

**EXPANDED LONG CANYON
EXPLORATION PROJECT
ELKO COUNTY, NEVADA
Environmental Assessment
EA#: DOI-BLM-NV-N030-2011-0001**

June 2011

**U.S. Department of the Interior
Bureau of Land Management
Elko District Office
Wells Field Office**

**FRONTEER DEVELOPMENT (USA) INC.
EXPANDED LONG CANYON EXPLORATION PROJECT
ENVIRONMENTAL ASSESSMENT**

TABLE OF CONTENTS

	Page
1 INTRODUCTION.....	1-1
1.1 Long Canyon Notice and Plan of Operations History	1-1
1.2 Project Area.....	1-1
1.3 Environmental Assessment Analysis Area	1-3
1.4 Purpose and Need	1-3
1.5 Land Use Plan Conformance	1-4
1.6 Relationship to Other Laws, Policies, and Plans.....	1-4
2 PROPOSED ACTION AND ALTERNATIVES	2-1
2.1 Introduction.....	2-1
2.2 Proposed Exploration Activities	2-3
2.2.1 Equipment	2-3
2.2.2 Staging Areas.....	2-3
2.2.3 Access and Road Construction	2-4
2.2.4 Trenching and Bulk Sampling.....	2-4
2.2.5 Drilling	2-5
2.2.6 Ground Water Monitoring Well Drilling	2-6
2.2.7 Reclamation	2-7
2.2.8 Environmental Protection Measures.....	2-10
2.3 No Action Alternative	2-19
2.4 Alternatives Considered But Eliminated from Detailed Analysis.....	2-19
3 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND CUMULATIVE EFFECTS.....	3-1
3.1 Introduction.....	3-1
3.2 Effects of the Proposed Action.....	3-3
3.2.1 Air and Atmospheric Values.....	3-3
3.2.2 Cultural Resources.....	3-4
3.2.3 Environmental Justice	3-6
3.2.4 Fire Management	3-7
3.2.5 Forestry and Woodlands	3-7
3.2.6 Geology and Mineral Resources	3-8
3.2.7 Invasive, Nonnative Species	3-10
3.2.8 Lands and Realty	3-11
3.2.9 Lands with Wilderness Characteristics	3-12
3.2.10 Migratory Birds	3-15
3.2.11 Native American Religious Concerns.....	3-21
3.2.12 Paleontology.....	3-22
3.2.13 Range Resources	3-22
3.2.14 Recreation	3-23
3.2.15 Social Values and Economics.....	3-24
3.2.16 Soils.....	3-25
3.2.17 Special Status Species	3-26
3.2.18 Vegetation	3-30
3.2.19 Visual Resources	3-31
3.2.20 Wastes (Hazardous or Solid).....	3-32
3.2.21 Water Resources	3-33

3.2.22	Wild Horses and Burros.....	3-36
3.2.23	Wildlife.....	3-37
3.3	Effects of the No Action Alternative.....	3-42
3.4	Cumulative Impacts.....	3-42
3.4.1	Past and Present Actions.....	3-49
3.4.2	Reasonably Foreseeable Future Actions.....	3-56
3.4.3	Air and Atmospheric Resources.....	3-58
3.4.4	Cultural Resources.....	3-59
3.4.5	Invasive, Nonnative Species.....	3-60
3.4.6	Lands with Wilderness Characteristics.....	3-61
3.4.7	Migratory Birds.....	3-62
3.4.8	Range Resources.....	3-63
3.4.9	Recreation.....	3-64
3.4.10	Soils.....	3-65
3.4.11	Special Status Species.....	3-66
3.4.12	Vegetation.....	3-68
3.4.13	Visual Resources.....	3-69
3.4.14	Water Resources.....	3-70
3.4.15	Wildlife.....	3-71
3.5	Cumulative Impacts of the No Action Alternative.....	3-74
3.6	Mitigation and Monitoring.....	3-74
4	CONSULTATION AND COORDINATION.....	4-1
4.1	Persons, Groups, and Agencies Consulted.....	4-1
4.2	List of Preparers.....	4-1
5	REFERENCES.....	5-1

LIST OF TABLES

Table 2.1-1:	Acreege of Authorized and Proposed Project Disturbance.....	2-1
Table 2.2-1:	Anticipated Exploration Reclamation Schedule.....	2-8
Table 2.2-2:	BLM Revegetation Seed Mixture.....	2-9
Table 2.2-3:	Weed and Invasive Species Control Best Management Practices.....	2-13
Table 2.2-4:	Long Canyon Drilling Notification and Response Protocol.....	2-18
Table 3.1-1:	Project Area Resources or Elements Associated with Supplemental Authorities and Rationale for Detailed Analysis for the Proposed Action...	3-1
Table 3.1-2:	Project Area Resources or Uses Not Associated with Supplemental Authorities.....	3-2
Table 3.2-1:	Migratory Bird Species Located In or Near the Project Area.....	3-15
Table 3.4-1:	Cumulative Effects Study Areas.....	3-43
Table 3.4-2:	Wildland Fire Disturbance Acres in the CESAs.....	3-51
Table 3.4-3:	Past and Present ROW Acres in the CESAs by Type of ROW.....	3-53
Table 3.4-4:	Past and Present Mineral Disturbance Acres in the CESAs.....	3-54

LIST OF FIGURES

Figure 1.1.1: Project Area, Access, and Land Status	1-1
Figure 2.1.1: Proposed Surface Disturbance.....	Error! Bookmark not defined.
Figure 3.2.1: Vegetation Communities and Wildlife Habitat.....	Error! Bookmark not defined.
Figure 3.2.2: Lands with Wilderness Characteristics	3-14
Figure 3.4.1. Cumulative Effects Study Areas – Large Scale, Part 1	3-45
Figure 3.4.2. Cumulative Effects Study Areas – Large Scale, Part 2	Error! Bookmark not defined.
Figure 3.4.3: Cumulative Effects Study Areas – Small Scale, Part 1.....	3-46
Figure 3.4.4: Cumulative Effects Study Areas – Small Scale, Part 2.....	3-47
Figure 3.4.5: Wildland Fire, Deer Habitat, and Migration Corridor Map.....	3-50

ABBREVIATIONS AND ACRONYM LIST

°F	degrees Fahrenheit
amsl	above mean sea level
APE	Area of Potential Effect
AUM	animal unit months
BAPC	Bureau of Air Pollution Control
BLM	Bureau of Land Management
BMPs	Best Management Practices
BMRR	Bureau of Mining Regulation and Reclamation
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
DOT	Department of Transportation
EPA	Environmental Protection Agency
ESA	Endangered Species Act
EA	Environmental Assessment
Fronteer	Fronteer Development (USA) Inc.
FR	Federal Registrar
FLPMA	Federal Land Policy and Management Act of 1976
GHG	greenhouse gas
gpm	gallons per minute
HMA	Herd Management Area
IB	Information Bulletin
IM	Instruction Memorandum
I-80	Interstate 80
MBTA	Migratory Bird Treaty Act
MDA	Mine Development Associates
MDB&M	Mount Diablo Base & Meridian
mg/L	milligrams per liter
Mining Law	General Mining Law of 1872, as amended
mph	miles per hour
MSHA	Mine Safety and Health Administration
NAC	Nevada Administrative Code
NAGPRA	Native American Grave Preservation and Reparation Act
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act of 1969
NFS	National Forest System
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NTU	Nephelometric Turbidity Units
OSHA	Occupational Safety and Health Administration
Plan	Plan of Operations

Project	Expanded Long Canyon Exploration Project
RFFAs	Reasonably Foreseeable Future Actions
ROWs	Right-of-Ways
RMP	Resource Management Plan
S.A.	Statistical Area
SWIP	Southwest Intertie Project
TDS	Total Dissolved Solids
US93	United States Highway 93
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
VRM	Visual Resource Management

**FRONTEER DEVELOPMENT (USA) INC.
EXPANDED LONG CANYON EXPLORATION PROJECT
ENVIRONMENTAL ASSESSMENT**

1 INTRODUCTION

Fronteer Development (USA), Inc. (Fronteer) proposes to expand mineral exploration activities at the Long Canyon Exploration Project (Project) on public lands managed by the Elko District Office of the Bureau of Land Management (BLM) and subject to 43 Code of Federal Regulations (CFR) 3809. The Project is located in Elko County, Nevada, in the eastern Pequop Mountains at elevations ranging between 5,800 feet above mean sea level (amsl) to 7,700 feet amsl and is approximately 28 miles east-southeast of the city of Wells, Nevada (Project Area). The Project is accessed by driving east on Interstate Highway 80 from Wells, Nevada, for 27 miles to exit 378 (Oasis, Montello), then proceeding south for approximately four miles on a two-lane road and then west northwest on an existing dirt road (Figure 1.1.1).

1.1 Long Canyon Notice and Plan of Operations History

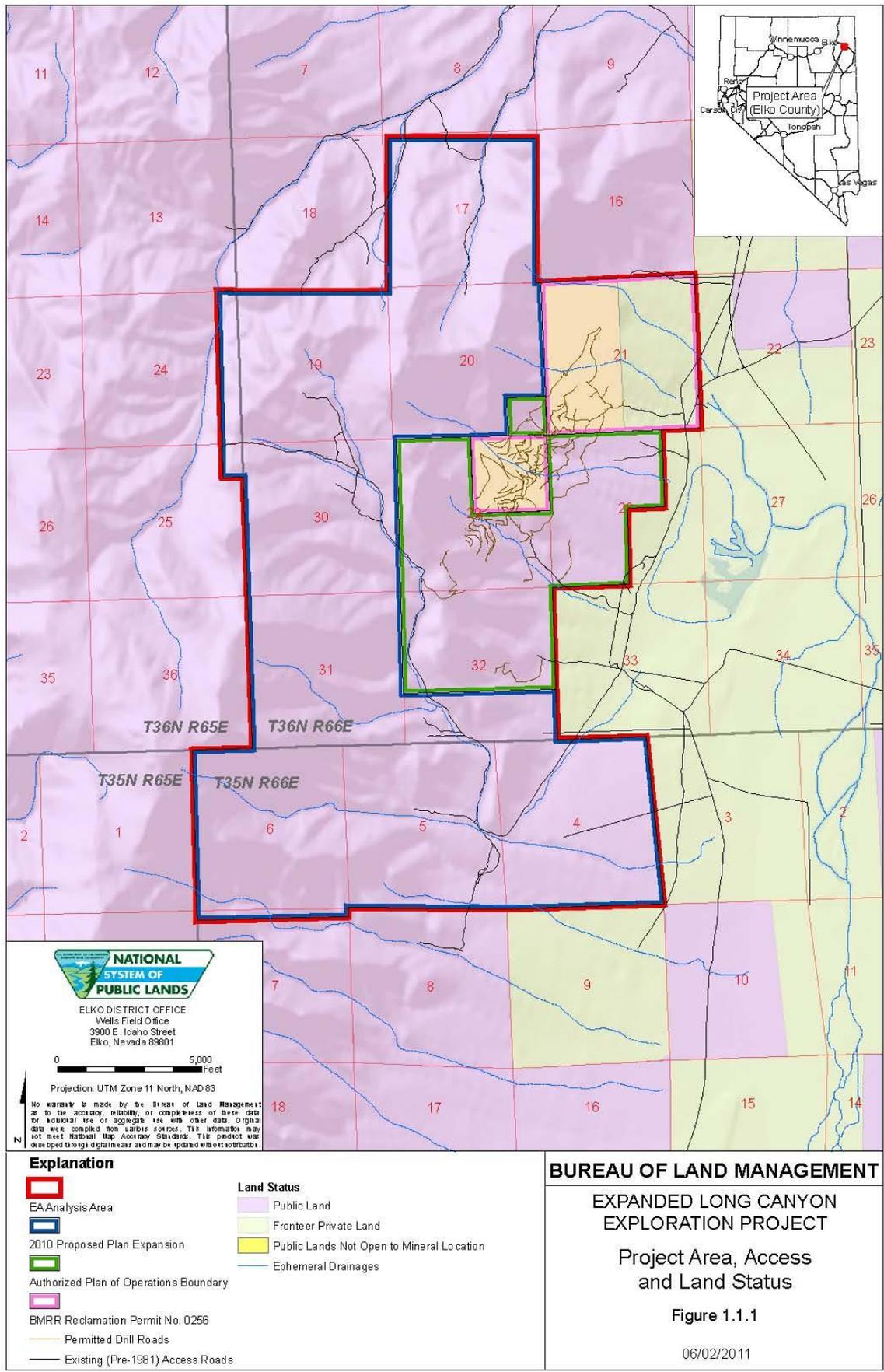
In 2005, Fronteer's former joint venture partner, AuEx, Inc. started exploration in Long Canyon under a BLM 3809 Notice (N-79949) in which 4.93 acres of surface area was disturbed. In 2007, Fronteer's predecessor company, NewWest Gold USA Inc., submitted a Plan of Operations/Permit for Reclamation application to expand the exploration activities beyond the 4.93 acres of surface disturbance constructed under the Notice. In August 2008, the Nevada Division of Environmental Protection (NDEP) Bureau of Mining Regulation and Reclamation (BMRR) approved the application and issued Reclamation Permit No. 0284. In September 2008, the BLM approved the Plan of Operations (NVN-82445), which authorized 44.93 acres of surface disturbance within the 1,341-acre project area on public land (Plan). In July 2009, the BLM and BMRR approved Amendment 2009-1 to expand the Plan boundary to include an additional 40 acres. Amendment 2009-1 did not propose an increase in the authorized surface disturbance. In September 2009, Fronteer submitted Amendment 2009-2 to drill nine ground water monitoring wells; however, this amendment was withdrawn in November 2009.

In March 2010, the 2010 Plan Amendment was submitted in accordance with the BLM's 43 CFR 3809 regulations and the BMRR's Nevada Administrative Code (NAC) 519A regulations. The 2010 Plan Amendment proposed to expand the Plan boundary by an additional 5,438 acres to bring the total Project Area to 7,664 acres of public and private land. The proposed activities in the 2010 Plan Amendment would create 69.43 acres of additional disturbance for a total of 114.36 acres of permitted surface disturbance on public lands open to location over a period of ten years.

Newmont Mining Corporation (Newmont) acquired Fronteer, owner and operator of the Long Canyon Project, in April 2011.

1.2 Project Area

As shown on Figure 1.1.1, the existing Plan boundary is located in portions of Sections 20, 29, 28, and 32 in Township 36 North, Range 66 East (T36N, R66E), Mount Diablo Base & Meridian (MDB&M), Elko County, Nevada.



The 2010 Plan Amendment adds the following sections of public land to the Plan boundary:

T36N, R66E: Section 17, Section 19, the remainder of Section 20, Section 30, Section 31, and the remainder of Section 32.

T35N, R66E: Sections 4, 5, 6 and a portion in the north end of Section 7.

T36N, R65E: E ½ E ½ of Section 24 and NE ¼ NE ¼ of Section 25.

The BLM is evaluating Fronteer's request to purchase the BLM's interest in the surface estate on 480 acres of BLM-acquired lands that overlie Fronteer's private mineral estate in the northwest quarter of Section 29 and the western half of Section 21, T36N, R66E. In order to proceed with such a sale, the BLM would have to prepare a separate NEPA document to evaluate the requested purchase. If the BLM approves the sale, Fronteer would purchase the BLM surface estate at fair market value in accordance with the land disposal provisions in Section 203 of Federal Land Policy and Management Act of 1976 (FLPMA). Existing approved surface disturbance on these lands total 54.93 acres under Reclamation Permit No. 0256. Fronteer would continue to pursue mineral activities on these lands pursuant to its valid existing rights as owner of the private mineral estate. Fronteer has committed that mineral activities on these lands would be conducted in a manner consistent with the environmental protection standards at 43 CFR Section 3809.420. Although the potential real estate transaction and the exploration activities associated with these private mineral estate lands are not included in the 2010 Plan Amendment, the associated property is included in the Project Area.

1.3 Environmental Assessment Analysis Area

As shown in Figure 1.1.1, the Project Area for this Environmental Assessment (EA) includes those lands subject to activities under the Proposed Action outlined in the 2010 Plan Amendment as well as those lands subject to the existing Reclamation Permits No. 0284 and No. 0256. The portion of the Project Area subject to existing approved disturbance was analyzed in a 2008 EA document, which is herein incorporated by reference (BLM 2008). All mineral exploration activities within the Project Area are analyzed in this EA.

1.4 Purpose and Need

Fronteer's purpose in proposing the Project is to explore for, locate, and delineate precious metal (gold) deposits on public land open to location under the General Mining Law of 1872, as amended (Mining Law) within the Project Area. The proposed activities are needed to further evaluate the mineral potential of the land. In order to conduct the proposed exploration activities, Fronteer submitted the 2010 Plan Amendment to the BLM and BMRR in March 2010, in accordance with BLM Surface Management Regulations 43 CFR 3809 and Nevada reclamation regulations at NAC 519A.

On lands open to location under the Mining Law, the BLM administers the surface of public land and federal subsurface mineral estate under the Mining Law and the FLPMA. The Mining Law allows the location and use of mining claims "under such regulations prescribed by law" and Section 302(b) of FLPMA recognizes the entry and rights of mining claimants while directing that the BLM take any action necessary by regulation or otherwise to prevent unnecessary or undue degradation of the lands. These two laws form the primary statutory basis for the Surface

Management Regulation codified at 43 CFR 3809 and BLM's purpose and need in reviewing and approving the Plan.

1.5 Land Use Plan Conformance

The Proposed Action as described in Chapter 2 is in conformance with the Minerals and Energy provisions on page 25 of the 1985 Wells Resource Management Plan (RMP) Record of Decision (BLM 1985). The decision states that "the public lands would be managed in a manner which recognizes the Nation's needs for domestic sources of minerals."

1.6 Relationship to Other Laws, Policies, and Plans

The Proposed Action is further consistent with other federal, state and local laws, regulations, and plans to the maximum extent possible. As noted for the purpose and need statement, this includes FLPMA, BLM's 43 CFR surface management regulations, State of Nevada mining statutes and regulations, and Elko County Public Lands Policy Plan.

The surface management regulations recognize that BLM is required to comply with the National Environmental Policy Act of 1969 (NEPA) through preparation of an environmental document that analyzes the potential impacts associated with the Proposed Action and any consultation required under other laws including the National Historic Preservation Act (NHPA) and the Endangered Species Act (ESA).

This EA has been prepared to comply with NEPA and evaluates the potential impacts from the proposed activities.

2.1 Introduction

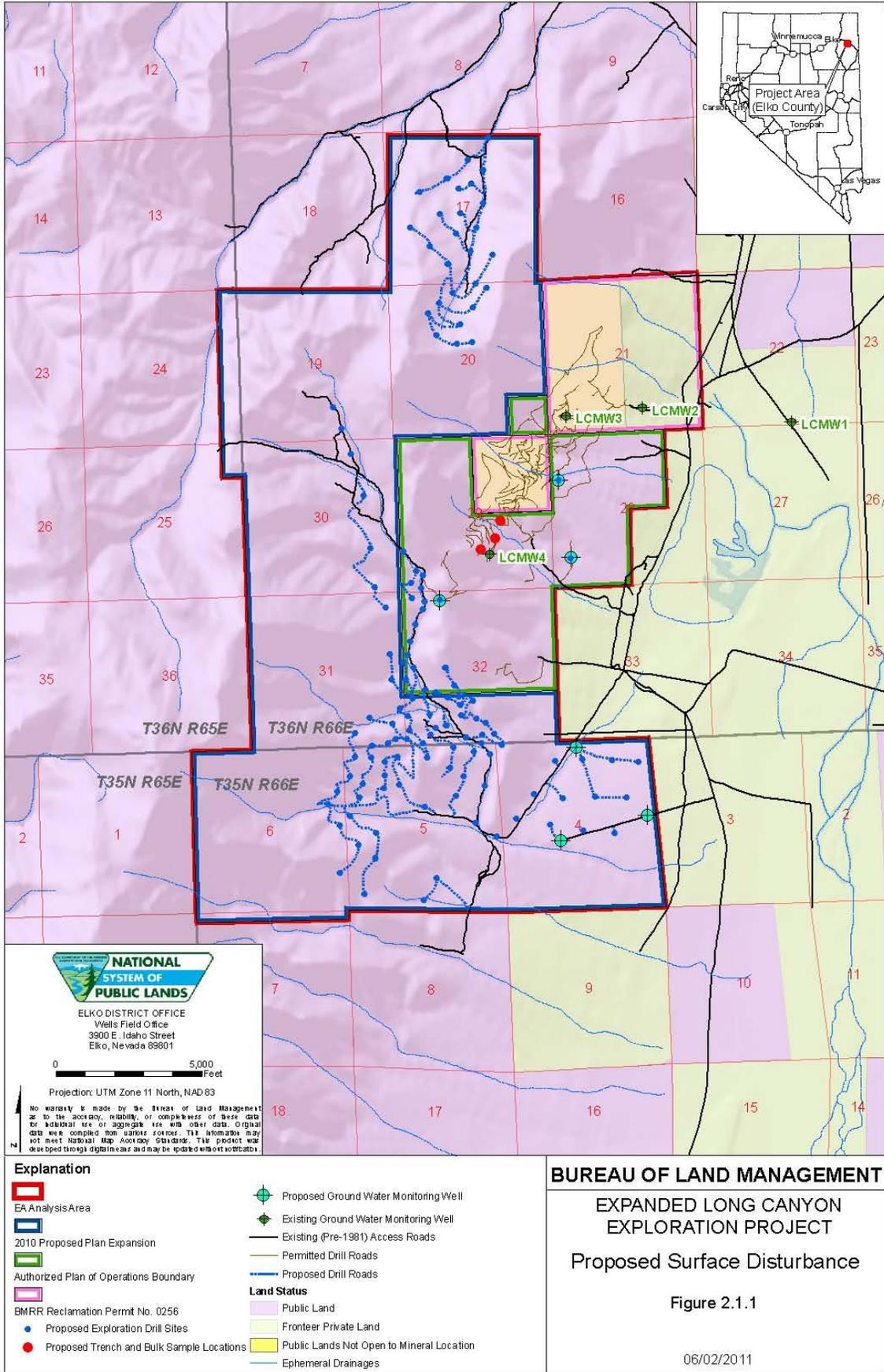
Fronteer's existing authorized exploration activities include access road maintenance, road building including water bars, drill pad construction, exploration drilling, construction of one ground water monitoring well, staging areas, trench construction and the collection of bulk samples for metallurgical testing, and reclamation. The 2010 Plan Amendment proposes to expand the area in which these activities would take place, increase the amount of surface disturbance associated with these activities, obtain samples from three additional bulk sample sites, and drill additional mineral exploration holes and up to 11 ground water monitoring wells (Proposed Action). The proposed surface disturbance associated with the Proposed Action is shown in Figure 2.1.1.

