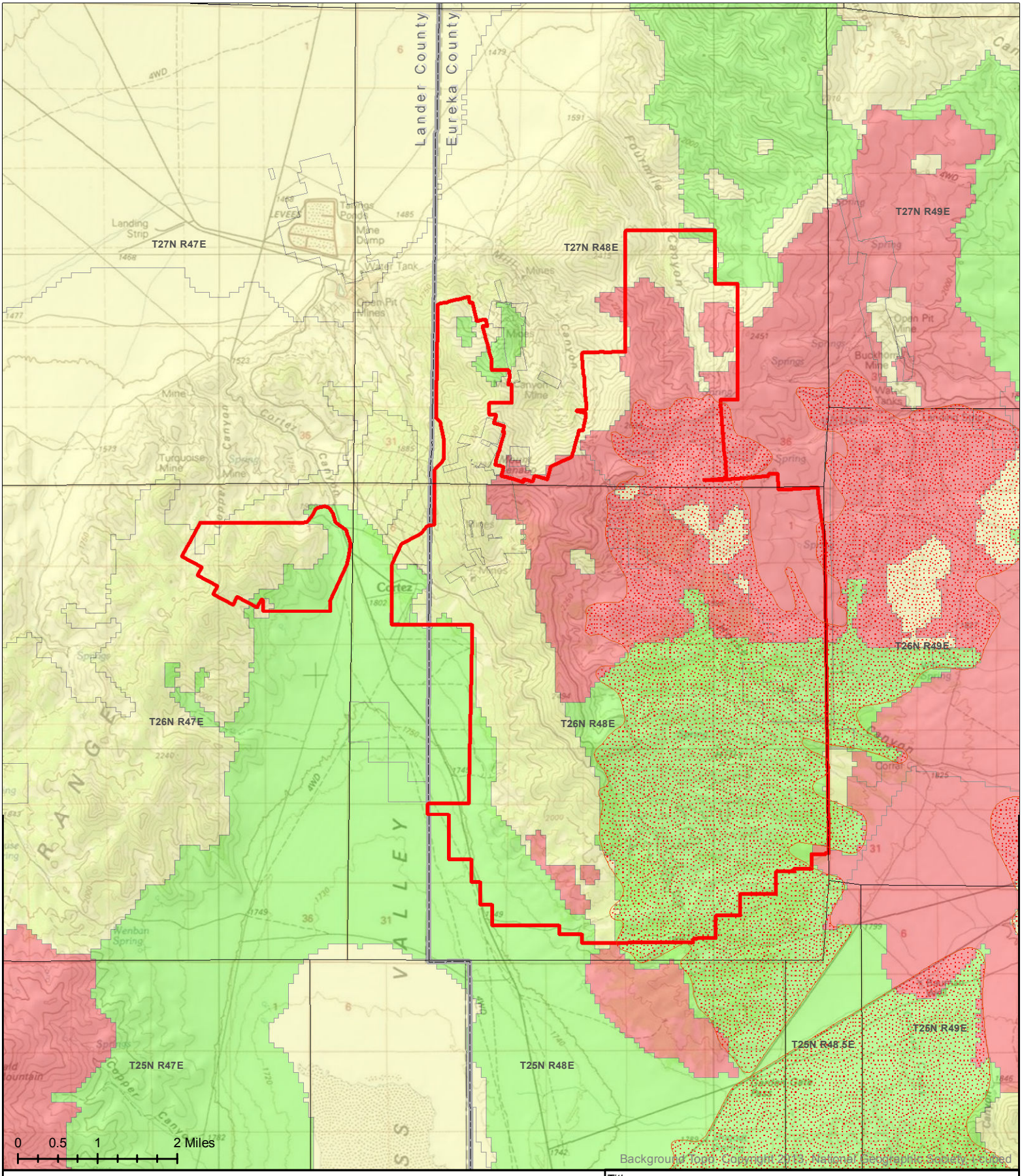
ESCO Associates Inc.