The proposed acres of disturbance shown in Table 2.1-1 represent an approximation of the surface disturbance associated with each disturbance type (i.e., roads, pads, trenches, etc.). In order to verify that the surface disturbance due to Project roads and other features remain within the cumulative existing and proposed surface disturbance authorized by the BLM and NDEP, Fronteer would conduct mapping at the end of each field season and submit the resulting disturbance calculations to the BMRR and BLM by April 15 of each subsequent year.

Table 2.1-1: Acreage of Authorized and Proposed Project Disturbance

Exploration Activity	Mineral Estate Land Status	Authorized and Proposed Surface Disturbance Acres				
		NDEP Permit 0256 ² (2006)	Notice ³ (2007)	Plan NVN82445 NDEP Permit No 0284 (2008)	Proposed 2010 Plan Amendment	Total Acres
Roads	Private	35.76	0.00	0.00	0.00	35.76
	Public	0.00	4.24	26.55	59.02	89.81
Drill Sites	Private	16.60	0.00	0.00	0.00	16.60
	Public	0.00	0.69	12.73	9.24	22.66
Overland Travel	Private	2.13	0.00	0.00	0.00	2.13
	Public	0.00	0.00	0.00	0.00	0.00
Overland Sites & Staging Areas	Private	0.44	0.00	0.00	0.00	0.44
	Public	0.00	0.00	0.40	0.23	0.63
Trenches & Bulk Sample Sites	Private	0.00	0.00	0.00	0.00	0.00
	Public	0.00	0.00	0.32	0.94	1.26
Total Disturbance	Private¹	54.93	0.00	0.00	0.00	54.93
	Public	0.00	4.93	40.00	69.43	114.36
Total Combined Disturbance Acres (Public and Private)						169.29

¹ Private is equivalent to private lands and private mineral estate lands within the EA Analysis Area and outside of the Plan Boundary. Public is equivalent to public lands within the Plan Boundary. ² BMRR Reclamation Permit No. 0256 was amended to authorize 54.93 acres of surface disturbance on the private mineral estate lands. ³ Notice #N-79949 included 4.93 acres of surface disturbance on public lands.



2.2 Proposed Exploration Activities

Activities conducted under the Proposed Action would be implemented using the appropriate Best Management Practices (BMPs) established by the NDEP and the Nevada Division of Conservation Districts, 1994, *Handbook of Best Management Practices*, adopted by the State Environmental Commission December 7, 1994 (updated 2008). The following sections describe general operating procedures, construction techniques, and equipment that Fronteer anticipates using.

2.2.1 Equipment

Personnel would access the site in four-wheel drive vehicles. One or more truck-mounted, track-mounted, or articulated buggy-mounted reverse circulation or core drill rigs would be used for drilling in the Project Area. A Cat D-7 or D-8 or equivalent would be used to construct the roads and drill sites. Roads and drill sites would be reclaimed using a bulldozer or a Cat 325 or Cat 350 front-end excavator or equivalent. The following vehicles and equipment could be used in conjunction with Project activities:

- Up to six reverse circulation truck-mounted, track-mounted, or articulated buggy-mounted rotary drill rigs or core rigs;
- Up to four 2,000 to 3,500 gallon water trucks;
- Up to six all-terrain vehicles;
- Up to four pipe trucks;
- Up to two booster trucks;
- Two D-7, D-8 or equivalent bulldozer for road construction;
- Up to three excavators with a pneumatic hammer;
- Up to four auxiliary air compressors; and
- Up to ten portable light plant/generators.

Fronteer would take steps to prevent fires by ensuring that each field vehicle carries hand tools and a fire extinguisher. Water trucks at the Project would be used in the event of a fire. All portable equipment, including drill rigs, support vehicles, and drilling supplies, would be removed from the Project Area during extended periods of non-operation.

2.2.2 Staging Areas

Two staging areas are present within the Project Area and one additional staging area is included in the Proposed Action. Although temporary in nature, the facilities placed within the staging areas would require authorization under BLM's surface occupancy regulations at 43 CFR 3715 regulations. The staging areas are used to store drilling supplies and samples and as a temporary logging facility to examine drill cuttings and core. Equipment and facilities at the staging areas include temporary trailers and storage containers. If one of the trailers is used as an office or storage facility, a portable propane generator would be used to supply electricity to this facility. Fronteer would obtain all necessary permits for this facility including but not limited to any air quality permits required by NDEP and any building permits required by Elko County. A Sani-Hut facility would be placed at the staging areas, as appropriate, during the field season.

In order to minimize surface disturbance, the additional staging area would be located on a previously built drill pad, which would be increased in size to accommodate a staging area. The

new staging area would measure approximately 100 feet wide by 100 feet long and would create approximately 0.23 acre of surface disturbance.

2.2.3 Access and Road Construction

Due to the steep topography in the Project Area overland travel is not practical throughout most of the area; therefore, most of the Project activities would occur on constructed roads and drill pads. New roads would have an average running surface of approximately 16 feet. The total disturbance width of the roads (i.e., the road width plus the adjacent sidecast material) would depend on slope steepness.

Road grades would be kept at ten percent or less where possible, though there may be short spurs where such grades would be exceeded. Balanced cut and fill construction would be used to the extent possible to minimize the exposed cut slopes and the volume of fill material. Since the depth of cut would be kept to a minimum, growth media removed during construction would be stockpiled in the fill slope to be used during reclamation.

Road construction within active drainages would be avoided whenever possible. When drainages must be crossed with a road, BMPs would be followed to minimize the surface disturbance and erosion potential. Culverts will be installed where necessary to maintain proper drainage on the exploration roads.

Road construction would be performed with a Cat D-7, D-8, or equivalent and would occur intermittently throughout the life of the Project. Approximately 95,574 feet (18.1 miles) of road construction is included in the Proposed Action. Specific road locations would be determined in the field based on geologic information collected during the exploration program.

The Proposed Action also includes maintenance of existing roads on an as-needed basis. Road maintenance activities would include minor seasonal regrading and reestablishment of water bars as necessary, and smoothing rutted surfaces and holes on existing access and drill roads, as necessary. Erosion control items such as water bars would be monitored in the spring and fall.

The currently authorized Plan includes the upgrade of existing drill roads in Sections 28 and 29 into an all-weather road with a 16-foot running surface and armoring the surface with crushed rock that is suitable for use as road material.

2.2.4 Trenching and Bulk Sampling

The Proposed Action includes the installation of three new trenches for the purpose of obtaining bulk samples. The trenches would be a maximum of 30 feet long, 30 feet wide, and 20 feet deep. Bulk samples would be collected immediately following excavation of the trenches. The trenches would then be immediately backfilled before the excavation equipment leaves the trench site. The trench sites would avoid any identified historic property (i.e. any cultural resource site that either qualifies for listing on the National Register of Historic Places [NRHP] or which has not yet been evaluated for NRHP eligibility) for which data recovery has not yet been completed. Additionally, trench construction would comply with all required biological survey requirements and seasonal operating constraints for migratory bird nesting sites and mule deer winter habitat considerations. An as-built of the actual trench construction locations would be provided with the annual April 15 updates. It is estimated that the material excavated from the trench would cover 50 feet on either side of the trench and 75 feet downslope of the trench for a total trench footprint of approximately 130 feet wide and 105 feet long. Each trench would create approximately 0.31 acre of disturbance. The trenches would be reclaimed (i.e., recontoured and revegetated) at

the end of the field season in the year in which they were built. The approximate locations of the proposed trenches are shown in Figure 2.1.1.

Blasting operations may be used in addition to trenching for bulk sampling and for some road building activities. The nature of the ore and host rock is such that blasting may be required to provide a suitable sample for metallurgical test work. Industry standards would be used when blasting is utilized. A qualified, federally licensed and insured contractor, certified to conduct such operations, would be retained to plan, specify, organize and implement the blasting activities.

The contractor would drill blast holes approximately three- to four-inches in diameter with small diesel powered crawler mounted drills. On the scheduled blast day, the blasting contractor would bring the explosives to the site in Department of Transportation (DOT) and Bureau of Alcohol Tobacco, Firearms and Explosives approved vehicles. The contractor would load the holes, fire the shot and take the unused explosives, if any, with them when they leave. There would be no overnight explosives storage at the site.

The contractor would use non-electric detonators with explosive boosters and packaged ANFO for dry holes and emulsion blasting agents for wet holes, if any. The blast holes would be connected with non-electric surface delays in a sequence engineered to minimize fly rock and vibration. Use of non-electric detonators and delays would allow the safe use of two-way radio communications during the blasting process.

The safe blasting process would begin with notifying project personnel and Fronteer's ranch manager in advance. On the blast day, warning signs would be posted at all entrances to the blast site for public safety. The contractor's qualified blaster and crew would load the holes, tie in the shot, and run a lead line to a safe distance from the shot. Blast Guards, under the direction of the Blast Safety Officer, would clear the blast safety zone in a coordinated manner so no one could be left behind, and would then retreat to a safe distance; guarding the entrances to the blast site assuring no accidental access. The Blast Safety Officer would order the blaster to sound warning sirens. The Blast Safety Officer would make a final confirmation via two-way radio with the Blast Guards that the blast site was secure and then give the blaster the order to sound the final warning siren and to fire the shot. After the shot detonated, the blaster would inspect the shot to ensure that all explosives fired and would then give an all-clear signal and radio call.

2.2.5 Drilling

New drill pad disturbance would be kept to the minimum necessary for safe access and a safe working area for equipment and crews. Drill pads typically require a working area of approximately 70 feet long by 30 feet wide. The Proposed Action includes the construction of approximately 126 drill sites. More than one hole would be drilled from many of these sites. Sediment traps (sumps) would be constructed at each drill site to collect drill cuttings and manage drill fluids. A typical dimension for a sump is approximately 15 feet long by ten feet wide by eight feet deep. Sumps would be closed at the end of each field season. The exploration program would consist of drilling exploration holes utilizing truck-mounted, track-mounted, or articulated buggy-mounted reverse circulation or core drill rigs and support equipment. Holes would be both vertical and angled.

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

Water or nontoxic approved drilling fluids would be utilized during drilling. Fronteer would obtain water for drilling from a well at the Oasis Truck Stop located four miles north of the Project. Fronteer has an agreement with the owner of the Truck Stop to use water from the well to support the exploration activities. Fronteer has obtained a temporary waiver from the Nevada Division of Water Resources (NDWR) (Waiver MM-166) authorizing the use of water from the Oasis well for mineral exploration drilling and dust control at the Long Canyon Project. Fronteer may also purchase water from the Cities of Wendover and West Wendover or develop its own water source on the Big Spring Ranch.

Standard drilling procedures typically require a geologist to be involved with all drilling activities. The duties of the geologist normally include monitoring the progress of the drilling activities, logging each hole according to the geologic features encountered, determining the maximum depth of each hole, and advising the drill operator as needed. The geologist normally travels to and from the drill site in a separate four-wheel drive pickup truck.

Standard drill rig crews normally consist of a drill operator and one or two helpers. The helpers normally remove and box the recovered core or rotary samples, mix drilling fluids in the portable mud tank, operate the water truck and assist with drilling operations, and conduct maintenance as necessary. The crew is normally transported to and from the drill site in a four-wheel drive vehicle. Depending on the number of drill rigs in operation at a given time, as many as 40 people (the drill crew, Project geologists, road-building crew, etc.) would be working on the Project. Drilling activities may occur on a 24-hour per day schedule for some drill rigs.

All equipment would be properly muffled and equipped with suitable and necessary fire suppression equipment, such as fire extinguishers and hand tools. All Project-related traffic would observe prudent speed limits to enhance public safety, protect wildlife and livestock, and minimize dust emissions. All activities would be conducted in conformance with applicable federal and state health and safety requirements.

All Project-related refuse would be disposed of on a daily basis consistent with applicable regulations. No refuse would be disposed of on site. In the event that hazardous or regulated materials such as diesel fuel are spilled, the measures outlined in the Spill Contingency Plan (Appendix E of the 2010 Plan Amendment) would be taken to control the spill. The BLM and the NDEP would be notified if a petroleum product spill exceeded the Reportable Quantity of 25 gallons or three cubic yards of contaminated material. The City would be notified if a petroleum product spill exceeds ten gallons. Any spill of a hazardous material would also be reported.

2.2.6 Ground Water Monitoring Well Drilling

The Proposed Action includes drilling up to 11 ground water monitoring wells in the Project Area. Three ground water monitoring wells are proposed to be installed within the mineralized zone and up to eight additional ground water monitoring wells may be drilled at locations to be determined at a future date within the Project Area. All ground water monitoring wells would be drilled on sites previously used for mineral exploration drilling so no new drill sites or roads would be constructed for the monitoring wells.

The ground water monitoring wells would require authorization under BLM's surface occupancy regulations at 43 CFR 3715. In compliance with NDWR requirements, each well would be equipped with a steel surface casing, and a locking cap. The elevation of the top of casing would be surveyed. Additionally, each borehole would be surveyed with a downhole directional survey

prior to installation of the PVC casing. The proposed locations for the three monitoring wells within the mineralized zone are shown on Figure 2.1.1.

The ground water monitoring wells would be drilled and completed by a Nevada-licensed water well driller using a truck-mounted, track-mounted, or articulated buggy-mounted reverse circulation drill rig and support equipment. All of the holes would be vertical because these are monitoring wells. Drill site construction within drainages would be avoided. Sediment traps (sumps) would be constructed at each drill site to collect drill cuttings and manage drill fluids. The surface disturbance attributable to the sump is included in the drill site disturbance acreage.

Each of the ground water monitoring wells would require a monitor well waiver from NDWR. Fronteer would provide the BLM and NDEP with copies of the NDWR waivers when they become available. It is anticipated that the monitoring wells would be actively monitored for a minimum of four years.

2.2.7 Reclamation

Reclamation would be completed to the standards described in 43 CFR 3809.420 and NAC 519A. Reclamation would meet the reclamation objectives as outlined in the United States Department of Interior Solid Minerals Reclamation Handbook #H-3042-1 (BLM 1992), Surface Management of Mining Operations Handbook H-3809-1 (BLM 1989), and revegetation success standards per BLM and NDEP “Revised Guidelines for Successful Mining and Exploration Revegetation” (BLM 1999). Existing roads would be utilized as much as possible, minimizing the need for road construction.

2.2.7.1 Schedule of Reclamation

The Proposed Action adopts the same reclamation practices that have already been approved and implemented for currently authorized and ongoing exploration activities. Reclamation activities would be conducted concurrently with exploration activities when the disturbance is no longer needed. Reclamation would begin within exploration areas considered inactive, without potential, or completed, at the earliest practicable time. Earthwork and revegetation activities are limited by the time of year during which they can be effectively implemented. Site conditions and yearly climatic variations may require that this schedule be modified to achieve revegetation success. Reclamation activities would be coordinated with the BLM and BMRR whenever necessary. The proposed reclamation is expected to have a duration of up to four years from the time of commencement of final reclamation and would be initiated within two years after the completion of exploration activities. Revegetation is anticipated to take three years after the time of seeding to achieve success. The trenches would be reclaimed at the end of the field season in the year in which they were built.

Table 2.2-1 outlines the anticipated reclamation schedule on a quarterly basis.

Table 2.2-1: Anticipated Exploration Reclamation Schedule

TECHNIQUES	Quarter				Year(s)
	1 st Jan- Mar	2 nd April- June	3 rd Jul- Sept	4 th Oct- Dec	
Regrading					Within 2 years of Project completion
Seeding					Within 2 years of Project completion
Monitoring					3 years beyond re-grading and reseeded

2.2.7.2 Drill Hole Plugging

The Proposed Action adopts the same drill hole plugging protocol that has been approved and implemented for currently authorized and ongoing exploration activities. All of the ground water monitoring wells would be plugged and abandoned according to NDWR requirements at a time in the future when they are no longer needed for environmental baseline data collection. Fronteer anticipates that the monitoring and data collection would continue for a minimum of four years following the completion of the monitoring wells. All of the ground water monitoring wells would be plugged and abandoned at the same time.

Except for the reverse circulation rotary drill holes that may be drilled as pre-collars for some of the core holes as discussed in Section 2.1.2, all drill holes (i.e., boreholes) would be plugged prior to the drill rig moving from the drill site in accordance with Nevada Revised Statutes (NRS) 534 and NAC 534.4369 and NAC 534.4371. If any drill hole encounters artesian conditions, the drill hole would be contained pursuant to NRS 534.060 and NAC 534.378 and would be sealed by the method described in subsection 2 of NAC 534.4371. If casings are set in a drill hole, either the drill hole must be completed as a well and plugged pursuant to NAC 534.420 or the casings would be completely removed from the drill hole and then the hole would be plugged according to NAC 534.4369 and NAC 534.4371.

2.2.7.3 Regrading and Reshaping

Regrading and reshaping of all constructed drill sites and exploration roads would be completed to approximate the original topography. Fill material enhanced with growth media would be pulled onto the roadbeds to fill the road cuts and restore the slope to natural contours. Roads and drill sites would be regraded and reshaped with an excavator or bulldozer. Reclamation of overland travel roads or pads that do not require replacement of sidecast material would be accomplished with an excavator bucket/ripper or a dozer to knock down and smooth any berms and relieve road compaction. Tire tracks (trails created by overland travel) would be lightly scarified and left in a rough state as necessary to relieve compaction, inhibit soil loss from runoff, and prepare the seed bed.

Should any drainage be disturbed, they would be reshaped to approach the pre-construction contours. The resulting channels would be of the same capacity as up and downstream reaches and would be made non-erosive by use of surface stabilization techniques (rip-rap) where necessary, and ultimately revegetated. Following completion of earthwork, all disturbed areas would be broadcast seeded as discussed in the following section. No drainages with viable riparian habitat would be disturbed by Project construction or drilling activities.

2.2.7.4 Revegetation

Generally, seedbed preparation and seeding would take place in the fall after regrading of disturbed areas. The seed bed would be harrowed or scarified before seeding to break up compacted soils as needed. All reclaimed areas would be broadcast seeded with a cyclone-type bucket spreader or a mechanical blower. Broadcast seed would be covered by harrowing, raking, or other site-specific appropriate methods as necessary to provide seed cover and enhance germination. Reclaimed surfaces would be left in a textured or rough condition (small humps, pits, etc.) to enhance moisture retention and revegetative success while minimizing erosion potential. Compacted areas including staging areas would be ripped or scarified prior to seed application.

The seed list provided by the BLM and listed in Table 2.2-2 is based on known soil and climatic conditions and was selected to establish a plant community that would support the post-exploration land use. The mix is designed to provide species that can exist in the environment of northeastern Nevada, are proven species for revegetation, or are native species found in the existing plant communities. Broadcast seeding would be at a rate of approximately 14.75 pounds pure live seed per acre. Changes or adjustments to the reclamation plant list or application rate would be made in consultation with and approval by the BLM and BMRR.

Timing of revegetation activities is critically important to the overall success of the program. Seeding activities would be timed to take advantage of optimal climatic windows and would be coordinated with other reclamation activities. In general, earthwork and drainage control would be completed in the summer or early fall and seedbed preparation would be completed in the fall, either concurrently with or immediately prior to seeding. Seeds would be sown in late fall to take advantage of winter and spring precipitation and optimum spring germination. Early spring seeding may be utilized for areas not seeded in the fall. Seeding would not be conducted when the ground is frozen or snow covered.

Table 2.2-2: BLM Revegetation Seed Mixture

Species		Application Rate (pounds of pure live seed/acre)
Common Name	Scientific Name	
Canby bluegrass	<i>Poa secunda</i>	2.00
Thickspike wheatgrass	<i>Elymus lanceolatus</i>	4.50
Western yarrow	<i>Achillea millefolium</i> var. <i>occidentalis</i>	0.25
Prostrate kochia	<i>Bassia prostrata</i>	2.00
Blue flax	<i>Linum Perenne</i>	0.25
Small burnet	<i>Sanguisorba minor</i>	0.25
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	5.50
Total		14.75

Per BLM's request, the seed mix for areas that would be reseeded without adding topsoil (i.e., the overland travel and staging areas) would include sagebrush, rabbitbrush, spiny hopsage, prostrate kochia, and crested wheatgrass. If drill sites and roads are constructed within stands of curl-leaf mountain mahogany (*Cercocarpus ledifolius*), two-year-old seedlings would be planted within the disturbed areas at stocking rates of no less than one individual every 20 feet.

2.2.7.5 Removal or Stabilization of Building, Structures, and Support Facilities

No permanent buildings or structures would be constructed on public lands within the Project Area. Although temporary in nature, the facilities placed within the staging areas would require authorization under BLM's surface occupancy regulations at 43 CFR 3715 regulations. The trailers and storage containers that may be placed on the staging areas would be removed when the exploration activities have been completed. All equipment and supplies would be removed following completion of the Project. In the event that fines are evident below the drill sumps, the area will be scarified and raked. Other materials, including scrap, trash, and unusable equipment would be removed on a regular basis and disposed in accordance with federal and state regulations and laws.

2.2.8 Environmental Protection Measures

The Proposed Action will continue to implement the environmental protection measures outlined in the 2008 EA (BLM 2008). Fronteer has committed to the environmental protection measures described below to reduce impacts and prevent unnecessary or undue degradation during construction, operation, and reclamation of the Proposed Action. The measures are derived from the general requirements established in the BLM's Surface Management Regulations at 43 CFR 3809 and BMRR mining reclamation regulations, as well as other water and air quality regulations. Additionally, Fronteer has volunteered to use environmental protections measures for the exploration activities on the private minerals estate land that are in substantial compliance with the 43 CFR 3809 performance standards.

Air Quality

- Emissions of fugitive dust from disturbed surfaces would be minimized by utilizing appropriate control measures such as prudent speed limits (i.e., 15 miles per hour [mph]) and spraying roads with a water truck, if necessary.

Cultural Resources

A finding of no adverse effects to historic properties for the Project is contingent upon adherence to the following protection measures. For purposes of this EA, a historic property is defined as any cultural resource that qualifies for listing on the National Register of Historic Places [NRHP] or which has not yet been evaluated for the NRHP. Since the entire Project has been determined to constitute a single federal undertaking under the NHPA, these environmental protection measures would apply to the entire 7,664-acre Project Area.

- Fronteer would avoid or otherwise mitigate potential effects to historic properties. Fronteer would notify BLM of any proposed ground disturbing activities that fall within 328 feet (100 meters) of the boundary of any historic property. The BLM would insure that measures to prevent adverse effects would be implemented. Once it is completed the project specific Programmatic Agreement (PA) discussed below would provide guidance as to appropriate mitigation measure. If a cultural property is unevaluated, the BLM would insure that Fronteer undertakes test excavations or otherwise collects sufficient data to determine National Register eligibility prior to considering mitigation measures.
- If avoidance is not practical or adverse effects cannot be effectively mitigated through avoidance, BLM would insure that Fronteer develops and implements an appropriate

treatment plan(s) designed to lessen or mitigate Project-related effects to historic properties. Treatment would be conducted in conformance with the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation* (48 Federal Registrar [FR] 44716) or undertake other appropriate protection measures. Completion of measures in the treatment plan to areas that may be affected by Project activities, including curation of collected artifacts and submission of final treatment reports acceptable to the BLM, would be a condition of approval for ground disturbing activities. More in-depth guidance would be provided by the cultural resources PA once it has been completed.

- Fronteer is working with the BLM and SHPO to develop a data recovery and treatment plan to mitigate effects to some historic properties located near current or planned exploration activities. Once the BLM and SHPO approve this plan, Fronteer would provide a BLM-approved archaeologist to implement the plan and mitigate these sites.
- A project specific cultural resources PA between the BLM, SHPO and Fronteer would be developed for the Long Canyon Project. The PA would specify procedures and mitigation measures for the entire project area for the life of the Project.
- A 164-foot (50 meter) buffer zone would be established around eligible sites that have not been mitigated through data recovery, and around unevaluated cultural resource sites within or near the Project Area to provide protection to the sites during construction and exploration. Historic properties and their buffer zones would be off-limit to all ground disturbing activities, including but not limited to driving, parking, grading/blading, excavation, equipment or supply storage, or any other activity that can break, damage, disturb or move artifacts-ecofacts/archaeological deposits. Any such activities are prohibited unless authorized in writing by the BLM authorized officer.
- If Fronteer abandons or withdraws its Long Canyon Exploration Project, then Fronteer shall incur no further expense for identification, evaluation or treatment for any historic properties or paleontological resources except for completing work (fieldwork and post-fieldwork activities including production of final inventory, testing and data recovery reports covering the description and analysis of all data collected up to that point) that is ongoing as of the date of withdrawal or abandonment.
- Pursuant to 43 CFR §10.4(g), Fronteer would notify the BLM authorized officer, by telephone and with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR § 10.2), and any previously undocumented archaeological, historic or paleontological sites. All Fronteer-related activities within 328 feet (100 meters) of the discovery would cease immediately and Fronteer or its authorized representative would secure the location to prevent vandalism or other damage. Activity at the location would be suspended until after the discovery has been evaluated, any necessary environmental protection measures completed and the BLM authorized officer has issued a written Notice to Proceed. Human remains, funerary objects, sacred objects, or objects of cultural patrimony found on federal land would be handled according to the provisions of Native American Graves Protection and Repatriation Act (NAGPRA) and its implementing regulations (43 CFR § 10). Human remains and funerary objects found on state or private land would be handled according to the provisions of Nevada statute NRS 383.150 to 383.190.

- Fronteer would ensure that measures are in place to protect cultural resources from runoff, drilling mud or effluent emitting from drill pads or new and upgraded roads.
- An archaeological monitor, funded by Fronteer, could be required during active construction at historic properties located within close proximity to ground disturbing activities. BLM would make determinations regarding monitoring needs on a case-by-case basis. Employment of a qualified archaeological monitor would also be required in the high vegetation area surrounding Long Canyon Spring during any project activities. Poor surface visibility due to dense vegetation prevented adequate inventory of this area.
- Given the long-term nature of the Project and the potential for Project-related deterioration of historic properties, BLM could require periodic monitoring of historic properties within the project boundary by a Fronteer funded archaeologist. BLM would determine the need and frequency of monitoring based on condition of the resources and the nature of ongoing activities within the Project Area. At a minimum, historic properties which have not been subjected to data recovery would be monitored biennially by a Fronteer funded archaeologist.
- Fronteer would train Project workers, contractors and any other Project personnel regarding the potential to encounter historic or prehistoric sites and objects, the proper procedures in the event that cultural items are encountered, prohibitions against artifact collection, and prohibitions against disclosing the location of culturally sensitive areas. Due to the potential for increased public access via exploration roads, Fronteer would be responsible for reporting to the BLM, actions of the public (such as artifact collecting or driving ATVs through historic properties) within the Project Area that could impact cultural resources.
- Fronteer would not disturb, alter, injure or destroy any scientifically important paleontological remains; or any historical or archaeological site, structure, building, object or artifact within the Project Area, cumulative effects areas. Fronteer would be responsible for ensuring that its employees, contractors or any others associated with the Project do not collect artifacts, or damage or vandalize archaeological, historical or paleontological sites or the artifacts within them. Should damage to cultural resources occur within the above areas during the period of construction, operation, maintenance or rehabilitation due to the unauthorized, inadvertent or negligent actions of Fronteer or any other project personnel, the Fronteer shall be responsible for costs of rehabilitation or mitigation. Individuals involved in illegal activities would be subject to penalties under the Archaeological Resources Protection Act (16 United States Code [U.S.C.] 470ii), the FLPMA (43 U.S.C. 1701), the NAGPRA (16 U.S.C. 1170) and other applicable statutes.

Invasive, Nonnative Species

- Noxious weeds would be controlled through implementation of preventive BMPs as outlined in Table 2.2-3, which would include, but not be limited to the following: (a) any heavy equipment moving in to the Project Area from another project site would have wheel wells, wheels and tires, bumpers, undercarriage, etc., cleaned with high pressure water or air to remove any weed seeds prior to moving onto the site; (b) only certified weed-free seed would be used for reclamation seeding; and (c) all reclamation would be monitored for infestations of noxious weeds. These BMPs are based off of the 2010 BLM

Elko District Office’s “Best Management Practices for Noxious Weed Prevention and Treatment” document.

- Eradication measures would be implemented in coordination with the BLM if noxious weeds were found.

Table 2.2-3: Weed and Invasive Species Control Best Management Practices

BMP	Purpose
Equipment washing prior to moving onto Project Area	Reduces spread of invasive species into Project Area.
Use certified weed-free seed for reclamation	Reduces introduction of invasive species into Project Area.
Avoiding disturbance to known populations	Reduces spread of species into Project Area.
Removal of populations in reclaimed areas	Manage spread of invasive species in disturbed areas to allow native vegetation to establish.
Concurrent reclamation	Reduces the establishment of invasive species in disturbed areas.
Monitoring of reclaimed areas	Identifies populations of invasive species in early stages.

Migratory Birds

- Prior to surface disturbance being conducted during the avian breeding season (March 15 through July 31), Fronteer would provide a wildlife biologist to conduct migratory bird nest surveys of active working areas within the Project Area to verify that no nesting birds will be affected. These migratory bird nest surveys would be coordinated via telephone with the Wildlife Biologist in the BLM Wells Field Office no more than one week in advance of the drilling operation. A migratory bird nest survey would be completed and reported to the Wildlife Biologist in the BLM Wells Field Office before conducting any new surface disturbance. During the period from March 15 through May 15, all ground disturbing activities would be completed within fourteen days of the date on which the bird nest survey was performed. If activities begin or last more than fourteen days from the date of the most recent bird nest survey, another bird nest survey would be performed to ensure that no nests are disturbed and that no take of migratory birds occurs. A single migratory bird nest survey would be performed without the fourteen day time restriction for project activities occurring between May 15 and July 31 as most migratory bird species will have completed their nest building activities by then. If nests are located, or if other evidence of nesting (i.e., mated pairs, territorial defense, carrying nest material, transporting food) is observed, a protective buffer (the size depending on the habitat requirements of the species) would be delineated and the buffer area avoided to prevent destruction or disturbance to nests until they are no longer active.

Reclamation

- On a yearly basis, on or before April 15, Fronteer would submit to the BLM and BMRR a summary of exploration activities for the previous year. Fronteer would provide a GPS map of the disturbance and a summary of exploration activities from the previous year.

- Annual visits to the site would be conducted by a Fronteer-hired biologist to monitor the success of the revegetation. The proposed reclamation is expected to have a duration of up to four years from the time of commencement of final reclamation and would be initiated within one year after the completion of exploration activities. Revegetation is anticipated to take three years after the time of seeding to achieve success.
- Reseeding and revegetation would be consistent with all BLM recommendations for mix constituents, application rate, and seeding methods.
- Drill roads, drill pads, trenches, and sumps not needed for future exploration would be reclaimed as soon as practicable after completion of exploration activities.
- The trenches would backfilled immediately after sampling and mapping are completed and reclaimed at the end of the field season in the year in which they were built.

Access and Safety

- Public safety would be maintained throughout the life of the Project. All equipment and other facilities would be maintained in a safe and orderly manner.
- All trenches, sumps, and other small excavations that pose a hazard or nuisance to the public, wildlife, or livestock would be adequately fenced or backfilled to preclude access.
- All applicable state and federal fire laws and regulations would be complied with, and all reasonable measures would be taken to prevent and suppress fires in the Project Area.
- All cut wood associated with road and drill site construction would be stockpiled off site in designated locations for the public to access to reduce the hazard to the public during heavy equipment operation on access roads.
- A speed limit of 15 mph would be used by Project-related equipment on roads within the Project Area to reduce the potential for collisions with recreationists and grazing animals.
- In the event that any existing roads are severely damaged as a result of Fronteer activities, Fronteer would return the roads to their original condition.

Soils

- Applicable operational BMPs specific to mineral exploration activities would be implemented to control stormwater run-off at drill sites (NDEP 1994) and roads. Operational controls could include:
 - Diversion berms and channels;
 - Sediment basins/sumps;
 - Water bars;
 - Variable road grades;
 - Certified weed-free straw bales;
 - Wood slash;
 - Silt fencing; and
 - Concurrent seasonal reclamation.

- Applicable administrative BMPs including good housekeeping practices (NDEP 1994) would be implemented. Drill sites would be maintained free of debris and litter. Product and wastes would be containerized or otherwise stored such that precipitation or run-off would not come in contact with any industrial, petroleum or chemical material.
- Equipment would be properly maintained to reduce the possibility of leaks and hose ruptures. In the event of a discharge or spill, cleanup procedures would be implemented immediately to ensure that no materials would be available for transport by stormwater run-off.
- Drilling fluids would be directed to drill sumps. These sumps would be managed to reduce the possibility of drilling fluids entering natural drainages.
- Sediment traps, constructed as necessary on drill pads, would be used to capture drill cuttings and prevent their release to the environment.
- Erosion control structures such as waterbars would be monitored in the spring and fall.

Wastes

- Pursuant to 43 CFR 8365.1-1(b)(3), no sewage, petroleum products, or refuse would be dumped from any trailer or vehicle.
- Portable chemical toilets would be utilized and all human waste would be hauled off site.
- Only nontoxic fluids would be used in the drilling process.
- Drill cuttings and fluids would be contained on site utilizing appropriate control measures. Sediment traps would be used, as necessary, and filled following completion of exploration activities.
- Regulated wastes would be removed from the Project Area and disposed in a state, federal, or local designated area.
- Fronteer would follow the Spill Prevention Plan as specified in the 2010 Plan Amendment.

Special Status Species and Wildlife

- The Project is located within an area that may be subject to seasonal operational limitations when mule deer are migrating to their wintering grounds or if they are wintering in the Project Area during the timeframes established by existing NDOW flight survey and collaring data (NDOW 2011). Limitations on the amount of surface disturbing activities, type and scale of operations, location of disturbance, and timing of operations would be developed annually in consultation with the BLM by assessing on-the-ground conditions in the Project Area using existing and future deer tracking data (collared studies and survey flights).
- A Fronteer-hired biologist would conduct a pre-disturbance survey for pygmy rabbit (*Brachylagus idahoensis*) in the occupied habitat within the eastern half of Section 4,

T35N, R66E two weeks prior to any surface disturbance. If occupied habitat is detected within the proposed are of disturbance, Fronteer would contact the BLM biologist to determine an appropriate avoidance measure or buffer zone.

- Sumps would be constructed with at least one gentle side slope or with escape ramps to allow wildlife egress and would be backfilled at the end of each field season.

Vegetation

- If a unique plant community cannot be avoided, vegetation would be replaced on a one to one basis with plantings of similar tree species and seeding of similar shrub species.
- If disturbance to areas supporting mountain mahogany is unavoidable, two-year-old seedlings would be planted within the disturbed sites at stocking rates of no less than a 20-foot spacing.

Water Resources

Fronteer has implemented the environmental protection measures described in the 2008 EA (BLM 2008) to ensure that Project activities would not reduce the flow of Big Springs or the Johnson Springs system, nor reduce the production capacity of any West Wendover, Nevada and Wendover, Utah (City) wells, nor impair the quality of the water of Big Spring or the Johnson Springs system or any City wells. Since 2008, Fronteer has worked collaboratively with the City's technical experts to collect hydrogeologic data to enhance the understanding of the hydrology of the area and to ensure that the exploration drilling activities have not damaged Big Spring, the Johnson Springs system, or any City wells. Fronteer would continue to implement the ongoing measures and would continue working with the City to gather additional hydrogeological information. The following describes the environmental protection measures that are in place and the ongoing water resources environmental protection measures.

- Fronteer constructed a new municipal water well, Shafter No. 6, and all related infrastructure at a site that was selected by Fronteer and the City's technical consultants on the basis of data collected from three hydrologic test borings in the northern Goshute Valley. Shafter No. 6 is located in the City's Shafter well field in Section 11, T35N, R67E, approximately eight miles east-southeast of the Project Area. Fronteer constructed Shafter No. 6 in response to a request from the City for a new well in the Shafter well field that the City could use as a an auxiliary water source if the exploration drilling were to affect Big Spring. This 960-foot deep well was drilled and completed in August 2009 according to specifications developed by the City's technical experts. The well can produce more than 500 gpm of good quality water that meets all drinking water standards and can serve as a backup water supply in the event the Long Canyon mineral exploration drilling activities affect Big Spring. The infrastructure and right-of-way to connect Shafter No. 6 to the City's water distribution facilities in the Shafter well field were completed in June 2010.
- Prior to completion of Shafter No. 6, BLM imposed an operating restriction that limited the depth of the exploration drill holes to above the elevation of Johnson Springs.
- Fronteer constructed four water-level monitoring wells in the Project Area to provide water level and water quality data. Fronteer collects water level information from these

wells on a monthly basis and shares this data with the City. A water quality sample was obtained during drilling of these monitoring wells.

- To the extent permitted by disclosure laws applicable to publicly-held companies, Fronteer shares hydrologic data from the mineral exploration drilling program and provides it to the City. In particular, Fronteer would advise the City as soon as practical of any hydrologically unusual drilling results such as large cavities, major lost circulation, or artesian water flows.
- Fronteer would also notify the City if a mineral exploration hole encounters a significant amount of water and would use cement to plug any such hole in accordance with legal and regulatory requirements.
- Fronteer would advise the City, the BLM, and other appropriate authorities of all reportable spills. The NDEP's threshold for a reportable spill of a petroleum product is 25 gallons or three cubic yards of contaminated soil. In addition to this, Fronteer would also advise the City of any spill of a petroleum product exceeding ten gallons.
- Fronteer purchased and installed a turbidity meter and connected the meter to the City's existing telemetry system. The turbidity meter provides the City with a real-time indicator of any changes in suspended solids which might result from drilling activities.
- Starting in July 2008, Fronteer implemented a monthly water quality sampling program at Big Spring. This program was expanded in October 2008 to include three of the smaller springs in the Johnson Spring system by a single round of sampling in October 2008, followed by regular monthly sampling starting in May 2009. This water quality data is shared with the City.
- In coordination with the City's hydrologic consultants, Fronteer has conducted Part I of a Hydrology Study of Big Spring and the Johnson Springs system described in the proposed work scope submitted to the City on May 16, 2008 with the goals of:
 1. Establishing what has localized Big Spring;
 2. Assessing the relationship of the nearby smaller springs in the Johnson Springs system; and
 3. Understanding the general nature of the source(s) of the water to Big Spring.
- Fronteer has coordinated with the City's hydrologic consultants in developing a general hydrologic study of the northern part of the Goshute valley with a goal of assessing the adequacy of the valley aquifer to supply water to the City's Shafter well field. Fronteer would continue to work with the City to expand and refine this study and to develop contingency plans for assuring that adequate water is available to the City.
- The City and Fronteer have agreed upon distance and depth buffer zones as the basis for the Long Canyon Notification and Response Protocol shown in Table 2.2-4. The "Distance Buffer Zone" covers a one-mile radius from Big Spring as an appropriate distance from the spring to minimize concerns about potential impacts due to drilling activities. The "Depth Buffer Zone" is the 5,700 feet amsl elevation for holes within the

Distance Buffer Zone. The elevation of the Depth Buffer Zone was selected to provide a 20-foot buffer zone above the elevation of Big Spring (5,680 feet amsl). Fronteer worked with the Johnson Spring Committee, which is comprised of officials from the cities of West Wendover, Nevada and Wendover, Utah to develop the notification protocol shown in Table 2.2-4. This notification and response protocol would be implemented in the event the monitoring data indicate that a reduction in spring flow or an increase in turbidity exceeds the trigger levels.

Table 2.2-4: Long Canyon Drilling Notification and Response Protocol

Event	Response
Any exploration drill hole within the one-mile Distance Buffer Zone that encounters water that is artesian to the surface	Fronteer immediately takes appropriate measures to plug and abandon the hole or otherwise control the artesian flow. Fronteer notifies BLM and the Cities as soon as possible but no later than within 24 hours.
Telemetry data indicate a reduction in spring flow and/or an increase in turbidity that exceed trigger levels	West Wendover City Manager or Director of Public Works notifies at least one of the following Fronteer personnel: <ol style="list-style-type: none"> 1. Dan Anderson (775-778-2138); or 2. Jon Powell (775/478-5850). The cities will immediately send staff to Johnson Springs to evaluate field conditions
Fronteer provides drilling data for all holes being drilled or recently drilled within the Distance Buffer Zone to Cities and BLM and schedules a conference call or a meeting	Within 24 hours: <ol style="list-style-type: none"> 1. Fronteer provides Cities and BLM with information on location, depth, hydrologic characteristics of current and recent drill holes within the one-mile distance Buffer Zone, and other information requested by Cities. 2. Fronteer, the cities, and BLM schedule a conference call or a meeting to discuss monitoring and drilling data and to determine appropriate response to the trigger event.
Meeting or conference call to discuss monitoring data and develop action plan.	As soon as possible, but no later than within 24 hours, Fronteer, the Cities and BLM meet or have a conference call to evaluate the monitoring data to determine whether the observed changes in spring flow or turbidity may be due to the exploration drilling. An appropriate Action Plan is developed in response to this evaluation. At this point, the Cities will have the right to require cessation of drilling below the Depth Buffer Zone (e.g., below 5,700 ft) within the one-mile radius Distance Buffer Zone until the reason the trigger threshold was exceeded is resolved to the satisfaction of the Cities.
Fronteer implements Action Plan	Fronteer immediately takes steps to implement the agreed upon Action Plan.