Legend

- HC/CUEP Boundary
- Township Range
- County Boundaries
- 1999 Fire

Greater Sage-grouse Habitat Category*

- Low Value
- Preliminary General Habitat (PGH)
- Preliminary Priority Habitat (PPH)

*Source: BLM reclassification of NDOW Habitat Categorization (March 2012)

1:100,000

N

Title: **Figure 3.1**
Greater Sage-grouse Habitat

Project: Barrick Gold Exploration, Inc.
Horse Canyon/Cortez Unified Exploration Project

Location: T26N, R48E; T27N, R48E; T26N, R47E Eureka/Lander Counties, NV

Map By: WR

Date: 4/21/2014

Appendix E Memorandum of Understanding Partnership for the Conservation and Protection of the Greater Sage-Grouse and Greater Sage-Grouse Habitat (BLM et al. 2013)

MEMORANDUM OF UNDERSTANDING

United States Department of Interior
Bureau of Land Management-Nevada State Office

United States Department of Agriculture, United States Forest Service, Humboldt-Toiyabe National Forest,

Nevada Department of Conservation and Natural Resources,

and

Barrick Gold of North America, Newmont Mining Corporation, and Other Companies

MEMORANDUM OF UNDERSTANDING

Among

THE U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT, NEVADA STATE OFFICE

THE UNITED STATES DEPARTMENT OF AGRICULTURE, UNITED STATES FOREST SERVICE, HUMBOLDT-TOIYABE NATIONAL FOREST,

NEVADA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

And

BARRICK GOLD OF NORTH AMERICA, NEWMONT MINING CORPORATION, and OTHER COMPANIES

Regarding the Establishment of a Partnership for the Conservation and Protection of the Greater Sage-Grouse and Greater Sage-Grouse Habitat

I. PURPOSE

This Memorandum of Understanding ("MOU") establishes a formal partnership among BLM Nevada ("BLM"), Humboldt-Toiyabe National Forest ("HTNF"), the Nevada Department of Conservation and Natural Resources ("DCNR") (together the "Agencies") and Barrick Gold of North America (including its US affiliates and subsidiaries), Newmont Mining Corporation (including its US affiliates and subsidiaries), and other members of the Nevada Mining Association as may choose to execute this Agreement (together the "Companies"). Collectively, the Agencies and Companies shall be referred to as the "Parties."

This MOU provides a consultation process for proposed mining projects occurring in sage-grouse preliminary priority habitat ("PPH") and preliminary general habitat ("PGH") located on federal lands. This process will guide the design and implementation of appropriate and consistent action to avoid, minimize, or mitigate adverse impacts to Greater Sage-grouse and Greater Sage-grouse habitat associated with mining exploration and development.

This MOU is consistent with BLM Washington Office Instructional Memorandum No. 2012-043, entitled Greater Sage-Grouse Interim Management Policies and Procedures, and Nevada BLM Instructional Memorandum No. NV-2012-058, entitled Revised Direction for Proposed Activities within Greater Sage-Grouse Habitat and the Forest Service (Regions 1, 2 and 4) "Interim Conservation Recommendations for Greater Sage-Grouse and Sage-Grouse Habitat" dated October 2, 2012.

II. PROCEDURES

A. The BLM is responsible for the administration and management of public lands. The BLM will be the lead agency in the National Environmental Policy Act ("NEPA") processes as described by 40 C.F.R. §§ 1501.5, 1508.16 and 43 CFR part 3809 for evaluation, analysis, and processing of Plans of Operation and mining exploration Notices of Intent within BLM administered lands.

B. The HTNF is responsible for the administration and management of National Forests. The HTNF will be the lead agency in the NEPA process as described by 40 C.F.R. §§ 1501.5, 1508.16 and 36 CFR 228 Subpart A for evaluation, analysis, and processing of Plans of Operation and mining exploration Notices of Intent within National Forest administered lands.

C. The DCNR is responsible for the administration of mining exploration and development on private and state lands.

D. The Parties agree to become cooperating partners in the formation of the BLM Nevada, Humboldt-Toiyabe National Forest, DCNR, and Nevada mining industry Greater Sage-grouse conservation partnership and in the NEPA process for plans of operation or mining exploration notices on public lands. DCNR will participate as a cooperating agency under 40 CFR §§ 1501.6, 1508.5, 43 CFR part 3809, and 36 CFR 228 Subpart A. Individual mining companies will participate as project applicants in the NEPA processes for their own Plans of Operation or mining exploration Notices of Intent.