- In the event that either the turbidity, flow reduction, or artesian flow triggers are met within the Distance Buffer Zone, the Cities may require that drilling below the Depth Buffer Zone be stopped until the data are evaluated to determine the reason the trigger threshold was exceeded. Thus, if the turbidity meter or flow meter trigger thresholds are met or exceeded, drilling would stop at any drill hole being drilled below the elevation of 5,700 feet (the Depth Buffer Zone) within a one-mile radius of Big Spring (the Distance Buffer Zone.) Drilling at sites located more than one mile away from Big Spring (i.e., outside the buffer zone) and holes within the buffer zone that are not planned to be drilled below 5,700 feet would not have to stop. Any hole within the Distance Buffer Zone that encounters water that is artesian to the surface would have to be immediately sealed

following Nevada Division of Water Resources sealing requirements for artesian wells at NAC 534.378.

- Fronteer would use non-toxic drilling fluids and would plug all drill holes (except those proposed to be completed as monitoring wells) prior to the drill rig moving from the drill site in accordance with NRS 534 and NAC 534.4369 and NAC 534.4371. (Drill holes collared with a reverse circulation drill rig and completed with a core rig would be plugged prior to the core rig moving from the drill site.) If any drill hole encounters artesian flow, the drill hole would be contained pursuant to NRS 534.060 and NAC 534.378 and would be sealed by the method described in Subsection 2 of NAC 534.4371. If casings are set in a drill hole, either the drill hole must be completed as a well and plugged pursuant to NAC 534.420 or the casings would be completely removed from the drill hole and then the hole would be plugged according to NAC 534.4369 and NAC 534.4371.
- Fronteer has included a Spill Contingency Plan in the 2010 Plan Amendment. The Spill Contingency Plan would be implemented to control any spills of drilling fluids and petroleum products. All containers of hazardous substances would be labeled and handled in accordance with NDOT and MSHA regulations.

Other

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

2.3 No Action Alternative

The NEPA requires that an alternative of No Action be analyzed in an EA. Under the No Action Alternative, the Proposed Action would not be approved. Fronteer could continue exploration activities under their existing approved Plan (NVN-82445) and would be limited to a maximum of 44.93 acres of surface disturbance on public land, of which approximately 31 acres is currently disturbed. In addition, Fronteer could continue exploration on private land and private mineral estate and create up to 54.93 acres of disturbance as approved under BMRR Permit No. 0256 without modifying this reclamation permit. This acreage on both public and private land could be reclaimed and released by the BLM or BMRR, based on compliance with the revegetation success release criteria; thereby, allowing Fronteer to create sequential acreage of disturbance. Activities associated with this total disturbance of 99.86 acres of surface disturbance include maintaining existing access roads, constructing exploration roads and drill pads, trenching, using two staging areas, and collecting bulk samples.

2.4 Alternatives Considered But Eliminated from Detailed Analysis

Fronteer and the BLM considered one other alternative to the Proposed Action; however, this alternative did not meet the purpose and need for the Project and was; therefore, eliminated from detailed analysis. The alternative considered was the use of overland travel to avoid construction of roads. This alternative was eliminated due to the fact that it is physically impossible to traverse the target areas without constructing roads due to the steepness of the terrain and density of trees.

3 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND CUMULATIVE EFFECTS

3.1 Introduction

The purpose of this Chapter of the EA is to describe the existing environment of the Project Area and potential environmental consequences affected by the Proposed Action. The 2008 EA analyzed the existing Plan boundary and approved surface disturbance and this analysis is incorporated herein by reference (BLM 2008). The potential effects of the No Action Alternative are discussed in Section 3.3. The cumulative effects associated with the Proposed Action in conjunction with past, present, and reasonably foreseeable future actions are discussed in Section 3.4.

Resources or elements that are managed under supplemental authorities (subject to requirements specified by statute or Executive Order) must be considered in all BLM environmental documents. Seventeen elements associated with the supplemental authorities listed in the NEPA Handbook (BLM 2008, Appendix 1) are listed in Table 3.1-1. The table lists the elements and their status in the Project Area as well as the rationale used to determine whether the element is present in the Project Area and if it would be affected by the Proposed Action. Elements that may be affected by the Proposed Action are analyzed in Section 3.2. Those elements listed under the supplemental authorities that do not occur in the Project Area and would not be affected are not discussed further in this EA. The elimination of irrelevant issues follows CEQ policy, as stated at CFR 1500.4.

Table 3.1-1: Project Area Resources or Elements Associated with Supplemental Authorities and Rationale for Detailed Analysis for the Proposed Action

Resource/Element	Not Present	Present/ Not Affected	Present/ Potentially Affected	Rationale/Reference Section
Air and Atmospheric Values			X	See Section 3.2.1.
Areas of Critical Environmental Concern	X			Not present in Project Area, not further addressed in this EA.
Cultural Resources			X	See Section 3.2.2.
Environmental Justice		X		See Section 3.2.3.
Farmlands, Prime or Unique	X			Not present in Project Area, not further addressed in this EA.
Floodplains	X			Not present in Project Area, not further addressed in this EA.
Forest and Rangelands			X	See Section 3.2.5, Forestry and Woodlands. See Section 3.2.13, Range Resources.
Health and Human Safety		X		Under Executive Order 13045, children are protected from environmental health and safety risks. In accordance with EO 13045, the Project would not use pesticides or herbicides. Therefore, the Project poses no health and human safety risk, and this element is not further addressed in this EA.
Invasive, Nonnative Species			X	See Section 3.2.7.
Migratory Birds			X	See Section 3.2.10.

Resource/Element	Not Present	Present/ Not Affected	Present/ Potentially Affected	Rationale/Reference Section
Native American Religious Concerns			X	See Section 3.2.11. The consultation to date has not revealed any concerns.
Threatened or Endangered Species (Plants and Wildlife)	X		X	Not present in Project Area but is further discussed. See Section 3.2.17.
Wastes (Hazardous or Solid)		X		See Section 3.2.20.
Water Resources (Surface and Ground Water)			X	See Section 3.2.21.
Wetlands and Riparian Zones	X			Not present in Project Area subject to disturbance. Impacts to wetlands adjacent to Project Area are not expected. This resource is not further addressed in this EA.
Wild and Scenic Rivers	X			Not present in Project Area, not further addressed in this EA.
Wilderness	X			Not present in Project Area, not further addressed in this EA.

In addition to the resources or elements managed under supplemental authorities, the BLM considers other resources and uses that occur on public lands and the issues that may result from the implementation of the Proposed Action. Other resources or uses of the human environment that have been considered for this EA are listed in Table 3.1-2 below.

Table 3.1-2: Project Area Resources or Uses Not Associated with Supplemental Authorities

Other Resources/Uses	Present/ Not Affected	Present/ Potentially Affected	Rationale/Reference Section
Fire Management		X	See Section 3.2.4.
Geology and Mineral Resources	X		See Section 3.2.6.
Grazing Management		X	See Section 3.2.13, Range Resources.
Lands and Realty		X	See Section 3.2.8.
Lands with Wilderness Characteristics		X	See Section 3.2.9.
Paleontological Resources	X		See Section 3.2.12
Recreation		X	See Section 3.2.14.
Social Values and Economics		X	See Section 3.2.15.
Soils		X	See Section 3.2.16.
Special Status Species (Plants and Wildlife)		X	See Section 3.2.17.
Vegetation		X	See Section 3.2.18.
Visual Resources		X	See Section 3.2.19.
Wild Horses and Burros	X		See Section 3.2.22.
Wildlife (General)		X	See Section 3.2.23.

3.2 Effects of the Proposed Action

The Project is located at elevations ranging between 5,800 feet amsl to 7,700 feet amsl and is located on approximately 7,664 acres, which is comprised mainly of public land, 480 acres of split estate lands where Fronteer owns the mineral estate and BLM acquired an interest in the surface overlying Fronteer's private mineral estate through a 1999 land exchange, and 320 acres of private land owned by Fronteer. Grazing, mineral exploration, and dispersed recreation have contributed to existing conditions (the baseline that reflects past and present actions) in the Project Area.

Direct effects are created by the action and occur at the same time and place. Indirect effects are a result of the action that are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects are discussed in Section 4.3 and may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8).

3.2.1 Air and Atmospheric Values

3.2.1.1 Affected Environment

Climate and Meteorology

The Project is located on the east flank of the Pequop Mountains in Elko County, where the climate is arid and characterized by warm, dry summers and cold, wet winters. The mean annual precipitation in Oasis, Nevada, located approximately four miles north of the Project, is 8.63 inches and the mean annual snowfall is 23.9 inches (Western Regional Climate Center 2008). The average annual low and high temperatures are 29.1 and 60.8 degrees Fahrenheit (°F), respectively.

Air Quality

NDEP air quality basins are generally the same as the Hydrographic Basins. The Project is located within the Goshute Valley Air Basin (187). The Goshute Valley Air Basin is designated by the Environmental Protection Agency (EPA) as "unclassified" per National Ambient Air Quality Standards as set forth in 40 CFR 81.329. An unclassified area is one for which no ambient air quality data are available and the ambient concentrations could be above or below the ambient air quality standards; however, unclassified areas are managed as in attainment. Generally, the ambient air quality over much of the valley is good, due to the limited population and absence of major industrial activity. The Project Area is classified as Class II, pursuant to the Prevention of Significant Deterioration regulations promulgated under the Clean Air Act (CAA). The Goshute Valley Air Basin is treated as an area "in attainment" with ambient air quality standards. Therefore, new sources within this basin must evaluate their impacts to air quality with respect to the ambient standards. The major source of fugitive dust in the vicinity of the Project Area includes vehicular traffic on unpaved roads and windblown dust.

Climate Change

According to the BLM's Instruction Memorandum (IM) No. 2008-171, "Guidance on Incorporating Climate Change into Planning and NEPA Documents," dated August 19, 2008,

climate change considerations should be acknowledged in EA documents. The IM states that ongoing scientific research has identified the potential impacts of anthropogenic (man-made) greenhouse gas (GHG) emissions and changes in biological carbon sequestration due to land management activities on global climate. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused CO₂(e) concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change recently concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.”

Several activities contribute to the phenomena of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs would have a sustained climatic impact over different temporal scales. For example, recent emissions of carbon dioxide can influence climate for 100 years.

Current emissions within the vicinity of the Project Area include vehicle combustion emissions, fugitive dust from travel on unimproved roads, ranch activities, and wildland fires. Emissions of all pollutants are generally expected to be low due to the extremely limited number of sources in the vicinity of the Project Area. Existing climate prediction models are global in nature; therefore they are not at the appropriate scale to estimate potential impacts of climate change within the Goshute Valley Air Basin in which the Project is located. Due to the nature and scale of the Proposed Action, effects on climate change are not further analyzed in this EA.

3.2.1.2 Environmental Consequences

Surface disturbance associated with the Proposed Action could impact up to 69.43 acres of soils through the removal of vegetation. Travel on dirt access roads, drilling, and excavation activities within the area of the Proposed Action would create fugitive dust, causing a minor impact to air resources. As described in the Proposed Action, fugitive dust would be controlled by minimizing surface disturbance. Speed limits on access roads would be observed and travel on roads within the Project Area would be conducted at prudent speeds. Impacts would be reduced by using water trucks for dust suppression, if required (e.g., when the roads are dry and dusty). Reclamation of proposed surface disturbance would gradually eliminate any potential for long-term impacts to air resources.

3.2.2 Cultural Resources

3.2.2.1 Affected Environment

The area of potential effect (APE) for this Project is defined as the 7,664-acre Project Area, all of which has been inventoried for cultural resources except for approximately 200 acres in Section 19 in T36N, R66E. Class III cultural resource inventories of the APE were completed by ASM Affiliates, Inc. (ASM), in December 2008, and in June, July, and October 2009 (Berg 2008, 2009, 2010). The inventories performed in 2008 and 2009 recorded a total of 48 sites; 13 of which are recommended as eligible for listing on the National Register of Historic Places

(NRHP) and deferral of eligibility evaluation to a later date is recommended for one additional site.

In 2008, ASM sent a field crew out to inventory Section 20, T36N, R66E (Berg 2008). The inventory consisted of intensive pedestrian surveys of the ridges and the northern drainage in this section; covering roughly 165 acres at 15m-wide transect intervals. In accordance with the approved BLM project authorization, this inventory strategy was designed to cover all areas that may contain sensitive cultural resources while avoiding areas with extremely steep terrain, which have proven through previous local cultural inventory projects to have a low probability for cultural resources. The inventory resulted in the discovery of only one isolated artifact, a resource type which is categorically not eligible for the NRHP.

ASM returned in June and July of 2009 to conduct a Class III cultural resources inventory of a 3,900-acre block area and proposed access road that included the western portion of Section 4 and all of Sections 5 and 6, T35N, R66E., along with portions of Sections 8, 9, 19, and 30 and all of Sections 17 and 30, T36N, R66E (Berg 2009). ASM identified 39 sites and 45 isolated artifacts in this part of the APE. Nine sites were recommended as eligible for the NRHP under Criterion D, and one was recommended as eligible under Criteria B and D. ASM also identified the area surrounding Long Canyon Spring as being of potential concern since seasonal vegetation growth in portions of Sections 19 and 30, T36N, R66E, resulted in inadequate ground visibility. ASM recommended that an archaeological monitor be present for any drilling or other project activities in this area to avoid inadvertently effecting historic properties that may currently be hidden by the vegetation.

In October 2009, ASM inventoried the remaining portion of Section 4, T35N, R66E, and ten proposed monitoring wells, some located within the APE and others on the valley floor outside to the north and east (Berg 2010). ASM also performed a reconnaissance of local rock shelters, caves, and rock overhangs in the APE to identify locations with surface or possible subsurface cultural or paleoenvironmental evidence. ASM identified nine archaeological sites and eight isolated artifacts. Three of the sites are recommended as eligible for listing on the National Register under Criterion D, and one other site requires further data collection and, therefore, remains unevaluated.

The BLM is currently reviewing ASM's 2009 and 2010 reports and has yet to make a formal determination of National Register eligibility or determine project effects for any of the sites, per Section 106 of the National Historic Preservation Act. All cultural resources having potential to qualify for listing on the NRHP would be avoided until Section 106 review is complete. Unevaluated sites would be treated as eligible until further investigation is conducted and an official determination of eligibility can be made. Avoidance or employment of a qualified archaeological monitor in the high vegetation area surrounding Long Canyon Spring would also be required during any project activities to avoid potential project effects to cultural resources.

3.2.2.2 Environmental Consequences

The Project would result in approximately 69.43 acres of surface disturbance over a period of ten years. Without measures incorporated into the Proposed Action, the proposed exploration drilling could impact historic properties directly as the result of damage incurred by construction activities. Indirect effects could result from improved access to areas within the Project Area that currently lack road access and from building roads in close proximity to historic properties. Creation of new or improved access can have substantial and long lasting adverse effects if

cultural resources are present. A number of studies (Williams 1978; Lyneis et al. 1980; Nickens et al. 1981) have shown that increased access leads to both intentional and incidental deterioration of nearby cultural resources. Nickens et al. (1981) found that most archaeological sites within approximately 300 feet of improved roads exhibited evidence of vandalism or illegal collection. Sites at considerably greater distances also suffered damage but with less frequency as distance increased (Desjean and Wilson 1990; Ison et al. 1981; Nickens et al. 1981). With the advent of widespread all-terrain vehicle use in the last decade, the BLM could anticipate that the spread of damage beyond new access roads may now be even greater. Based on the implementation of the protection measures discussed in Section 2.2.8, no impact to cultural resources would result from the Proposed Action.

Fronteer is working with the BLM and SHPO to develop a data recovery and treatment plan for some cultural sites that have been determined to be eligible for the NRHP. Once the BLM and SHPO approve this plan, Fronteer would provide a BLM-approved archaeologist to implement the data recovery and treatment plan and mitigate these sites.

3.2.3 Environmental Justice

3.2.3.1 Affected Environment

On February 11, 1994, President William Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. In April of 1995, the EPA released the document titled Environmental Justice Strategy: Executive Order 12898. The document established EPA-wide goals and defined the approaches by which the EPA would ensure that disproportionately high and adverse human health or environmental effects on minority communities and low-income communities are identified and addressed.

According to the 2000 United States Census, the American Indian and Hispanic populations constitute approximately 5.3 percent and 19.7 percent, respectively, of the total population of Elko County. Black, Asian, and Pacific Islanders comprise 0.6, 0.7, and 0.1 percent, respectively, of Elko County's population (U.S. Census Bureau 2010). For Nevada as a whole, American Indian and Hispanic persons made up 1.3 and 19.7 percent, respectively, of the population in 2000. Black, Asian, and Pacific Islanders constituted 6.8, 4.5, and 0.4 percent of the population, respectively in the State of Nevada in 2000 (U.S. Census Bureau 2010).

In accordance with EPA's Environmental Justice Guidelines (EPA 1998), these minority populations should be identified when either of the following exists:

- The minority population of the affected area exceeds 50 percent; or
- The minority population of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Populations of American Indians, Hispanics, Blacks, Asians, or Pacific Islanders do not exceed 50 percent of the population for Elko County. Although persons of American Indian heritage constitute a higher percentage of the total population within Elko County than the minority population in the State of Nevada, the Project Area is located on BLM-administered lands and private lands in predominantly vacant and rural areas.

The median household incomes in Elko County and the State of Nevada in 2008 were \$70,125 and \$56,432, respectively (U.S. Census Bureau 2010). According to the Census Bureau, the percentage of individuals below the poverty level in Elko County and the State of Nevada was 7.5 and 11.2 percent, respectively (U.S. Census Bureau 2010).

3.2.3.2 Environmental Consequences

Since the Project Area is undeveloped and unpopulated, the minority population is not meaningfully greater than the percentage for the State of Nevada as a whole. Therefore, for the purposes of screening for environmental justice concerns, the identified populations defined in EPA's guidance (EPA 1998) do not exist within the Project Area.

The median income in Elko County was higher than for the state as a whole in 2008 and the 2008 poverty rates were lower; therefore a low income population group as defined in EPA's guidance (EPA 1998) for the purposes of screening for environmental justice concerns is not present in the Project Area. There are no anticipated impacts to environmental justice from the Proposed Action; therefore, environmental justice is not further analyzed in this EA.

3.2.4 **Fire Management**

3.2.4.1 Affected Environment

No fuel reduction or habitat enhancement projects have been conducted or are proposed within the Project Area; however, the BLM has ongoing hazardous fuels reduction and habitat enhancement projects, in the vicinity of the Project Area.

3.2.4.2 Environmental Consequences

Implementation of the Proposed Action would be coordinated with the BLM's fire staff in order to ensure the safety of Fronteer personnel during all periods of prescribed fire activity in the area. Based on fire avoidance measures to be implemented under the Proposed Action (Section 2.2.8) and the fact that the Project Area would continue to be accessible, no impacts to fire management are anticipated. In addition, reclamation measures include seeding with vegetation that may be more favorable to fire avoidance and suppression in the long term.

No impacts to fire management from the Proposed Action are anticipated; therefore, fire management is not further analyzed in this EA.

3.2.5 **Forestry and Woodlands**

3.2.5.1 Affected Environment

The dominant vegetation community within the Project Area is the Great Basin Piñon-Juniper Woodland. This community in the Project Area is not within a designated or within a proposed old growth management area or within a proposed old growth forest stand. Approximately 5,690 acres of the Project Area is located within a Christmas Tree Cutting Area. No commercial timber harvest areas are located within the Project Area.

3.2.5.2 Environmental Consequences

Activities associated with the Christmas tree sales would not be restricted by the Proposed Action. Tree removal associated with road construction and exploration activities would be limited in nature relative to the abundance of the Great Basin Piñon-Juniper Woodland community within the Project Area and surrounding habitats. Piñon Pine and Juniper trees that are removed during construction of drill pads and drill roads would be removed from the site to the designated locations shown on Figure 3.2.1. This would reduce the risk of beetle infestation to the remaining stands. Trees would be removed within 72 hours of being harvested.

When possible, drill pad locations and roads would avoid areas containing curleaf mountain mahogany. As stated in Section 2.2.8, if disturbance to areas supporting this species is unavoidable, two-year-old seedlings would be planted within the disturbed sites at stocking rates of no less than a 20-foot spacing.

Based on the actions specified above, no impact to forestry or woodlands would result from the Proposed Action; therefore, forestry and woodlands is not further analyzed in this EA.

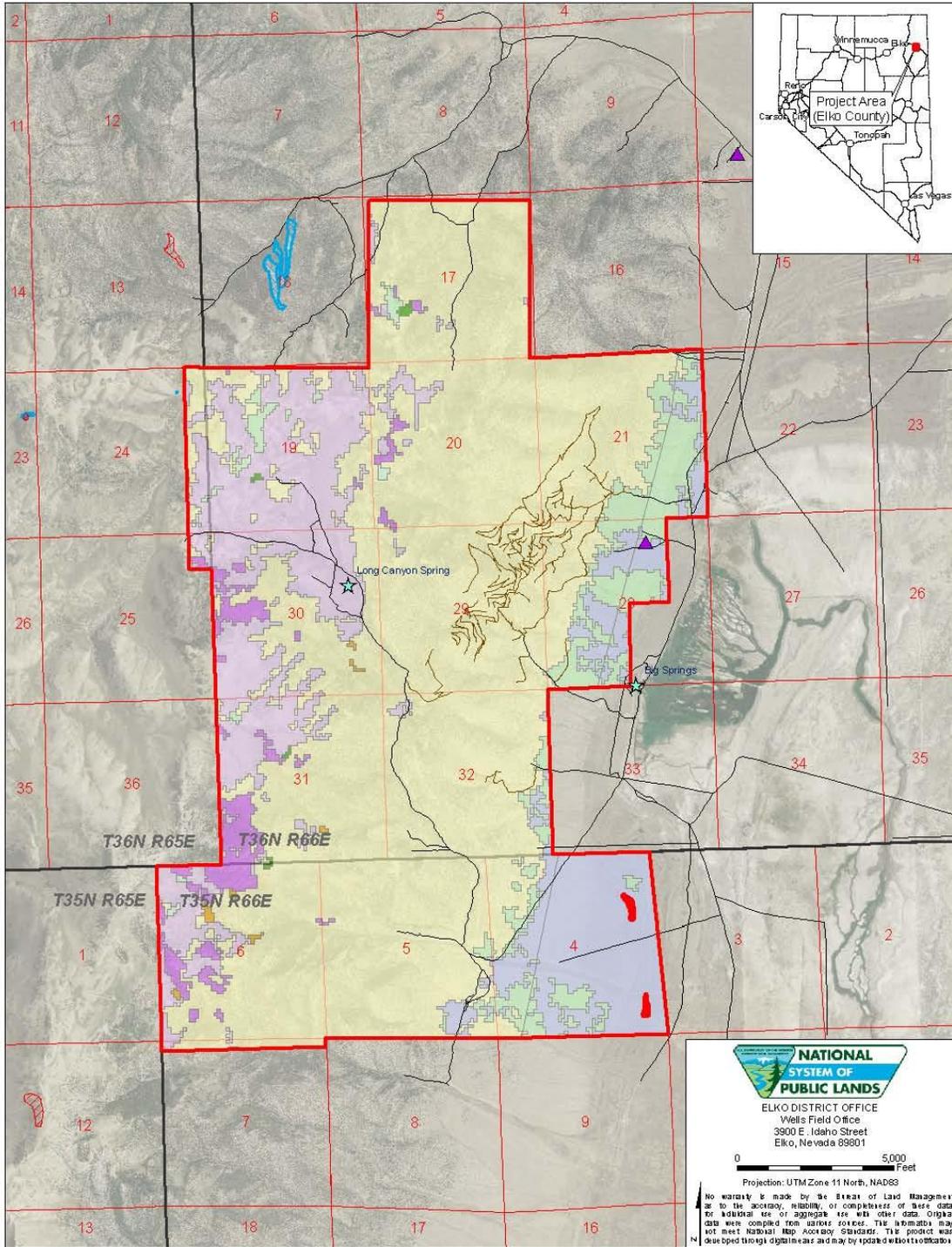
3.2.6 **Geology and Mineral Resources**

3.2.6.1 Affected Environment

The Pequop Mountains comprise an uplifted block of regionally east-dipping Paleozoic carbonate and siliciclastic rocks. As stated in Mine Development Associates' (MDA) *Updated Technical Report on the Preliminary Economic Assessment of the Long Canyon Project*, rocks of particular interest to the Project include limestone and dolomite of the Cambrian Notch Peak Formation and limestone of the overlying Ordovician Pogonip Group. In the Project Area, the dolomite horizon at the top of the Notch Peak Formation has been extended into a series of northeast-elongated megaboudins that strongly control the distribution of gold at the Project. There is evidence of weak metamorphism in the Project Area, mostly likely from the Elko Orogeny (MDA 2009).

The general stratigraphy of the Project Area begins with the Middle Cambrian Candland Shale, a thinly bedded calcareous siltstone and silty limestone exposed at the extreme south end of Long Canyon ridge. The strata, as well as the contact with the overlying Notch Peak Formation, are highly strained, but the contact appears to be depositional (Smith 2009). The Upper Cambrian Notch Peak Formation overlies the Candland Shale and consists of massive to thinly bedded limestone or dolomite in places with chert ribbons and nodules. There is an erosional unconformity between the Upper Cambrian Notch Peak Formation and the Ordovician Pogonip Group. The Pogonip Group is comprised of six main units and several sub-units.

The basal unit of the Pogonip Group hosts most of the mineralization at in the Project Area and consists of thinly bedded silty limestone, with varying zones of chert and pebble conglomerate. The Upper Ordovician Eureka Quartzite overlays the Pogonip Group. The Late Ordovician to Silurian Fish Haven Dolomite and Permian Pequop Formations are units presently mapped on the northern boundary of the Project Area that overlay the Eureka Quartzite. Mafic sills and dikes are present in the Project Area with varying degrees of alteration, with possible evidence of ductile deformation and multiple phases of intrusion (Smith 2009).



Explanation		Vegetation Communities (National GAP Analysis Program)	
	EAA Analysis Area		Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland
	Cut Wood Stockpiles		Great Basin Piñon-Juniper Woodland
	Springs		Great Basin Xeric Mixed Sagebrush Shrubland
	Permitted Drill Roads & Sites		Intermountain Basins Big Sagebrush Shrubland
	Existing (Pre-1981) Access Roads		Intermountain Basins Cliff and Canyon
	Potential Golden Eagle Cliff Nesting Habitat		Intermountain Basins Montane Sagebrush Steppe
	Suitable Golden Eagle Cliff Nesting Habitat		Intermountain Basins Mountain Mahogany Woodland and Shrubland
	Occupied Pygmy Rabbit Habitat		Intermountain Basins Semi-Desert Grassland

BUREAU OF LAND MANAGEMENT

EXPANDED LONG CANYON EXPLORATION PROJECT

Vegetation Communities and Wildlife Habitat

Figure 3.2.1

04/20/2011

The structural geology of the Project Area includes at least four deformational events. Strata are locally characterized by the following descriptions: a penetrative fabric at low angles to bedding; local areas of tight to isoclinal folds; intrafolial folds, development of a southeast-plunging, stretching lineation; and northeast-trending folds with boudinage on a regional scale (Smith 2009). The ductile deformation event that created these structures is attributed to the Jurassic Elko Orogeny. There are reverse and normal faults present in the Project Area as well as brittle and ductile deformation.

Gold mineralization in the Project Area occurs mainly within limestones along dolomite boudin margins and in boudin neck areas (Smith 2009). Significant karsting, likely of both meteoric and hydrothermal origin, is localized along the boudin margins and boudin necks, resulting in large, solution-collapse cavities. Much of the higher grade mineralization at the Project Area is hosted within the hematitic matrix of these collapse breccias, as well as in stratiform zones characterized by strong decalcification (MDA 2009). The alteration, mineralization, and geochemistry of the Long Canyon deposit are similar in nature to Carlin-type sediment-hosted gold deposits. The gold is present as micron-size to sub-micron-size disseminated grains, often internal to iron-sulfide minerals (arsenical pyrite is most common) or with carbonaceous material in the host rock (MDA 2009). The mineralization discovered to date is almost entirely oxidized.

3.2.6.2 Environmental Consequences

The Proposed Action would not involve the removal of rocks other than from drill holes and from trenches due to bulk sampling. The Proposed Action would increase understanding and knowledge of geology and mineralization within the Project Area. There would be no significant impact to geology and mineral resources from the Proposed Action.

3.2.7 Invasive, Nonnative Species

3.2.7.1 Affected Environment

An “invasive species” is defined as a species that is nonnative to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Invasive, nonnative species are species that are highly competitive, highly aggressive, and easily spread. They include plants, animals, and insects designated as “invasive,” “noxious,” or “pests” by federal, state, or other legally responsible authority. There are no known invasive, nonnative animal species (pests) that are mandated for control in the Project Area; therefore, pests are not further addressed in this EA.

The BLM defines “noxious weed” as “a plant that interferes with management objectives for a given area of land at a given point in time” (BLM 1996). Approximately 45 weed species are currently listed as noxious by the State of Nevada in NAC 555.010. The BLM Nevada strategy for noxious weed management is to “prevent and control the spread of noxious weeds through local and regional cooperative efforts to ensure maintenance and restoration of healthy ecosystems on BLM-managed lands. Noxious weed control would be based on prevention, education, detection, and quick control of small infestations” (BLM 1997). The Nevada Department of Agriculture, Plant Industry Division maintains a “Nevada Noxious Weed List.”

Based on the results of biological surveys, including four vegetation surveys, conducted since 2006 in the Project Area, there are no known invasive species or noxious weed infestations in the Project Area. As discussed in Section 3.4.5, some invasive or nonnative species have been

identified in the Pequop Mountain range along existing roads west of the Project Area. Cheatgrass is present within the Project Area, primarily along access roads in the lower elevations, but not in large monocultures (Enviroscientists 2006, 2007, 2009, 2010).

3.2.7.2 Environmental Consequences

New surface disturbance as a result of the Proposed Action would increase the potential for and promote the establishment and spread of invasive, nonnative, and noxious weeds. These impacts would be low because there are no known invasive species infestations in the Project Area and weed and invasive species control BMPs as outlined in Section 2.2.8 would be implemented to avoid the introduction of invasive species into the Project Area.

The BLM and Fronteer would cooperate to inventory and monitor noxious weeds within areas of Project-related disturbance within the Project Area. Fronteer would monitor and treat any noxious weed infestations that resulted from ground disturbing activities within the Project Area for at least three years following the treatment of the infestation until reclamation is completed. Treatments would be permitted, applied, and recorded per BLM policy. The BLM and Fronteer would cooperate to monitor the effectiveness of treatments on noxious weeds.

3.2.8 Lands and Realty

3.2.8.1 Affected Environment

The Proposed Action is in conformance with the Wells RMP for land use. The Proposed Action would result in minor temporary changes to land use in the Project Area with regard to recreation and grazing. Public safety would be maintained throughout the life of the Project as described in the environmental protection measures (Section 2.2.8), which include that all equipment and other facilities would be maintained in a safe and orderly manner; all trenches, sumps, and other small excavations that pose a hazard or nuisance to the public, wildlife, or livestock would be backfilled or adequately fenced to preclude inadvertent access; activities would be restricted to frozen or dry ground conditions where feasible; and in the event that any existing roads are severely damaged as a result of Fronteer activities, Fronteer would return the roads to their original condition.

Fronteer is not proposing any changes or alterations to existing access roads outside of the Project Area. In addition, activities associated with Christmas tree cutting would not be restricted and these uses would not be impacted by the Proposed Action.

No real estate transactions are part of the Proposed Action. The expanded area proposed to be added to the Plan boundary and all proposed surface disturbance in the Proposed Action is located on public land managed by the BLM. The BLM is evaluating Fronteer's request to purchase the BLM's interest in the surface estate on 480 acres of BLM-acquired lands that overlie Fronteer's private mineral estate in the northwest quarter of Section 29 and the western half of Section 21, T36N, R66E as described in Section 1.2. Although this potential real estate transaction is not included in the Proposed Action, the associated property is included in the Project Area. The BLM would have to prepare a separate NEPA document in order to evaluate the proposed purchase.

3.2.8.2 Environmental Consequences

The Proposed Action would not result in impacts to land use, access, or realty actions.

3.2.9 **Lands with Wilderness Characteristics**

3.2.9.1 Affected Environment

Very few exploration activities have occurred in the South Pequops Mountain Range. In the late 1970's there was a barite production mine and the area's most important feature at that time was a large resource of phosphate-bearing sedimentary rocks. Most exploration activities in the 1970's to middle 1980's have occurred on the crest of the range (LaPointe et al. 1991). In 2000 a Plan of Operations was submitted to the BLM for gold exploration in the South Pequops.

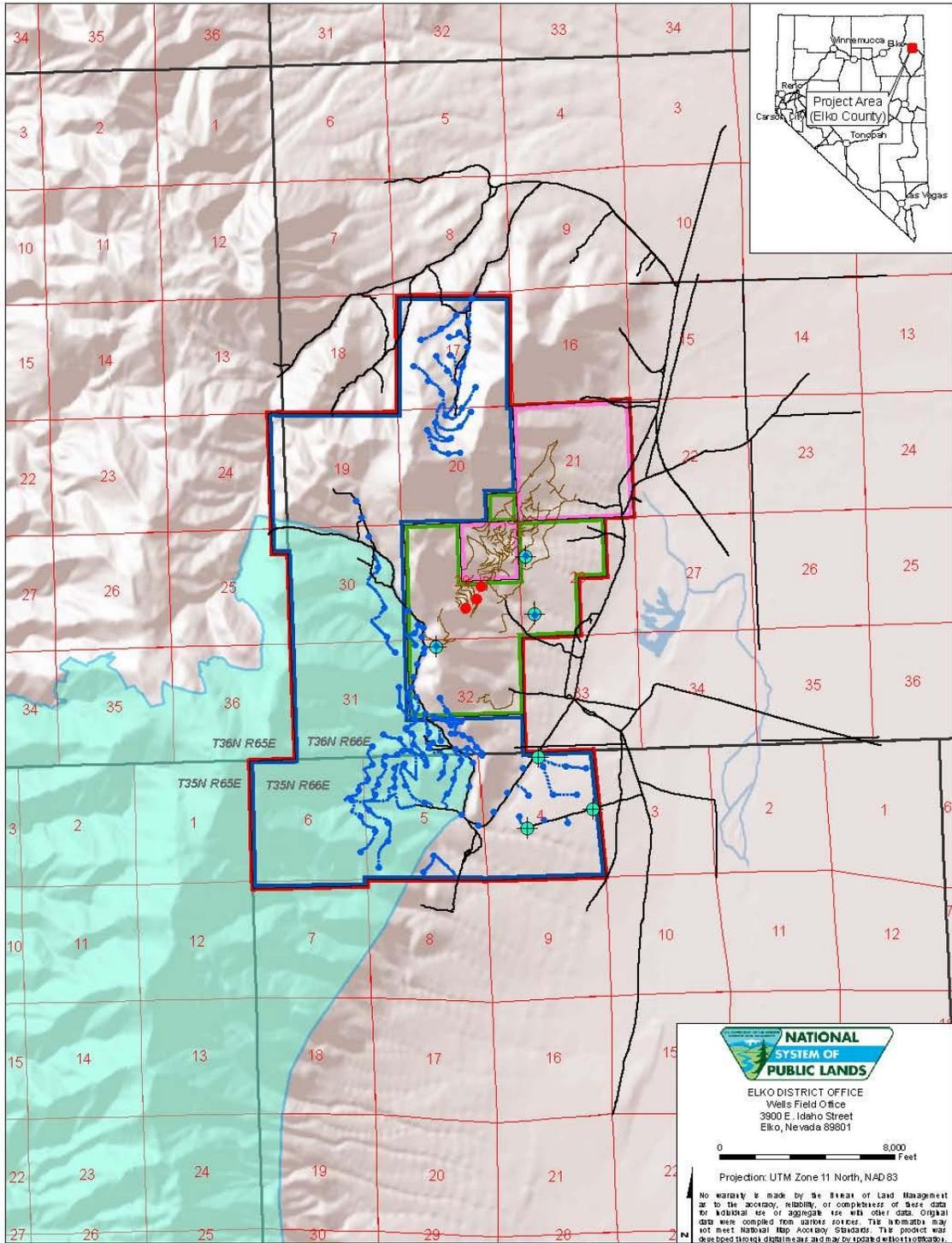
Within the proposed Project Area there are no Wilderness or Wilderness Study Areas (WSA). The South Pequops WSA is approximately 20 miles south of the Project Area. In 1999, BLM acquired approximately 70,000 acres adjacent to and encompassing the Project Area through the Big Springs Ranch Land Exchange. Under Section 201 of the FLPMA, the BLM is required to maintain an inventory of public lands. Because the Project Area encompasses recently acquired public lands, an area which covers 63,235 acres of BLM lands, including the Long Canyon and West Pequop existing and proposed exploration Project Areas, was inventoried for resource values including wilderness characteristics. Wilderness characteristics are defined in Section 2(c) of the Wilderness Act based on size, naturalness, and outstanding opportunity for solitude or primitive recreation, and may include other supplemental values such as ecological, geological or other features of scientific, educational, scenic, or historical value. A Lands with Wilderness Characteristics file for area NV-EK-03-076 has been created and is located in the Wells Field Office. Of those 63,235 acres in the inventory, BLM found that 27,835 acres possessed wilderness characteristics and approximately 2,537 acres of the Long Canyon Proposed Expanded Project boundary would be located in the area containing wilderness characteristics (Figure 3.2.2).

3.2.9.2 Environmental Consequences

The Proposed Action would result in surface disturbance of up to 14.26 acres within the 2,537 acre Long Canyon Proposed Expanded Project boundary on the 27,835 acres determined to have wilderness characteristics.

Size: Implementation of the Proposed Action would directly disturb up to 14.26 acres. These acres would be located on the north east edge of the lands having wilderness characteristics, thus the disturbance would not segment the area determined to have wilderness characteristics into areas less than 5,000 acres.

Naturalness: Deviations from naturalness are often described in terms of human modification of the natural landscape. The Long Canyon proposed exploration activities will result in surface disturbance from the development of drill pads and new roads, which could temporarily detract from the natural character of the landscape in the immediate vicinity of the 14.26 acres of disturbance. This temporary disturbance would be dispersed throughout the 2,537 acres of the expanded Project Area. Due to the rugged topography, vegetative screening, and overall size of the wilderness characteristics area, the naturalness of the areas beyond the immediate disturbance would not be affected.



Explanation

- EA Analysis Area
- 2010 Proposed Plan Expansion
- Authorized Plan of Operations Boundary
- BMRR Reclamation Permit No. 0256
- Proposed Exploration Drill Sites
- Proposed Trench and Bulk Sample Locations
- + Proposed Ground Water Monitoring Well
- Existing (Pre-1981) Access Roads
- Permitted Drill Roads
- Proposed Drill Roads
- Pequop LWC Unit (NV-EK-03076)

BUREAU OF LAND MANAGEMENT

**EXPANDED LONG CANYON
EXPLORATION PROJECT**
Lands with Wilderness Characteristics

Figure 3.2.2

04/20/2011

Outstanding Opportunities for Solitude: Noise from exploration activities would reduce the quality of the opportunity for solitude in the vicinity of the disturbance areas during periods of active operations. Those noise effects would be temporary in that they would last only as long as the exploration was occurring and would cease immediately upon completion of the Project. Visual effects of the Proposed Action would include surface disturbance and movement of machinery and vehicles, both directly in the disturbance areas and at further distances, depending on the topographic and vegetative screening. In most instances a visitor will be able to find solitude in the other 27,835 acres where exploration activities are not taking place. The Proposed Action would not eliminate outstanding opportunities for solitude within the wilderness characteristics area.

Outstanding opportunities for Primitive and Unconfined Recreation: Opportunities for primitive and unconfined recreation would not be diminished within the boundary of the 2,537-acre proposed Project Area. Access would remain to the area for all forms of primitive and unconfined recreation, including hiking, backpacking, fishing, hunting, cross-country skiing, wildlife watching and other non-motorized, non-mechanized activities. As noted above, the naturalness of areas in the immediate vicinity of the 14.26 acres of disturbance would be temporarily affected during operations; however, these impacts would be spatially and temporally limited, and reclamation of the drill roads would avoid increased motorized use of the area. Consequently, outstanding opportunities for primitive and unconfined recreation would continue to exist throughout the 27,835 acre area.

In summary, impacts to wilderness characteristics, mostly naturalness, would occur temporarily in the immediate vicinity of the 14.26 acres of disturbance until reclamation is complete and successful. BLM requires reclamation of all 3809 related activities, including this Project, making all proposed disturbance activities temporary and not expected to permanently impair the area's wilderness characteristics. Upon completion of the Project, roads and drill pads will be recontoured and reclaimed back to a natural state. Solitude and unconfined types of recreation are not required on every acre in order for the area to have wilderness qualities. Because solitude and primitive recreation can be found throughout the remaining portions of the wilderness characteristics area, they would not be considered compromised. Additional environmental protection measures as outlined in Section 2.2.8 will prevent impairment of wilderness suitability and undue or unnecessary degradation of land and resources.

Section 201 of FLPMA states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resource and other values (including but not limited to, outdoor recreation and scenic values), giving priority to areas of critical environmental concern. This inventory shall be kept current so as to reflect changes in conditions and to identify new and emerging resource and other values. The preparation and maintenance of such inventory or the identification of such areas shall not, of itself, change or prevent change of the management or use of public lands." Section 301 of FLPMA states that "The Secretary shall manage the public lands under principles of multiple use and sustained yield, in accordance the land use plans developed by him under section 202 of this Act when they are available, except that where a tract of such public lands has been dedicated to specific uses according to any other provisions of law it shall be managed in accordance with such law." The 1985 Wells Resource Management Plan (RMP) does identify additional management prescriptions within Wilderness Study Areas; however, the RMP does not establish management prescriptions for other lands having wilderness characteristics. The proposed Project is consistent with the management directives contained in the RMP.