E. All Parties agree to:

   i. Adhere to and comply with the applicable laws and regulations of the United States and regulations of the Secretary of the Interior and Secretary of Agriculture, for areas under their respective jurisdictions.

   ii. Meet as needed on mutually agreed dates to review and evaluate current conditions and trends as well as the implementation of this MOU. These meetings will also serve as coordination sessions to determine immediate and future timing requirements and the general programming of cooperative actions.

   iii. Implement the state consultation requirements of BLM NV Instructional Memorandum No. 2012-058 through this MOU for mining projects. This MOU provides that the consultation process will involve a collaborative approach among the Parties on a project basis.

   iv. Support and implement appropriate sage-grouse monitoring and mitigation for mining related activities in PPH and PGH on federal lands. Through the NEPA process for Plans of Operation or through the development of mining exploration Notices of Intent, the Agencies will consult with the Parties to identify and implement appropriate monitoring and mitigation for mining exploration and development on BLM and HTNF lands in Nevada, consistent with the interim management direction for PPH and PGH. The goals for project development include, but are not limited to: (a) Avoidance and minimization of sage-grouse

habitat disturbance where practicable, recognizing existing mineral rights and authorizations; (b) Offsetting, or mitigation where avoidance is not practicable; and (c) Establishment of sage-grouse mitigation bank(s).

v. For mining projects on federal lands not previously approved by the appropriate Agency, provide for restoration, mitigation, or offsetting of potential impacts on sage-grouse. The final determination of the effects that require restoration, mitigation, and offsetting shall be accomplished through site specific analysis and/or addressed in a NEPA compliant document. In determining any requirements, the Agencies shall consider the recommendations of an evaluation committee consisting of representatives of the project, the federal land management agency, and the State Sage-Grouse Technical Team. Such determinations shall be guided by the following principles:

   a. No restoration, mitigation, or offset would be required where site specific analysis establishes that there will be no negative effects to sage-grouse or its habitat, even in areas that have been designated on maps as PPH or PGH. Such analysis would be conducted by a qualified biologist with sage-grouse experience and agreed to by the relevant Parties. The analysis would include an evaluation of the use of the site by sage-grouse during its life cycle. In order to reach a conclusion that no restoration, mitigation, or offsetting is required in an area previously designated as PPH or PGH, the analysis must be conducted prior to any disturbance and must account for any projected changes in sage-grouse behavior as a result of the activity proposed. Attachment A (Sage-Grouse Habitat Assessment Framework) hereto describes one acceptable approach to such site-specific analysis. Other methods or procedures, including without limitation streamlining of data requirements, may be considered on a case-by-case basis.

   b. Site reclamation plans may include specific measures designed to provide for restoration/rehabilitation or improvement of sage-grouse habitat during the reclamation process. Where such reclamation is found to adequately address some or all of the impacts on Greater sage-grouse, the required mitigation or offsetting may be reduced or eliminated.

   c. Where reclamation is infeasible or will not, by itself, adequately address all impacts on Greater Sage-grouse, any excess impact not addressed by reclamation will be offset or mitigated as provided in a plan approved by the appropriate federal Party, consistent with the objective of no unmitigated net loss and the following principles:

      i. Offset at a ratio of 1 to 1 by providing long-term assurances, acceptable to the land management agency and in place prior to the disturbance, for the protection, management, and conservation of comparable habitat on private land. For purposes of this Agreement, "comparable" shall refer to habitat

of the same (or better) kind and quality, to the satisfaction of the land management agency.

ii. Mitigated by the project proponent at ratios of no more than 3 to 1 for PPH-quality habitat and 2 to 1 for PGH-quality habitat. Notwithstanding these mitigation targets, it is understood and agreed that the Agencies may approve alternative mitigation proposals where the net benefit to sage-grouse conservation meets or exceeds the benefit that would be achieved by performing traditional acre for acre mitigation. For example, but without limitation, it is agreed that fire control, focused improvements to high value habitat areas, and other projects may have great benefit to sage-grouse that is not easily correlated to per acre mitigation ratios.