3.2.10 Migratory Birds

3.2.10.1 Affected Environment

"Migratory bird" means any bird listed in 50 CFR 10.13. All native birds found commonly in the United States, with the exception of native resident game birds, are protected under the Migratory Bird Treaty Act (MBTA). The MBTA prohibits taking of migratory birds, their parts, nests, eggs, and nestlings. Executive Order 13186, signed January 10, 2001, directs federal agencies to protect migratory birds by integrating bird conservation principles, measures, and practices.

Additional direction comes from the Memorandum of Understanding (MOU) between the BLM and the United States Fish and Wildlife Service (USFWS), signed January 17, 2001. The purpose of this MOU is to strengthen migratory bird conservation through enhanced collaboration between the BLM and USFWS, in coordination with state, tribal, and local governments. The MOU identifies management practices that impact populations of high priority migratory bird species, including nesting, migration, or over-wintering habitats, on public lands, and develops management objectives or recommendations that avoid or minimize these impacts. Table 3.2-1 provides a compilation of the migratory bird species detected within the Project Area and vicinity during biological surveys conducted between 2006 and 2010.

Table 3.2-1: Migratory Bird Species Located In or Near the Project Area

Common Name	Scientific Name	PIF ¹ "Long term Planning and Responsibility Species"	NVPIF ² "Priority Species"	Habitat Associations*
American kestrel	<i>Falco sparverius</i>	No	No	Found in various open and semi-open habitats. Nest in natural holes in trees and abandoned bird nests.
American Robin	<i>Turdus migratorius</i>	No	No	Found in mixed, coniferous, and hardwood forests, grasslands, shrublands, and orchards.
Black-throated gray warbler	<i>Dendroica nigrescens</i>	Yes	Yes	Found mostly in piñon-juniper woodlands, and less frequently in mountain mahogany and montane riparian woodlands.
Black-throated sparrow	<i>Amphispiza bilineata</i>	No	No	Found in desert and shrubland/chaparral. Nests are well-concealed at the base of a bush or cactus, on or near the ground.
Blue-gray gnatcatcher	<i>Poliopitila caerulea</i>	No	No	Found in deciduous forest, open woodland, second growth, scrub, brushy areas, chaparral, and in open piñon-juniper woodland. Nests where tracts of brush, scrub, or chaparral are intermixed with taller vegetation

Common Name	Scientific Name	PIF ¹ “Long term Planning and Responsibility Species”	NVPIF ² “Priority Species”	Habitat Associations*
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	No	No	Found in agricultural fields that have brushy edges, open areas including parks, campgrounds, parking lots, wetlands, and suburban and urban settings.
Brown-headed Cowbird	<i>Molothrus ater</i>	No	No	Breeding habitat includes woodland, forest (primarily deciduous), forest edge, city parks, suburban gardens, farms, and ranches.
Burrowing owl	<i>Athene cunicularia</i>	No	Yes	Found in valley bottoms. Nest primarily in abandoned burrows of ground squirrels, badgers, and coyotes.
Bushtit	<i>Psaltriparus minimus</i>	No	No	Found in woodlands and scrub habitat with scattered trees and shrubs, in brushy streamides, piñon-juniper, chaparral and pine-oak associations.
Chipping sparrow	<i>Spizella passerina</i>	No	No	Found in woodlands edges, dry open woodlands, in pine-oak forests, along river and lakes shores, on lawns, grassy fields, orchards and parks.
Clark's nutcracker	<i>Nucifraga columbiana</i>	Yes	No	Found in piñon-juniper woodlands, and in higher elevation coniferous forests including ponderosa/Jeffrey pine forest, red fir forest, and spruce-fir forests.
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	No	No	Found in open canyons and river valleys with rocky cliffs for nesting, under bridges and freeways, farmland, wetlands, prairies, residential areas, road cuts and over open water. Require a source of mud for their nests.
Common nighthawk	<i>Chordeiles minor</i>	No	No	Found in open habitats, from shrub-steppe, grassland, and agricultural fields to cities, clear-cuts, and burns, as long as there are abundant flying insects and open gravel surfaces for nesting.
Common raven	<i>Corvus corax</i>	No	No	Found in dense forests, open sagebrush country, and alpine parklands.
Common poorwill	<i>Phalaenoptilus nuttallii</i>	No	No	Found in valleys and foothills, mixed chaparral-grassland, and piñon-juniper habitat. Nests in open areas on a bare site.

Common Name	Scientific Name	PIF ¹ “Long term Planning and Responsibility Species”	NVPIF ² “Priority Species”	Habitat Associations*
Cooper's hawk	<i>Accipiter cooperii</i>	No	Yes	Nest in old, tall deciduous tree groves, such as cottonwood stands.
Dark-eyed junco	<i>Junco hyemalis</i>	No	No	Habitats include various sorts of coniferous, mixed, and deciduous forest, forest edge; forest clearings, open woodland. Nests are in scrapes on the ground and usually are concealed by logs, rocks, tree roots, leaves, or ground vegetation.
Gray flycatcher	<i>Empidonax wrightii</i>	Yes	Yes	Found in tall sagebrush and bitterbrush stands and the sagebrush shrubland/piñon juniper transitional zone. Nest in tall sagebrush or conifers.
Gray vireo	<i>Vireo vicinior</i>	Yes	No	Found in open piñon-juniper woodlands. Nest in west or north facing trees in forked, lateral branches.
Great horned owl	<i>Bubo virginianus</i>	No	No	Found in forested habitats, moist or arid, deciduous or evergreen lowland forest to open temperate woodland, including second-growth forest, swamps, orchards, riverine forest, brushy hillsides, and desert.
Green-tailed towhee	<i>Pipilo chlorurus</i>	Yes	No	Found in mixed-species shrublands of intermediate and higher elevations, including piñon-juniper woodlands, montane sage steppe, and aspen. Nest on or near the ground under dense shrub cover.
Hairy woodpecker	<i>Picoides villosus</i>	No	No	Found in forest, open woodland, swamps, well-wooded towns and parks, open situations with scattered trees. Nests in hole dug mostly by male in live or dead tree or shrub.
House finch	<i>Carpodacus mexicanus</i>	No	No	Found in arid scrub and brush, thornbush, oak-juniper, pine-oak associations, chaparral, open woodlands, towns, cultivated lands, and savanna. Nest on ledge, tree branches, shrub, and cacti.

Common Name	Scientific Name	PIF ¹ “Long term Planning and Responsibility Species”	NVPIF ² “Priority Species”	Habitat Associations*
House wren	<i>Troglodytes aedon</i>	No	No	Inhabits thickets, shrubbery, and brushy areas in partly open situations, open woodland, farmlands, chaparral, and areas around human habitations. Nests in cavities.
Juniper titmouse	<i>Baeolophus ridgwayi</i>	No	Yes	Found in piñon-juniper woodlands. Nest constructed in natural tree cavity, in old woodpecker hole.
Lark sparrow	<i>Chondestes grammacus</i>	No	No	Found in shortgrass, mixed-grass, and tallgrass prairie; parkland; sandhills; barrens; old fields; cultivated fields; shrub thickets; woodland edges; shelterbelts; parks; riparian areas; brushy pastures; and overgrazed pastures. Nest on ground near plant or bush or in low tree or bush. May use old nest of mockingbird or thrasher.
Loggerhead shrike	<i>Lanius ludovicianus</i>	No	Yes	Found in open shrublands, including Mojave scrub, Joshua tree, salt desert scrub, sagebrush, lowland riparian, and montane riparian.
MacGillivray’s warbler	<i>Oporornis tolmei</i>	No	Yes	Nests in dense riparian willow and alder at the edges of meadows, coniferous or mixed woods.
Mountain bluebird	<i>Sialia currucoides</i>	Yes	No	Found in coniferous forest edges, open woodlands, and in the transitional area between piñon-juniper woodlands and sagebrush.
Mountain chickadee	<i>Poecile gambeli</i>	No	No	Found in dry coniferous forests, especially ponderosa and lodgepole pines. During the summer they can also be found in high-elevation aspen forests. In winter, they sometimes inhabit juniper stands and river bottoms.

Common Name	Scientific Name	PIF ¹ “Long term Planning and Responsibility Species”	NVPIF ² “Priority Species”	Habitat Associations*
Mourning dove	<i>Zenaida macroura</i>	No	No	Found in open woodlands, forest edges, cultivated lands with scattered trees and bushes, parks and suburban areas, arid and desert country. Nest in trees or shrubs, sometimes on a stump or rock or on a ledge of a building, or on ground. May nest in an old nest of another species or build its own platform of twigs.
Northern flicker	<i>Colaptes auratus</i>	No	No	Found in open forest, both deciduous and coniferous, open woodland, open situations with scattered trees and snags, riparian woodland, pine-oak association, parks. Nests in dead tree trunk, or stump, or dead top of live tree; sometimes nests in wooden pole, building or earth bank.
Northern harrier	<i>Circus cyaneus</i>	No	No	Hunts over open land or marshes; usually flies low when hunting, captures prey on ground. Nests on the ground, commonly near low shrubs, in tall weeds or reeds, sometimes in bog; or on top of low bush above water, or on knoll of dry ground, or on higher shrubby ground near water, or on dry marsh vegetation.
Northern saw-whet owl	<i>Aegolius acadicus</i>	No	No	Found in dense coniferous or mixed forest, cedar groves, alder thickets, swamps, and tamarack bogs. Nests usually in old woodpecker hole or other tree cavity.
Piñon jay	<i>Gymnorhinus cyanocephalus</i>	No (Management)	Yes	Found almost exclusively in piñon-juniper and occasionally wander into sagebrush and Joshua tree.
Prairie falcon	<i>Falco mexicanus</i>	No	Yes	Forage in sagebrush, salt desert, wet meadows, and some agricultural areas; nest in cliff ledges with overhead cover.
Red-tailed hawk	<i>Buteo jamaicensis</i>	No	No	Found in wide variety of open woodland and open country with scattered trees, rarely in dense forest.

Common Name	Scientific Name	PIF ¹ “Long term Planning and Responsibility Species”	NVPIF ² “Priority Species”	Habitat Associations*
Red-winged blackbird	<i>Agelaius phoeniceus</i>	No	No	Habitat includes freshwater and brackish marshes, bushes and small trees along watercourses, and upland cultivated fields. Nests usually are near water, in cattails, rushes, or sedges, occasionally in shrubs or trees.
Rock wren	<i>Salpinctes obsoletus</i>	No	No	Found in bare rock, talus, scree, on cliffs, and in the desert and shrubland/chaparral. Nest in gopher burrows, rock crevices, cavities under rocks, adobe buildings, etc.
Rough-legged hawk	<i>Buteo lagopus</i>	Yes	No	Found in grasslands, field, marshes, sagebrush flats, and open cultivated areas. Nests on cliffs.
Sage sparrow	<i>Amphispiza belli</i>	Yes	Yes	Found in big sagebrush and associated shrub species. Nest close to and on the ground under shrubs or in grass tufts.
Sage thrasher	<i>Oreoscoptes montanus</i>	Yes	Yes	Found in big sagebrush stands, in greasewood flats, and montane sagebrush steppe. Nest on the ground or in the shrub canopy, depending on greatest overhead cover.
Turkey vulture	<i>Cathartes aura</i>	No	No	Found in forested and open situations, from lowlands to mountains.
Vesper sparrow	<i>Poocetes gramineus</i>	No	Yes	Found in sagebrush steppe and dry-grassland associated species during breeding. Nest on the ground under vegetative cover.
Western meadowlark	<i>Sturnella neglecta</i>	No	No	Found in grasslands, savanna, cultivated fields, and pastures. Summers in grasslands and valleys; ranges up to higher elevations in foothills and open mountain areas. Female builds nest on dry ground.
Western scrub jay	<i>Aphelocoma californica</i>	No	No	Found in scrub (especially oak, piñon and juniper), brush, chaparral and pine-oak associations. Nest in low trees or shrubs.

¹Partners in Flight North American Landbird Conservation Plan. (March 2005)

²Nevada Partners in Flight (Neel 1999)

*References: NatureServe 2010 and Great Basin Bird Observatory 2005.

3.2.10.2 Environmental Consequences

The Project would result in up to 69.43 acres of surface disturbance, which could potentially result in the destruction of active nests or disturb the breeding behavior of migratory bird species. Fronteer has committed to provide a qualified biologist to conduct the nest surveys as described in Section 2.2.8 prior to any surface disturbing activities that would be conducted during the avian breeding season (March 15 through July 31). If nests are located, or if other evidence of nesting (i.e., mated pairs, territorial defense, carrying nest material, transporting food) is observed, a protective buffer (the size depending on the habitat requirements of the species) would be delineated and the buffer area would be avoided to prevent destruction or disturbance to nests and birds until they are no longer active.

3.2.11 **Native American Religious Concerns**

3.2.11.1 Affected Environment

In accordance with the NHPA (P.L. 89-665), NEPA, FLPMA, American Indian Religious Freedom Act, NAGPRA, and Executive Order 13007, the BLM must provide affected tribes an opportunity to comment and consult on the proposed Project. BLM must attempt to identify locations having traditional, cultural, or spiritual importance and limit, reduce, or possibly eliminate any negative impacts to identified traditional, cultural, spiritual sites, activities, and resources.

On April 26 and 27, 2010, the BLM invited Native American tribes and interested non-government groups to provide input, comment and/or consult on the proposed Long Canyon Project expansion. Letters were mailed to the Duck Valley Shoshone-Paiute Tribes, Te-Moak Tribal Council, Battle Mountain Band Council, Elko Band Council, South Fork Band Council, Wells Band Council, Western Shoshone Committee, the Confederated Tribes of the Goshute Reservation, and the Western Shoshone Defense Project. Letters notifying the above groups of a proposal to issue an archaeological excavation permit to conduct archeological data recovery at the Long Canyon Project were mailed on August 6, 2010. This letter was also sent to the Goshute Business Council, the Yomba Shoshone Tribe, the Duckwater Shoshone Tribe, the Ely Shoshone Tribe, the Western Shoshone Descendants of Big Smoky and the Bureau of Indian Affairs. Tribal representatives and tribal members from the Wells Band, the Duckwater Shoshone Tribe and the Shoshone-Tribe visited the project area with BLM on either September 9, 2010 or September 29, 2010. The Project was also discussed during the Shoshone-Paiute Wings and Roots meeting held on August 23, 2010. Tribal coordination is ongoing, however, no locations having traditional, cultural, or spiritual importance have been identified in the Project Area to date.

Cultural and archaeological resources are protected under the Archaeological Resources Protection Act and FLPMA. Therefore, as stated in Section 2.2.8, if any cultural properties, items, or artifacts (e.g., stone tools or projectile points) are encountered during Project activities, Fronteer would ensure that such items are not collected by their employees or contractors.

No Native American gravesites are known to be located within the Project Area. Should Native American human remains be discovered, inadvertent discovery procedures would be implemented as outlined in Section 2.2.8. The procedures outlined in Section 2.2.8 are in keeping with the NAGPRA, section (3)(d)(1), which requires the discovering individual to notify the land manager of such a discovery in writing and cease all activities until the land manager

can respond to the situation. Native American human remains discovered on private land would be treated in accordance with Nevada Law.

3.2.11.2 Environmental Consequences

No impacts to areas having Native American traditional or religious value have been identified to date.

3.2.12 Paleontology

3.2.12.1 Affected Environment

Fusulinid and crinoid columnals are present (with rare occurrence of gastropods) in the Pequop Formation in the Spruce Mountains (Coats 1987). In the Pequop Mountains, Pequop Formation is noted to contain only some fusulinids (Coats 1987). The Lehman Formation in the upper Pogonip Group is highly fossiliferous and contains planispiral gastropods and the ostracode *Leperditia*, which are characteristic. Based on the above, limited, literature review of the geologic setting of Project Area, significant vertebrate fossils are not abundant within the geological formations noted to be present. Additionally, there would appear to be limited potential for preserved paleontological resources due to the extensive hydrothermal alteration, folding, and faulting evident in the Project Area.

3.2.12.2 Environmental Consequences

Based on the review of the geologic setting of Project Area (Section 3.2.6), significant vertebrate fossils are not abundant within the geological formations mapped in the Project Area. Additionally, there would appear to be limited potential for preserved paleontological resources due to the extensive hydrothermal alteration, folding, and faulting mapped in the Project Area. The Proposed Action would not result in significant impacts to paleontological resources and, therefore, this resource is not further evaluated in this EA.

3.2.13 Range Resources

3.2.13.1 Affected Environment

The Project Area lies within the East Pequop Bench and Payne Basin/Long Canyon/Six Mile pastures of the East Big Springs Allotment. This allotment includes the Big Spring Ranch private lands owned by Fronteer. Fronteer has leased the Big Spring Ranch to the current East Big Springs Allotment permittee. Grazing use in the East Big Springs Allotment is governed by the “Final Grazing Management Decision and Record of Decision for the Sheep Complex, Big Springs, and Owyhee Allotments” dated 30 October 2006.

The East Pequop Bench Pasture has a carrying capacity of 3,069 Animal Unit Months (AUMs). Under the terms of the decision, this pasture is grazed in a four-year cycle. Two years out of four livestock use starts on March 1, with use starting on March 15 in the other two years. Livestock are removed from this pasture on June 15 in all four years. This pasture is divided by fences and water distribution into three use areas. The Project Area is located within an area that is used for livestock grazing at the end of each season (May through June) due to greater sage-grouse nesting and brood rearing habitat.

The Payne Basin/Long Canyon/Six Mile pasture has a current carrying capacity of 375 AUMs. Under the terms of the grazing decision, this would increase to 756 AUMs following completion of several range improvement projects and attainment of management objectives. The Long Canyon/Six Mile portion of this pasture is also grazed in a four year cycle, with livestock present from June 16 through August 30 in two years and June 16 through September 5 in the other two years.

Due to topography, the drilling that has been completed to date has not occurred in areas used by livestock. The Proposed Action includes drilling sites located along the bottom of Long Canyon and in the immediate vicinity of Long Canyon Spring where a livestock watering trough is located.

3.2.13.2 Environmental Consequences

Disturbance as a result of the Proposed Action is approximately 69.43 acres; however, due to the limited nature of the surface disturbance compared to the size of the pastures, livestock could continue grazing in the area and the impact of the Project activities on range resources would be minimal. Also, if access is required through a livestock fence, Fronteer would repair the livestock fence with a temporary gate. Potential exists for livestock/vehicle collisions on the road, and livestock may not want to utilize the area if drilling activities and grazing are occurring in the same time and place. As stated in Section 2.2.8, speed limits would be limited to 15 mph to reduce collision hazards. In addition, special precautions would be taken to avoid disturbance to the BLM's livestock key area located in the southeast quarter of the northeast quarter of Section 30, T36N, R66E. This may include limiting activity in this area during active grazing periods or other means established by the BLM's rangeland specialists.

Indirect impacts to livestock would occur as a result of short-term temporary loss of vegetation as a result of Project-related surface disturbance. There could be a long-term improvement of habitat in the Project Area once the surface disturbance has been reclaimed and revegetated providing a greater amount of herbaceous vegetation species available for livestock foraging. No impacts to the livestock watering trough would result from the Proposed Action.

3.2.14 Recreation

3.2.14.1 Affected Environment

Recreational use in the Project Area is dispersed in nature and consists mainly of hunting, Christmas tree gathering, motorcycle use and mountain bicycle racing and use. No developed recreational sites are located in or near the Project Area; however, there are established mountain bicycle and motorcycle race course routes adjacent to and within the Project Area. Hunters and motorcyclists utilize the road accessing Big Spring Ranch and the road through Long Canyon for recreation access.

Most users are from the local communities of Elko and Wells or own private lands in the Pequop area. The physical and social setting of the area is generally backcountry with a naturally appearing landscape, no obvious major roads, and between seven to 15 encounters per day on roads but zero to three encounters off the main travel ways.

3.2.14.2 Environmental Consequences

The Project could result in short-term impacts from noise and visual modifications associated with exploration activities. There would be a change in physical and social setting from backcountry to one that is more front country directly at the Project Area and as you move away from the Project Area becoming more of a middle country. Workers and vehicles would be more predominate, up to 30 encounters per day, and there would be increased evidence of use in the area. Hunters would be discouraged from using the area because of the increase in activity. The Proposed Action, which includes approximately 69.43 acres of surface disturbance, would also have a temporary impact to recreational opportunities because localized Project activities could temporarily block access on roads to and through the Project Area.

As stated in Section 2.2.8, a maximum speed limit of 15 mph by Project equipment would be utilized to reduce the hazard for collisions on public roads within the Project Area.

3.2.15 Social Values and Economics

3.2.15.1 Affected Environment

The Project is located in Elko County, Nevada, a county approximately 17,179 square miles in size (U.S. Census Bureau 2010). The closest cities providing a variety of services and lodging are Wells and West Wendover. The population of Elko County was estimated to be 51,325 in 2009 (State of Nevada Demographer 2010). The 2009 population estimates for Wells and West Wendover were 1,515, and 4,945, respectively (State of Nevada Demographer 2010). The City of West Wendover provides a variety of services including lodging, casinos, restaurants, gas stations, and stores. Frontier leases a warehouse storage unit in Wells to store some of the equipment and materials associated with the Project.

According to the Census Bureau, the percentage of individuals below the poverty level in Elko County and the State of Nevada was 7.5 and 11.2 percent, respectively (U.S. Census Bureau 2010). The median household incomes in Elko County and the State of Nevada in 2008 were \$70,125 and \$56,432, respectively (U.S. Census Bureau 2010).

In 2003, the U.S. Census Bureau defined new classifications of counties which are designated as "Micropolitan Statistical Areas." To be classified as a Micropolitan Statistical Area a group of counties must have a community of at least 10,000 to 49,999 people, be distant from a large city, and have proportionately few residents commuting outside the area. The northeastern Nevada counties of Elko and Eureka meet these requirements and have been designated as the Elko Micropolitan Statistical Area (S.A.). In September 2007, the University of Nevada, Reno published a technical report (UCED 2007/08-03) entitled "An Analysis of the Economic Impact of the Hard Rock Mining Sector on the Elko Micropolitan Statistical Area" (Price and Harris 2007). This report summarizes the important economic impact that the mining industry has on the Elko Micropolitan S.A. For example, the Elko Micropolitan S.A. is the primary area for the state's mining industry and during the First Quarter 2007, this area employed 5,202 mining employees, which consisted of 44.07 percent of total state of Nevada mining employment. In addition, the mineral industry accounted for 20.42 percent of the total employment within the Elko Micropolitan S.A. It was concluded that given the economic linkages of the Hard Rock Mining Sector, any changes in production levels by the Hard Rock Mining Sector greatly impacts the Elko Micropolitan S.A. economy. Finally, lost occupations from closure of mining

operations would not be hired into other Elko Micropolitan S.A. sectors and wages would not equal those in the mining industry (Price and Harris 2007).

A maximum of 40 people may be working at any time on the Proposed Action. Drilling activities may occur in two daily shifts. Temporary housing would be secured in Wells or West Wendover.

3.2.15.2 Environmental Consequences

The Project would have beneficial impacts on the local economies as the contract workers would obtain lodging, meals, and supplies in the nearby towns and would most likely be based out of Wells or West Wendover. No additional facilities or housing would need to be constructed and the maximum workforce of 40 persons would not strain the local housing supply or other services. Impacts from the Project would be beneficial to the local economies and temporary.

3.2.16 Soils

3.2.16.1 Affected Environment

Soils in the Project Area are typical of mountain slopes in the north-central Great Basin. Slopes are gentle to steep in gradient and runoff is medium to very high. In general, soil productivity is limited by the relatively short growing season and low levels of precipitation (BLM 1983). Soils in the Project Area were mapped by the Natural Resources Conservation Service (NRCS) as part of preliminary surveys of southeastern Elko County (NRCS unpublished data). The NRCS Web Soil Survey identifies the Pookaloo-Cavehill-Rock Outcrop, Haunchee-Halacan-Wardbay, and Pyrat-Automal-Shabliss associations as the three most dominant soil associations in the Project Area together covering 88.6 percent of the Project Area (NRCS 2010).

The Pookaloo-Cavehill-Rock Outcrop association covers 42.8 percent of the Project Area and is characterized by a low erosion hazard by water, moderate erosion hazard by wind, moderate to very high runoff, and moderate permeability. The Haunchee-Halacan-Wardbay association covers approximately 35.0 percent of the Project Area and is characterized by a moderate erosion hazard by water, low to moderate erosion hazard by wind, moderate to very high runoff, and moderate to high permeability. The Pyrat-Automal-Shabliss association covers approximately 10.7 percent of the Project Area and is characterized by a low erosion hazard by water, low to moderate erosion hazard by wind, low to moderate runoff, and moderate permeability.

3.2.16.2 Environmental Consequences

Surface disturbance associated with the Proposed Action would impact up to 69.43 acres of soils in phases over a ten-year period. The soil associations in the Project Area vary from very low to moderate for erosion hazard by water and the associations vary from low to high for erosion hazard by wind. Exploration activities associated with the Project would increase the erosion potential by wind and water of disturbed soils until reclamation was successfully completed. The potential impacts to soils would be reduced by the environmental protection measures incorporated in the Project design as outlined in Section 2.2.8, including the use of waterbars and other BMPs, and the concurrent reclamation of drill pads, sumps, trenches, and drill roads no longer needed for access. Reclamation activities such as regrading, ripping, and revegetation of disturbed areas would minimize soil loss.

3.2.17 Special Status Species

The BLM's policy for management of special status species is in the BLM Manual Section 6840. Special status species include the following:

- Federally Threatened or Endangered Species: Any species that the United States Fish and Wildlife Service (USFWS) has listed as an endangered or threatened species under the ESA throughout all or a significant portion of its range.
- Proposed Threatened or Endangered Species: Any species that the USFWS has proposed for listing as a federally endangered or threatened species under the ESA.
- Candidate Species: Plant and animal taxa that are under consideration for possible listing as threatened or endangered under the ESA.
- BLM Sensitive Species: 1) Species that are currently under status review by the USFWS; 2) Species whose numbers are declining so rapidly that federal listing may become necessary; 3) Species with typically small and widely dispersed populations; or 4) Species that inhabit ecological refugia or other specialized or unique habitats.
- State of Nevada Listed Species: State-protected animals that have been determined to meet BLM's Manual 6840 policy definition.

Nevada BLM policy is to provide State of Nevada listed species and Nevada BLM sensitive species with the same level of protection as is provided to candidate species in BLM Manual 6840.06C. Per the wording in Table IIa in BLM Information Bulletin (IB) No. NV-2003-097, Nevada protected animals that meet BLM's 6840 policy definition are those species of animals occurring on BLM-managed lands in Nevada that are: 1) 'protected' under authority of the NAC; 2) have been determined to meet BLM's policy definition of "listing by a state in a category implying potential endangerment or extinction;" and 3) are not already included as federally listed, proposed, or candidate species.

3.2.17.1 Affected Environment

The Project Area occurs on the eastern flank of the Pequop Range and contains ridges, cliffs, canyons, rock outcrops, and ephemeral drainages. Long Canyon, a major geographical feature within the Project Area, traverses the Project Area from northwest to southeast. Cliff walls, rock outcrops, and talus slopes are scattered throughout Long Canyon and throughout the Project Area. The only permanent source of water within the Project Area is Long Canyon Spring, which consists of a series of three man-made troughs. Big Springs and the Johnson Spring system occur immediately east of the Project Area and provide a dependable year-round water source for wildlife. The ephemeral drainages within the Project Area only carry water during snowmelt or rain events.

The Project Area contains six key habitats for wildlife as defined in Nevada's Wildlife Action Plan (NDOW 2006) including sagebrush, lower montane woodlands, intermountain conifer forests and woodlands, springs and springbrooks, cliffs and canyons, and barren landscapes. Sagebrush provides nesting cover and structure, protection from predators, thermal cover, and foraging for wildlife. Lower montane woodlands provide nesting cover, structure, and cavities, protection from predators, thermal cover, and foraging for wildlife. Intermountain conifer forests

and woodlands provide nesting cover, structure, and cavities, roosting, protection from predators, thermal cover, and foraging for wildlife. Springs and springbrooks provide water availability and food resources to wildlife. Cliffs and canyons provide structure for ledges and crevices for nesting, roosting, or denning, protection from predators, protection from the summer sun, and areas for foraging. Barren landscapes such as rocky slopes and talus are frequently found under cliffs and provide foraging, protection from predators, thermal cover, and food storage (NDOW 2006).

Federally Listed Species

No federally-listed plant species are known to occur in the Project Area; therefore, federally-listed plant species are not addressed further in this EA (USFWS 2010).

No federally listed threatened or endangered wildlife species occur within the Project Area. One federal candidate wildlife species occurs in the Project Area, greater sage-grouse (*Centrocercus urophasianus*). Greater sage-grouse is also a BLM sensitive species. The Sheep Complex, Big Springs, and Owyhee Grazing Allotments, Draft Environmental Impact Statement, Sensitive Bird Species, prepared by the BLM, Elko District Office, Nevada, December 2005, noted that greater sage-grouse could utilize part of the Project Area. The nearest greater sage-grouse leks and strutting grounds are approximately four miles south of the Project Area. The Project Area lies between lower elevation and upper elevation summer greater sage-grouse habitat and is located in BLM and the Nevada Department of Wildlife (NDOW) designated crucial winter habitat. Winter and nesting habitat for greater sage-grouse is located within the Project Area. Three greater sage-grouse individuals were detected within Section 4, T35N, R65E, of the Project Area during a wildlife survey conducted by Enviroscientists in July 2009. During a wildlife survey conducted by Enviroscientists in May 2010, both greater sage-grouse single scat and piles of scat were observed within Section 4, T35N, R65E.

BLM Special Status Species

No BLM sensitive plant species were identified as occurring within the Project Area; therefore, BLM sensitive plant species are not further discussed in this EA. Although not a BLM sensitive species, slender buckwheat (*Eriogonum microthecum* var. *laxiflorum*) as a host plant to a BLM sensitive butterfly species is discussed below.

Enviroscientists conducted wildlife surveys in the Project Area in July 2006, September 2007, July 2009, and May 2010. BLM special status species including insects, birds, raptors, and mammals have been detected within the Project Area during surveys. One BLM sensitive insect species was found within the Project Area during the July 2009 wildlife survey, the Mattoni's blue butterfly (*Euphilotes pallescens* var. *mattonii*) in conjunction with the species host plant, slender buckwheat. Greater than 50 individual Mattoni's blue butterflies were observed in Sections 19, 20, 28, 30, and 31, T36N, R66E, within the Project Area. The Mattoni's blue butterfly was observed in areas with dense populations of slender buckwheat. Areas of scattered host plant also occurred within the Project Area; however, no Mattoni's blue butterflies were observed in association with the areas of scattered slender buckwheat plants (Enviroscientists 2009).

BLM special status bird species that occur within the Project Area include the following: gray vireo (*Vireo vicinior*); juniper titmouse (*Baeolophus griseus*); loggerhead shrike (*Lanius ludovicianus*); piñon jay (*Gymnorhinus cyanocephalus*); and vesper sparrow (*Pooecetes*

gramineus). All of these species have foraging and nesting habitat within the Project Area; however no nests have been found during wildlife surveys conducted from 2006 to 2010.

BLM special status raptor species that have been identified during wildlife surveys within the Project Area include burrowing owl (*Athene cunicularia*) and prairie falcon (*Falco mexicanus*). A road killed fledgling burrowing owl was found on the north-south trending access road to the Project Area in July 2006. No burrows or nests have been found; however burrowing owls have suitable nesting habitat of abandoned burrows within the Project Area. Prairie falcons have been observed within the Project Area during the July 2006 and May 2010 wildlife surveys. An historic prairie falcon nest was observed in the Project Area in 1975. The nest location was searched for during the July 2009 wildlife survey and was not found. Suitable prairie falcon nesting habitat of cliffs and rock outcrops occurs within the Project Area.

Although not observed within the Project Area during wildlife surveys, there is suitable habitat for BLM special status raptors such as bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), and northern goshawk (*Accipiter gentilis*). Golden eagles have foraging habitat within the Project Area and vicinity. In eastern Nevada, suitable nesting habitat for golden eagle is primarily cliffs and ledges. The potential golden eagle nesting habitat located outside of the Project Area is shown on Figure 3.2.1. An historic golden eagle nest site was observed in the Project Area (NDOW 2009). The golden eagle nest location was searched for during the July 2009 wildlife survey and was not found. Bald eagles have a nesting distribution that is largely restricted to coastal areas, lakes, and rivers. Concentrations of fish, carrion, and waterfowl on wildlife refuges support the majority of the nation's wintering bald eagles. One bald eagle nest has been reported in northeastern Nevada and one nest has been reported near Lahontan Reservoir in western Nevada. Although no bald eagle nests or roosts have been observed in the Project Area, bald eagles could winter in the Project Area.

No ferruginous hawks or their nests were detected within the Project Area. Potentially suitable nesting habitat for ferruginous hawks is present in the eastern portion of the Project Area. Nest sites are normally located at the interface between piñon and juniper woodland and open sagebrush. Nest trees typically overlook broad expanses of open sagebrush or grassland. According to the NDOW, ferruginous hawks forage in the Long Canyon area (NDOW 2009).

Northern goshawks have suitable foraging habitat within the Project Area. According to the NDOW, northern goshawks forage in the Long Canyon area (NDOW 2009). In Nevada, northern goshawk most commonly nests in aspen stands (*Populus tremuloides*) which are not present within the Project Area. There is a historic northern goshawk nest in Six Mile Canyon in a white fir; therefore, there is potential atypical nesting habitat present within and near the Project Area.

A total of six BLM special status bat species have been detected within the Project Area. A bat survey conducted in the Project Area in September 2007 (Enviroscientists 2007), detected the following BLM special status species: little brown myotis (*Myotis lucifugus*); silver-haired bat (*Lasionycteris noctivagans*); long-eared myotis (*Myotis evotis*); and Brazilian free-tailed bat (*Tadarida brasiliensis*). The survey also potentially detected the fringed myotis (*Myotis thysanodes*) and the hoary bat (*Lasiurus cinereus*). The quality of the recordings was not sufficient for positive identification of the fringed myotis and hoary bat.

Additional bat surveys were conducted during the July 2009 wildlife surveys and detected the following BLM special status bat species: long-eared myotis; small-footed myotis (*Myotis ciliolabrum*); Brazilian free-tailed bat; and big brown bat (*Eptesicus fuscus*). One species was

potentially detected, little brown bat; however, the quality of the recording was not sufficient for positive identification of little brown bat. Numerous large, extensive rock outcrops, which could provide roosting habitat for bats, are present in the Project Area. These outcrops were carefully searched and no evidence of roosting bats (i.e., scat, urine, prey remains) was found. Long-eared myotis was recorded at most of the survey sites (ten out of 16 sites) and should be considered the most common bat species within the Project Area. All four of the bat species detected were present at Long Canyon Spring (shown on Figure 3.2.1) during the July 2009 wildlife survey.

Pygmy rabbit, a BLM special status mammal species, was detected in the Project Area during the July 2006 and May 2010 wildlife surveys. Occupied pygmy rabbit habitat is located within the eastern half of Section 4, T35N, R66E as shown in Figure 3.2.1. Typical pygmy rabbit habitat consists of dense stands of big sagebrush growing in deep loose soils that are deeper than 20 inches, have at least 13 to 30 percent clay content, and are light colored and friable. Pygmy rabbit habitat is generally on flatter ground or moderate slopes in Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) uplands, Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) drainages, and in ephemeral drainages in between ridges of low sagebrush (*Artemisia arbuscula*) (Ulmschneider 2004); however they have been found in greasewood (*Sarcobatus* sp.) and rabbitbrush (*Chrysothamnus* sp.) (Enviroscientists 2006).

The pygmy rabbit is believed to be one of only two rabbits in North America that digs its own burrows. Pygmy rabbits dig burrows three inches in diameter and a burrow may have three or more entrances (NatureServe 2010). Burrows are relatively simple and shallow, often no more than seven feet in length and less than four feet deep with no distinct chambers. The elevation range for this species is 4,500 to 7,450 feet amsl; however, they occur in elevations up to 8,000 feet amsl in the mountains in central Nevada. The winter diet of pygmy rabbits is composed of up to 99 percent sagebrush. During spring and summer, their diet may consist of roughly 51 percent sagebrush, 39 percent grasses, and ten percent forbs. During winter, pygmy rabbits use extensive snow burrows to access sagebrush forage, as travel corridors among their underground burrows, and possibly as thermal cover (USFWS 2003). Pygmy rabbit burrows, scat, runways, and individuals occur within the Project Area in Section 4, T35N, R66E. Pygmy rabbit burrows, scat, runways, and individuals occur just outside the Project Area in Sections 15 and 28, T36N, R66E.

According to the Nevada Natural Heritage Program (NNHP), there are two occurrences of relict dace (*Relictus solitarius*), a BLM sensitive fish species, outside of the Project Area in Big Springs that were last observed in 2005. Relict dace inhabits freshwater creeks, springs/springbrooks, and intermittent lakes and marshes with mud or stone bottoms. This species typically concentrates in well-vegetated pools where banks are undercut. Relict dace is a midwater swimmer and takes cover in soft bottom or in vegetation. This species feeds on amphipods, gastropods, insects, ostracods, and leeches (NaturServe 2010).

3.2.17.2 Environmental Consequences

Federally Listed Species

No federally threatened or endangered species are known to occur in the Project Area or were observed during biological surveys; therefore, no impacts to federally listed species would result from the Proposed Action. The greater sage-grouse, a candidate species for listing, is also a BLM Special Status Species and is discussed below.

BLM Special Status Species

Direct impacts to bats, pygmy rabbits, and other special status animal species sensitive to human activity and noise could include temporary displacement as a result of the Proposed Action. Construction of roads and drill pads and the operation of drilling equipment could disturb special status animal species due to the presence of humans and by creating noise and dust. Special status animal species foraging activities within the Project Area could continue since a maximum of five drill rigs would be operating in diverse locations at one time, allowing special status animal species to move around and between Project activities. The animals could still be frightened by noise and not utilize the area during drilling. Habitat fragmentation would be unlikely to occur because the drill program would be dispersed over the 7,664-acre Project Area with a maximum of 69.43 acres (or one percent) of disturbance over the life of the Project. Impacts to special status animal species would be lessened by reclaiming access and drill roads, and drill sites no longer needed for future exploration as quickly as possible. No long-term impacts to habitat are likely to occur since reclamation and reestablishment of vegetation would take place between one and three years after Project completion.

The direct disturbance of big sagebrush habitat within the 7,664-acre Project Area would preclude use by sensitive species, such as greater sage-grouse and pygmy rabbits. Destruction or disruption of an active nest or burrow may affect individual success, but is not expected to contribute to any detectable loss of viability for the regional population of these species. The disruption of habitat use could extend until operations cease. Lost habitat would not be replaced until the disturbed areas are successfully reclaimed. Some Project-related surface disturbance is proposed in pygmy rabbit habitat and there is potential for pygmy rabbit mortality along the access road. Direct impacts to sensitive species would be minimized by the implementation of the environmental protection measures outlined in Section 2.2.8 including a pre-disturbance migratory bird nesting survey, a pygmy rabbit clearance survey, clearing proposed drill site areas prior to construction, flagging areas to avoid, and observing speed limit restrictions in the Project Area. There would be no indirect impacts to special status animal species as a result of the Proposed Action.

Golden eagles are protected by the MBTA and the Bald and Golden Eagle Protection Act, both of which prohibit take. The Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance provides guidance to conduct informed impact analyses and mitigation during the NEPA process (USFWS 2010). Golden eagle foraging habitat is present in the Project Area and potential nesting habitat was observed in vicinity of the Project Area and consists of cliffs and ledges as shown in Figure 3.2.1. In order to avoid impacts to individual golden eagles and their habitat, implementation of the environmental protection measure outlined in Section 2.2.8 for migratory birds would ensure that prior to surface disturbance nesting surveys for migratory birds (including golden eagles) would be conducted and any identified nests would be avoided.

3.2.18 Vegetation

3.2.18.1 Affected Environment

The Project is located within the Calcareous Mountains Floristic Section, Great Basin Division, of the Intermountain Region (Cronquist et al. 1972). According to digital BLM vegetation data, a total of seven vegetation communities are located within the Project Area (Figure 3.2.1). In

general, the lower slopes of the Project Area are covered by sagebrush, progressing upslope to piñon-juniper woodlands typical of high desert mountain vegetation in northeast Nevada. Locally scattered subalpine fir, limber pine, and mountain mahogany are present at higher slope elevations, giving way to sagebrush and grasses on ridge tops.

As defined by the GAP Analysis Program and confirmed during biological surveys within the Project Area, Great Basin Piñon Juniper Woodland is the dominant vegetation community in the Project Area with an overstory that consists of Utah juniper (*Juniperus osteosperma*), singleleaf piñon pine (*Pinus monophylla*), and a sparse mixture of shrubs and forbs in the understory. The next largest vegetation communities, which are located on the eastern side of the Project Area, consist of the following: Intermountain Basin Montane Sagebrush Steppe mixed with Intermountain Basin Mountain Mahogany Woodland and Shrubland. Great Basin Xeric Mixed Sagebrush Shrubland and Intermountain Basin Big Sagebrush Shrubland are present in the lower elevations of the western portion of the Project Area. Located primarily in the eastern portion of the Project Area, are a few small occurrences of Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland and Intermountain Basins Semi-Desert Grassland.