iii. Mitigated by the project proponent providing payment to a sage-grouse mitigation bank account or other program approved by DCNR and the appropriate federal land management agency in an amount equal to the cost of satisfying the target mitigation ratios set forth above. Costs for making such improvements on private lands shall be based on the Nevada Standardized Reclamation Cost Estimator (SCRE) model. SCRE shall also provide the basis for negotiating costs for public lands, which will also include cost of NEPA compliance.

iv. Without limitation, mitigation measures may include habitat restoration/rehabilitation, vegetation management, fencing of springs and meadows, thinning or removal of woodland vegetation in sagebrush communities, creating fuel breaks to protect intact sagebrush communities, noxious weed treatments, and supplemental (*i.e.*, not baseline) GPS or telemetry sage-grouse population monitoring. Mitigation/offsetting may be performed on or off-site, on either private or public lands, subject to appropriate mechanisms for assuring that off-site mitigation projects will maintain adequate protections.

vi. Continue to work toward development of a program for and establishment of a sage-grouse mitigation bank(s) across all land ownerships and jurisdictions. The Parties will identify potential habitat to be included in a mitigation bank(s); a program for implementing restoration/rehabilitation, reclamation, and enhancement activities on banked land; a system for validating, tracking, and monitoring the success of mitigation efforts on Greater Sage-grouse populations; mechanisms for assuring adequate protection of projects; and an accounting system for banked credits.

vii. Support the development and application of state and transition models for ecological sites to assess Greater Sage-grouse habitat values and optimize Greater Sage-grouse restoration/rehabilitation, reclamation, and enhancement efforts. Modeling will be used, if available, during the NEPA process and during consultation with the Parties to assess habitat disturbance and identify appropriate mitigation measures. Modeling may also be used to identify potential land for a mitigation bank(s) and provide a metric for assigning values to habitat restoration/rehabilitation, reclamation, and enhancement activities within the bank(s).

viii. Greater Sage-grouse related data that becomes available through site-specific surveys, remote sensing data, state and transitional models, or other sources will be provided to and stored in a central location acceptable to the relevant Parties. The appropriate protocols and location of the data storage will be coordinated by the State Sage-Grouse Technical Team.

ix. Consistent with this MOU, offsetting/mitigation, including any monitoring or other requirements, to address impacts to Greater Sage-grouse from mining projects on federal lands will be developed through the NEPA process and issued as a condition of project approval.

III. AUTHORITIES

A. The following Legislative Authorities apply to the BLM and will apply to other subsequent and mutually agreed to instruments:

i. The Taylor Grazing Act of June 28, 1934, (43 U.S.C. § 315 *et seq.*), as amended.

ii. General Mining Law of 1872 (30 U.S.C. § 22 *et seq.*), as amended.

iii. The Federal Land Policy and Management Act of 1976 (43 U.S.C. § 1737(b)).

iv. The Public Rangelands Improvement Act of 1978 (43 U.S.C. § 1901 *et seq.*).

v. National Environmental Policy Act of 1969 (42 U.S.C. § 4321 *et seq.*).

B. The following Legislative Authorities apply to the HTNF and will apply to other subsequent and mutually agreed to instruments:

i. National Forest Management Act of 1976 (16 U.S.C. §§ 1600-1614), as amended.

ii. General Mining Law of 1872 (30 U.S.C. § 22 *et seq.*), as amended.

iii. The Federal Land Policy and Management Act of 1976 (43 U.S.C. § 1737(b)),

iv. National Environmental Policy Act of 1969 (42 U.S.C. § 4321 *et seq.*).

C. The following Legislative Authorities under this MOU apply to DCNR, for its participation as a NEPA cooperating agency, and to the Companies for participation as project applicants: NRS 232.070(3).

IV. ADMINISTRATION

A. It is mutually agreed and understood by all Parties that:

i. Nothing in this MOU will be construed as affecting or restricting the legal authorities of the Parties or as binding beyond their respective authorities, or to obligate the federal agencies to any current or future expenditure in advance of appropriations from Congress. Nor does this agreement obligate or require the United States, through BLM or NTNF, or the State of Nevada to expend funds on any particular project or purpose, even if funds are available.

ii. Any information furnished to the BLM, HTNF, or other Parties during and related to the NEPA process may be subject to disclosure under the Freedom of Information Act (5 U.S.C. § 552), unless covered by a relevant exception (e.g., for confidential commercial or financial information (5 U.S.C. § 552(b)).

iii. This MOU in no way restricts the BLM, HTNF, DCNR, or the Companies from participating in similar activities with other public or private agencies, organizations, and individuals.

iv. Nothing in this MOU shall obligate the BLM, HTNF, DCNR, or the Companies to obligate or transfer any funds. Specific work projects or activities that involve the transfer of funds, services, or property among the various agencies and offices of the BLM, HTNF, DCNR, and the Companies shall require execution of separate agreements consistent with law and any funds provided by the government agencies pursuant to their legal authorities will be contingent upon the availability of appropriated funds. All funded activities must be independently authorized by appropriate statutory authority as this MOU does not provide such authority. Negotiation, execution, and administration of each such agreement must comply with all applicable statues and regulations.

v. This MOU is not intended to and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by a party against the United States, its agencies, its officers, or against the State of Nevada or any other person.

vi. Conflicts between the Parties concerning procedures under this MOU, which cannot be resolved at the operational level, will be referred to successively higher levels as necessary for resolution.

vii. Upon request by any of the Parties, each Party shall review this MOU to assure that it continues to reflect the appropriate understandings and procedures to provide for current needs and capabilities and adherence to the Public Laws.

viii. The terms of this MOU may be renegotiated at any time at the initiative of any Party. Any Party may propose changes to this MOU during its term by providing 30-day written notification to the other Parties. Such changes will be in the form of an amendment and will become effective upon signature by the Parties.

ix. The Federal Government's liability shall be governed by the provisions of the Federal Tort Claims Act (28 U.S.C. §§ 2671-80). The Parties shall operate in conformance with the Code of Federal Regulations and the United States Code.

x. The Parties shall comply with all Federal Statutes relating to nondiscrimination. These include but are not limited to: a) Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d), which prohibits discrimination on the basis of race, color, handicap, or national origin; b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§ 1681-16783, §§ 1685-1686), which prohibits discrimination on the basis of sex.

xi. Any Party may terminate its involvement under this MOU upon providing a 30-day written notice of such termination to the other Parties.

xii. Unless otherwise provided, this agreement is not intended to supersede provisions of other agreements between the Parties, in whole or in part, unless there is a conflict between the two agreements.

xiii. FEDERAL IDENTIFIER NUMBER. For the purposes of the HTNF, the Federal Identifier Number is **13-MU-11041730-040**.

xiv. SUPPLEMENTAL PROVISIONS. The U.S. Forest Service (HTNF) Supplemental Provisions are hereby incorporated into and made part of the Memorandum of Understanding among the BLM, HTNF, DCNR, and the Companies regarding the Establishment of a Partnership for the Conservation and Protection of the Greater Sage-Grouse and Greater Sage-Grouse Habitat.

xv. NON-FEDERAL STATUS FOR COOPERATOR PARTICIPANT LIABILITY. DCNR and the Companies agree that any of their employees, volunteers, and program participants shall not be deemed to be Federal employees for any purposes including Chapter 171 of Title 28, United States Code (Federal Tort Claims Act) and Chapter 81 of Title 5, United States Code (OWCP), as DCNR and the Companies hereby willingly agree(s) to assume these responsibilities.

Further, DCNR and the Companies shall provide any necessary training to DCNR and the Companies' employees, volunteers, and program participants to ensure that such personnel are capable of performing tasks to be completed. DCNR and the Companies shall also supervise and direct the work of its employees, volunteers, and participants performing under this agreement.

xvi. ASSURANCE REGARDING FELONY CONVICTION OR TAX DELINQUENT STATUS FOR CORPORATE ENTITIES. This agreement is subject to the provisions contained in the Department of Interior, Environment, and Related Agencies Appropriations Act, 2012, P.L. No. 112-74, Division E, Section 433 and 434 regarding corporate felony convictions and corporate federal tax delinquencies. Accordingly, by entering into this agreement the Companies acknowledges that it: 1) does not have a tax delinquency, meaning that it is not

subject to any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, and (2) has not been convicted (or had an officer or agent acting on its behalf convicted) of a felony criminal violation under any Federal law within 24 months preceding the agreement, unless a suspending and debarring official of the United States Department of Agriculture has considered suspension or debarment is not necessary to protect the interests of the Government. If any of the signatory mining Companies fails to comply with these provisions, the U.S. Forest Service will annul this agreement and may recover any funds the Companies have expended in violation of sections 433 and 434.

xvii. MEMBERS OF U.S. CONGRESS. Pursuant to 41 U.S.C. 22, no U.S. member of, or U.S. delegate to, Congress shall be admitted to any share or part of this agreement, or benefits that may arise therefrom, either directly or indirectly.

xviii. NOTICES. Any communications affecting the operations covered by this agreement given by the U.S. Forest Service or the Parties is sufficient only if in writing and delivered in person, mailed, or transmitted electronically by e-mail or fax, as follows:

To the Principal Contact(s) listed in Section IV(A)(xxii).

Notices are effective when delivered in accordance with this provision, or on the effective date of the notice, whichever is later.

xix. DEBARMENT AND SUSPENSION. The Cooperator shall immediately inform the U.S. Forest Service if they or any of their principals are presently excluded, debarred, or suspended from entering into covered transactions with the federal government according to the terms of 2 CFR Part 180. Additionally, should the Cooperator or any of their principals receive a transmittal letter or other official Federal notice of debarment or suspension, then they shall notify the U.S. Forest Service without undue delay. This applies whether the exclusion, debarment, or suspension is voluntary or involuntary.

xx. This MOU documents a framework for cooperation between the HTNF and the other Parties for carrying out their separate activities in a coordinated and mutually beneficial manner where nothing of value transfers between the Parties. The Parties direct their own activities, use their own resources and funding, and do not expect any deliverable by the HTNF and the other Parties. Nothing in this MOU commits the HTNF to future projects or any future obligation.

xxi. ENDORSEMENT. Any of the Parties' contributions made under this MOU do not by direct reference or implication convey U.S. Forest Service endorsement of the Parties' products or activities.

xxii. PRINCIPAL CONTACTS. Individuals listed below are authorized to act in their respective areas for matters related to this agreement.

Principal DCNR Contacts:

DCNR Program Contact	DCNR Administrative Contact
Name: Jim Lawrence Address: 901 S Stewart St, Suite 5003 City, State, Zip: Carson City, NV 89701 Telephone: 775-684-2720 FAX: Email: Lawrence@lands.nv.gov	Name: Tim Rubald Address: 901 S. Stewart St, Suite 1003 City, State, Zip: Carson City, NV 89701 Telephone: 775-684-2764 FAX: Email: timrubald@sagebrusheco.nv.gov

Principal BLM Contacts:

BLM Program Contact	BLM Administrative Contact
Name: Raul Morales Address: 1340 Financial Blvd City, State, Zip: Reno, NV 89502 Telephone: 775-861-6464 FAX: 775-861-6712 Email: rmorales@blm.gov	Name: Kenda Tucker Address: 1340 Financial Blvd City, State, Zip: Reno, NV 89502 Telephone: 775-861-6417 FAX: 775-861-6634 Email: ktucker@blm.gov

Principal Companies Contacts:

Companies Program Contact	Companies Administrative Contact
Name: Tim Crowley, President, Nevada Mining Association Address: 201 West Liberty St City, State, Zip: Reno, NV 89501 Telephone: 775-829-2121 FAX: 775-852-2631 Email: Tim@nevadamining.org	Name: Address: City, State, Zip: N/A Telephone: FAX: Email:

Principal HTNF Contacts:

HTNF Program Manager Contact	HTNF Administrative Contact
Name: Tom Frolli, Natural Resources & Planning Officer Address: 1200 Franklin Way City, State, Zip: Sparks, NV 89431 Telephone: 775-355-5313 FAX: 775-355-5398 Email: tfrolli@fs.fed.us	Kevin Worth, Grants Management Specialist Southwest ID & NV Acquisition Center 1249 S Vinnell Way, Suite 200 Boise, ID 83709 Telephone: (208) 373-4295 FAX: (208) 373-4294 Email: kworth@fs.fed.us

The authority and format of this agreement have been reviewed and approved for signature. 13-MU-11041730-040

7/8/13

KEVIN WORTH
U.S. Forest Service Grants Management Specialist

Date

V. APPROVALS

This MOU will become effective upon the last date of signature between the Parties and shall remain in effect for 5 years or until the issuance of a Record of Decision approving BLM and HTNF's California-Nevada Greater Sage-Grouse Sub-regional Resource Management Plan Amendments, as contemplated by IM No. 2012-044, whichever is sooner. ***This MOU may be amended to include additional participating Companies as deemed appropriate by the signatory agencies.***

7/8/13

Amy Lueders
State Director, Nevada
Bureau of Land Management

Date

William Dunkelberger
Forest Supervisor, Humboldt-Toiyabe National Forest
United States Forest Service

Date

Leo Drozdoff
Director
Nevada Department of Conservation and Natural Resources

Date

The authority and format of this agreement have been reviewed and approved for signature. 13-MU-11041730-040

7/8/13

KEVIN WORTH
U.S. Forest Service Grants Management Specialist

Date

V. APPROVALS

This MOU will become effective upon the last date of signature between the Parties and shall remain in effect for 5 years or until the issuance of a Record of Decision approving BLM and HTNF's California-Nevada Greater Sage-Grouse Sub-regional Resource Management Plan Amendments, as contemplated by IM No. 2012-044, whichever is sooner. ***This MOU may be amended to include additional participating Companies as deemed appropriate by the signatory agencies.***

Amy Lueders
State Director, Nevada
Bureau of Land Management

Date

Jack R Isaacs for

7/18/13

William Dunkelberger
Forest Supervisor, Humboldt-Toiyabe National Forest
United States Forest Service

Date

Leo Drozdoff
Director
Nevada Department of Conservation and Natural Resources

Date

The authority and format of this agreement have been reviewed and approved for signature. 13-MU-11041730-040

7/8/13

KEVIN WORTH
U.S. Forest Service Grants Management Specialist

Date

V. APPROVALS

This MOU will become effective upon the last date of signature between the Parties and shall remain in effect for 5 years or until the issuance of a Record of Decision approving BLM and HTNF's California-Nevada Greater Sage-Grouse Sub-regional Resource Management Plan Amendments, as contemplated by IM No. 2012-044, whichever is sooner. ***This MOU may be amended to include additional participating Companies as deemed appropriate by the signatory agencies.***

Amy Lueders
State Director, Nevada
Bureau of Land Management

Date

William Dunkelberger
Forest Supervisor, Humboldt-Toiyabe National Forest
United States Forest Service

Date

Leo Drozdoff
Director
Nevada Department of Conservation and Natural Resources

7/9/13

Date

S. Hal

July 24/13

Gary Halverson
President
Barrick Gold of North America

Date

Tom Kerr
Senior Regional Vice President – North American Region
Newmont USA Limited

Date

Gary Halverson
President
Barrick Gold of North America

Date

Tom Kerr
Senior Regional Vice President – North American Region
Newmont USA Limited

07-15-13
Date

AUTHORIZED REPRESENTATIVE. By signing below, the President of the Nevada Mining Association (NvMA) certifies as being an authorized representative to sign on behalf of all members of NvMA who shall be and are a participating party to this Memorandum of Understanding (MOU), FS Agreement #13-MU-11041730-040. It shall be the responsibility of the President of NvMA to maintain a current and accurate list of the legal names of all members of NvMA who are a participating party to this MOU. At the request of a party to this MOU, the President of NvMA shall provide that party with a current and accurate list of the legal names of all members of NvMA who are a participating party to this MOU within 30 days of such request.

Tim Crowley — 8-21-13

TIM CROWLEY, President
Nevada Mining Association

Date