3.2.18.2 Environmental Consequences

The Project would result in surface disturbance of up to approximately 69.43 acres of vegetation over the life of the Project. The disturbance would be created incrementally and be dispersed throughout the Project Area. Reclamation would begin upon completion of exploration activities using a BLM recommended seed mix (Table 2.1-3). In addition, the disturbance would be primarily linear (roads) or patchy (drill pads) in form, and therefore highly likely to be recolonized by surrounding vegetation. When possible, drill pad locations and roads would avoid areas containing mountain mahogany. As stated in Section 2.2.8, if disturbance to areas supporting these species is unavoidable, two-year-old seedlings would be planted within the disturbed sites at stocking rates of no less than 20-foot spacing. No disturbance is proposed under the Project within the Great Basin Foothill and Lower Montane Riparian Woodland Shrubland or within the Intermountain Basin Mountain Mahogany Woodland and Shrubland; therefore, no impacts to these unique communities would occur.

3.2.19 Visual Resources

3.2.19.1 Affected Environment

Scenic quality is a measure of the visual appeal of a parcel of land. Section 102(a)(8) of the FLPMA emphasizes protection of the quality of scenic resources on public lands. Section 101(b) of NEPA requires that measures be taken to ensure that aesthetically pleasing surroundings be retained for all Americans.

The Project Area is located in a Class IV Visual Resource Management (VRM) Class. The objective of this class is to provide for management activities that allow for major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Management activities could dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of such activities through careful location, minimal disturbance and repeating the basic elements of line, form, color, and texture (BLM 1986).

The characteristic landscape is that of the Great Basin, with wide open valleys bordered by mountain ranges trending north and south. The Project Area is located on the eastern slope of the Pequop Mountain Range. Elevations of the Pequop mountains are near 8,000 feet and the Project Area is located between 6,000 to 6,750 feet in elevation. The Project Area is in a predominately pinon-juniper forest type with open meadowlike areas dispersed throughout. From most vantage points the area's texture looks smooth and consistent with dark green and black coloring. Man made features in the area include existing mine disturbance in the form of roads, drill pads, machinery; range improvements and fences are also present.

3.2.19.2 Environmental Consequences

Visual concerns are mostly from the Interstate 80 west-bound travelers. Although the Project Area is more than a mile and a half from the Interstate (low visibility corridor), the Pequop Mountains are a focal point in the viewshed. West-bound travelers would look directly at the Project Area in the distance. The Project would result in short-term visual impacts principally affecting the visual elements of line and color. Horizontal and shallow diagonal lines from drill roads would cause moderate, temporary line contrasts with the natural landscape. Disturbance of vegetation would cause moderate, temporary color contrasts. With successful reclamation of exploration roads and revegetation, long-term visual impacts would be minimized. Environmental Protection Measures and standard operating procedures for exploration would aid in protecting the visual quality of the area. The effects of the Project on visual resources would be consistent with BLM prescribed Visual Resource Inventory Class IV objectives.

3.2.20 Wastes (Hazardous or Solid)

3.2.20.1 Affected Environment

All refuse generated by the Proposed Action would be transported off site and disposed of at an authorized landfill facility, consistent with applicable regulations. No refuse would be disposed of on site. Water and nontoxic drilling fluids or products, including Abandonite, Alcomer 120L, bentonite, EZ-mud, polyplus, and super plug, would be utilized as necessary during drilling and would be stored within the Project Area.

Hazardous materials utilized within the Project Area would include diesel fuel, gasoline, and lubricating grease. Approximately 500 gallons of diesel fuel would be stored in fuel delivery systems on vehicles and drill rigs. Approximately 150 gallons of gasoline would be stored in fuel delivery systems for light vehicles. Approximately 100 pounds of lubricating grease would be stored on the drill rigs or transported by drill trucks. All containers of hazardous substances would be labeled and handled in accordance with Nevada Department of Transportation (NDOT) and Mine Safety and Health Administration (MSHA). In the event hazardous or regulated materials, such as diesel fuel, were spilled, Fronteer would implement the spill control and cleanup measures outlined in the Spill Prevention Plan included in the 2010 Plan Amendment, and the BLM, NDEP, Occupational Safety and Health Administration (OSHA), EPA, and the Emergency Response Hotline would be notified, as required. As required in the Spill Prevention Plan, a spill kit would be kept on site. If any oil, hazardous material, or chemicals are spilled during operations, they would be cleaned up immediately. After clean up, the oil, noxious fluids, or chemicals and any contaminated material would be removed from the site and disposed at an approved off-site disposal facility.

Self-contained, portable, chemical toilets would be used for human waste and all human waste would be hauled off site and disposed in a sewage treatment facility.

3.2.20.2 Environmental Consequences

Through the implementation of the Spill Contingency Plan (Appendix E, 2010 Plan Amendment) and the BMPs and environmental protection measures described in Section 2.2.8, no impacts to the environment from wastes would result from the Proposed Action.

3.2.21 Water Resources

3.2.21.1 Affected Environment

Surface Water

The Project Area is located in the Goshute Valley Hydrographic Basin (No. 187) within the Central Hydrographic Region. The drainages within the Project Area are formed from ephemeral streams supplied with runoff from rains and winter snow pack. Drainage flows generally to the east from the Pequop Range toward Hardy Creek and Big Spring. The ephemeral drainages typically infiltrate into the ground water prior to reaching Hardy Creek or Big Spring and there are no channels (beds and banks) connecting these ephemeral drainages to Hardy Creek. In addition, these ephemeral drainages do not exhibit a vegetation response that differs from the vegetation in the adjacent upland areas. Long Canyon Spring is an ephemeral water feature in the northeast quarter of Section 30, T36N, R66E as shown on Figure 3.2.1.

The nearest known source of permanent surface water is the Johnson Springs system which discharges ground water to the surface producing localized perennial surface flows of water outside of the Project Area in Sections 22, 27, 28, 33, and 34, T36N, R66E. The principal discharge point of the Johnson Springs system is known as Big Spring. Big Spring is located on the Big Spring Ranch in the southwest quarter of the southeast quarter of Section 28, T36N, R66E as shown on Figure 3.2.1.

A portion of the flow from Big Spring is diverted into a pipeline and used as a source of municipal water for West Wendover, Nevada and Wendover, Utah. The Administrative Authority Wendover Pipeline Company rehabilitated Big Spring in the fall of 2003 and a new pump station was installed and cottonwoods were cleared from the spring area.

Much of the flow from the smaller springs in the Johnson Springs system, as well as some of the flow from Big Spring, is used by Big Spring Ranch for irrigation. The remainder of the resulting surface streams in the Johnson Springs system converge to form Hardy Creek which flows for approximately three miles downstream (to the east and then south) before the water is consumed by vegetation, is lost to evaporation, or it sinks into the ground (Global Hydrologic Services Inc. 2010).

The flow of Big Spring varies naturally due to changes in the distribution and quantity of precipitation in the recharge areas upgradient from the spring. The cities of West Wendover, Nevada and Wendover, Utah have collected flow data at Big Spring from a continuous flow meter since November 2006. During this data collection period, the flow of Big Spring has varied from a high of 2,053 gallons per minute, which was the daily average flow on November

14, 2006, to a low of 820 gallons per minute, which was the daily average flow on February 23, 2010 (Fronteer 2009 and Global Hydrologic Services Inc. 2010).

The Project Area is within the West Wendover Source Water Protection Area for the Johnson Springs system. In addition to the water that is piped from Big Spring to West Wendover and Wendover, the cities also obtain municipal water from six groundwater production wells in the Shafter well field located approximately eight miles east-southeast from the Project Area and from Big Spring.

Water quality is typically good in the Goshute Valley aquifers near the mountain fronts but deteriorates toward the valley floor (Eakin et. al 1949). For this reason (and possibly due to permeability considerations), water is typically withdrawn from Goshute Valley aquifers along the western valley margin at the base of the Pequop Mountains and along the east valley margin at the base of the Toano Range.

Since July 2008, Fronteer has been collecting water quality data on a monthly basis from Big Spring in compliance with one of the environmental protection measures described in the 2008 EA (BLM 2008). Prior to that, previous operators collected water quality samples at Big Spring in 2000, 2005, and 2007 (BLM 2008). The sample collected in 2000 was obtained approximately one month prior to any drilling activities and therefore provides baseline water quality data. Since October 2008, Fronteer has also collected monthly samples from three other springs in the Johnson Spring system (Fronteer 2009 and Global Hydrologic Services Inc. 2010).

The collected water quality samples have been tested for all naturally occurring constituents that have a drinking water standard, plus some trace elements typically associated with epithermal mineral deposits like Long Canyon. Field pH measurements were taken for most samples and range from 7.27 to 7.30 standard pH units.

All of the water quality samples taken to date meet the Nevada drinking water standards for all parameters. As would be expected for any natural water source, individual chemical parameters vary slightly over the period of measurement, but there are no discernable trends in the water chemistry over the period of record. For example, the total dissolved solids (TDS) content of the waters of Big Spring was 198 milligrams per liter (mg/L) in October 2000, dropped as low as 170 mg/L in September 2008, was 200 mg/L in August of 2008 and ranged between 180 mg/L to 210 mg/L throughout 2009. The Nevada drinking water standard for TDS is 1,000 mg/L. TDS is a good proxy indicator of overall water quality because changes in other chemical parameters would be reflected as variations in TDS. The water quality sampling results show that there has been no significant change in water quality or trace element chemistry since drilling activities began in 2000 (Fronteer, 2009 and Global Hydrologic Services Inc., 2010).

In early 2009, Fronteer installed a continuous monitoring turbidity meter at Big Spring to satisfy another environmental protection measure described in the 2008 EA (BLM 2008). This turbidity meter provides the City with a real-time time indicator of potential changes in water quality at Big Spring. The turbidity data are transmitted via a telemetry system to computers monitored by the City. If the turbidity exceeds 1 nephelometric turbidity unit (NTU) an alarm system will shut off the pumps and notify personnel of the City. Once the initial meter calibration problems were solved by the end of March 2009, the turbidity data show virtually no fluctuation in turbidity, and a low average turbidity measurement of 0.03 NTU.

Temperature data collected for Big Spring and the sampled springs in the Johnson Spring system are warmer than the mean annual temperature of this location. Therefore, it appears that Big Spring and some of the smaller springs of the Johnson Spring system contain some water that has arrived at the spring via a deep flow path (Global Hydrologic Services Inc. 2010).

Ground Water

Recharge to the aquifers of the Goshute Valley Hydrographic Basin is from infiltration of precipitation in the form of rain or winter snow pack. Precipitation is greatest in the highest elevation areas, and decreases with decreasing elevation. For example, precipitation data collected at Pequop summit (elevation 6,998 feet) from the period 1948-1984 show a mean annual precipitation of 12.34 inches. In contrast, the mean annual precipitation at Oasis (elevation 5,830 feet) from the period 1987-2008 is 8.68 inches. Oasis is located approximately four miles north of the Project Area and is the closest meteorological data collection station to the Long Canyon Project (Global Hydrological Services Inc. 2010). Eakin and Maxey (1949, p. 25) give the average precipitation of the floor of Goshute Valley as “about 8 inches.”

Fronteer drilled and completed the four ground-water monitoring wells in the Project Area shown in Figure 2.1.1 to fulfill one of the environmental protection measures in the 2008 EA (BLM 2008.) The NDWR issued Waiver Number M/O 1508 approving the installation of these wells on July 24, 2008. Ground water monitoring wells LCMW03 and LCMW04 were completed in December 2008. Ground water monitoring well LCMW02 was completed in April 2009; ground water monitoring well LCMW01 was completed in May 2009.

Fronteer has measured the depth to water in these monitoring wells on a monthly basis since March 2009. The measured depth to water in the Project Area varies from zero at the discharge area for the Johnson Springs system to over 780 feet at LCMW4. During the period of measurement, water levels have been stable. The potentiometric surface elevation ranges from 5633.86 feet at monitor well LCMW01 (September 2009) to 5683.97 feet at monitor well LCMW03 (June 2009). For comparison, the elevation of ground water surface elevations of Big Spring was 5681.25 feet amsl on June 10, 2009. The potentiometric surface in the bedrock beneath the mineral exploration area is up to 2.72 feet higher at LCMW03 than the elevation of Big Spring, with a gradient in the bedrock towards the east or southeast of significantly less than one foot per 1,000 feet. The direction of ground water movement is towards the east or southeast in the fractured bedrock of the Long Canyon deposit (Global Hydrologic Services Inc. 2010).

Ground water samples were collected by airlifting during the drilling of the boreholes for the monitoring wells in the Project Area. The ground water samples have not been collected from the completed monitoring wells, because, with the possible exception of LCMW01, the depth to water is too deep to allow sample collection from the existing wells. The water quality in the bedrock monitoring wells (LCMW02, LCMW03, and LCMW04) is chemically similar to the waters of Big Spring and the smaller springs of the Johnson Springs system. This is interpreted as evidence that the Johnson Springs system is likely supplied by the fractured bedrock aquifer. The water chemistry from monitor well LCMW01, located in the alluvium in the discharge area for the smaller Johnson Springs, is also similar.

Based on the ground water elevations measured in the monitoring wells, the ground-water gradient in the Project area is from the Pequop Range towards Big Spring and the Johnson Springs system. Therefore, it appears that the likely source of the flow of Big Spring and the Johnson Springs system is ground water from the fractured bedrock aquifers within the Pequop

Mountains. The likely source of that ground water is ultimately from infiltration of precipitation falling on the Pequop Range. The anomalously warm water temperatures observed in Big Spring (70°F) and some of the smaller springs in the Johnson Spring system suggest that some of the water has reached the springs via a deep flow path (Global Hydrologic Services Inc. 2010).

3.2.21.2 Environmental Consequences

The Project activities are unlikely to have direct impacts to water resources because of the environmental protection measures discussed in Section 2.2.8. The water quality data collected from Big Spring indicate that the exploration drilling activities have not had any effect on Big Spring and the Johnson Springs system. Water samples collected from Big Spring in October 2000 before drilling activities started met drinking water standards. Water quality samples collected since 2008 show only minor variability of a few constituents and continue to meet all drinking water standards (Fronteer 2009). The environmental protection measures outlined in Section 2.2.8 have been implemented by Fronteer in consultation with the City to avoid or mitigate potential impacts to Big Spring and the Johnson Spring system. Shafter No. 6, the municipal water well that Fronteer drilled and completed for the City in 2009, provides the City with an auxiliary well that guarantees that there would be no disruption of the City's water supply in the event that the mineral exploration drilling were to impact Big Spring. Prior to completion of Shafter No. 6, BLM imposed an operating restriction that limited the depth of the exploration drill holes to above the elevation of Big Spring. On September 1, 2009, the Wendover Utah City Council voted to lift this depth restriction. On September 2, 2009, the West Wendover, Nevada City Council also voted to lift this depth restriction.

The four monitoring wells that Fronteer drilled in the Project Area are providing monthly water level data that contributes to the understanding of the ground water hydrology of the Project Area. The location of these monitoring wells is shown on Figure 2.1.1. Similarly, the monthly water quality samples being taken from Big Spring and the Johnson Spring system are providing useful hydrologic information. The ongoing collaboration between Fronteer and the City's hydrologic consultants in developing a hydrologic study of the northern part of the Goshute Valley will help the City refine its understanding of the adequacy of the valley aquifer to supply water to the City's Shafter well field.

Indirect effects to water resources would be minimized by placement of fabric or straw bale (certified weed-free) filter fences upslope of Big Spring to prevent sediment runoff from reaching the spring.

A Spill Contingency Plan is included in the 2010 Plan Amendment and would be implemented to control drilling fluids and petroleum products. All containers of hazardous substances would be labeled and handled in accordance with NDOT and MSHA regulations (Section 2.2.8). Impacts would be minimal due to the use of nontoxic drilling fluids and adherence to NAC 534.4369 and 534.4371.

3.2.22 Wild Horses and Burros

3.2.22.1 Affected Environment

The Project Area is not within a Herd Management Area (HMA); however, wild horses are expected to utilize the Project Area on a seasonal basis. As a result of the elevation and winter conditions, the primary use of the Project Area by wild horses occurs during the summer months.

The limited perennial water sources restrict wild horse use of the Project Area to periods when ephemeral sources are available. There are no burros in the area.

3.2.22.2 Environmental Consequences

Due to the nature of the Project and the location of the Project Area outside of any HMAs, the management of wild horses would not be affected by the Project and, therefore, not further evaluated in this EA.

3.2.23 Wildlife

3.2.23.1 Affected Environment

A detailed description of the wildlife habitats within the Project Area is included in Section 3.2.17.1. The wildlife species that inhabit the Project Area are typical of the arid/semi-arid environment in the central Great Basin and were identified by Enviroscientists during wildlife surveys conducted in July 2006, September 2007, July 2009, and May 2010. Wildlife species detected in the Project Area include insects, reptiles, birds, raptors, and mammals. No perennial streams and no fish habitat occur in the Project Area.

Insects

The following common insect species have been observed in the Project Area: Anise swallowtail (*Papilio zelicaon*); Behr's hairstreak (*Satyrium behrii*); dotted blue (*Euphilotes enoptes*); grasshopper (Family: Acrididae); ground spider (Family: Gnaphosidae); house fly (*Musca domestica*); Juba skipper (*Hesperia juba*); Mattoni's blue; Melissa blue (*Plebejus melissa*); mourning cloak (*Nymphalis antiopa*); orange sulfur (*Colias eurytheme*); painted lady (*Vanessa cardui*); Queen Alexandra's sulphur (*Colias alexandra*); red admiral (*Vanessa atalanta*); red ants (Family: Formicidae); silvery blue (*Glaucopsyche lygdamus*); small wood nymph (*Cercyonis oetus*); spring azure (*Celastrina argiolus*); spring white (*Pontia sisymbrii*); Weidemeyer's admiral (*Limenitis weidemeyerii*); western admiral (*Limenitis weidemeyerii*); western swallowtail (*Papilio zelicaon*); western tiger swallowtail (*Papilio rutulus*); western tortoise shell (*Nymphalis californica*); and zerene fritillary (*Speyeria zerene*). The Mattoni's blue is a BLM special status species and is discussed in Section 3.2.17.

Snails

Three colonies of mountain land snails, *Oreohelix strigosa*, have been located in isolated stands of white fir and mountain brush in the limestone canyons in the northern part of the Pequop Mountains (Ports 2010). No known colonies are located within the Project Area. The known populations occur west of the access routes in Six Mile Canyon that will be used for the Project. Based on species requirements, no additional habitat for mountain land snails has been identified in the Project Area or the section of Six Mile Canyon that would be utilized for access to the Project Area.

Reptiles

The following reptiles were observed in the Project Area: common side-blotch lizard (*Uta stansburiana*); western fence lizard (*Sceloporus occidentalis*); Great Basin skink (*Emueces*

skiltonianus utahensis); Great Basin whiptail (*Cnemidophorus tigris*); mountain short-horned lizard (*Phrynosoma hernandesi*); and sagebrush lizard (*Sceloporus graciosus*).

Birds

The following common bird species have been detected in the Project Area: American robin (*Turdus migratorius*); black-throated gray warbler (*Dendroica nigrescens*); black-throated sparrow (*Amphispiza bilineata*); blue-gray gnatcatcher (*Polioptila caerulea*); Brewer's blackbird (*Euphagus cyanocephalus*); brown-headed cowbird (*Molothrus ater*); bushtit (*Psaltriparus minimus*); chipping sparrow (*Spizella passerina*); Clark's nutcracker (*Nucifraga columbiana*); cliff swallow (*Petrochelidon pyrrhonota*); common poorwill (*Phalaenoptilus nuttallii*); common raven (*Corvus corax*); dark-eyed junco (*Junco hyemalis*); gray flycatcher (*Empidonax wrightii*); Gray vireo; green-tailed towhee (*Pipilo chlorurus*); hairy woodpecker (*Picoides villosus*); house finch (*Carpodacus mexicanus*); house wren (*Troglodytes aedon*); juniper titmouse; lark sparrow (*Chondestes grammacus*); loggerhead shrike; MacGillivray's warbler (*Oporornis tolmiei*); mountain bluebird (*Sialia currucoides*); mountain chickadee (*Parus gambeli*); Northern flicker (*Colaptes auratus*); plain titmouse (*Parus inornatus*); piñon jay; red-winged blackbird (*Agelaius phoeniceus*); rock wren (*Salpinctes obsoletus*); sage sparrow (*Amphispiza belli*); sage thrasher (*Oreoscoptes montanus*); vesper sparrow; western meadowlark (*Sturnella neglecta*); and western scrub jay (*Aphelocoma californica*). Gray vireo, juniper titmouse, loggerhead shrike, piñon jay, and vesper sparrow are BLM special status species and are discussed in Section 3.2.17.

Raptors

The following raptors species were observed in or near the Project Area: American kestrel (*Falco sparverius*); burrowing owl; common nighthawk (*Chordeiles minor*); Cooper's hawk (*Accipiter cooperii*); great horned owl (*Bubo virginianus*); northern harrier (*Circus cyaneus*); prairie falcon; red-tailed hawk (*Buteo jamaicensis*); rough-legged hawk (*Buteo lagopus*); and turkey vulture (*Cathartes aura*). Burrowing owl and prairie falcon are BLM special status species and are discussed in Section 3.2.17.

Appropriate foraging habitat for all of the aforementioned raptor species occurs within the Project Area. No raptor nests were found in or near the Project Area; however, the presence of two separate pair and fledgling American kestrels during the July 2009 wildlife survey indicate that this species may be nesting in the Project Area. Appropriate nesting habitat of open ground and shrubs occur in the Project Area for common nighthawk and northern harrier. Appropriate nesting habitat for Cooper's hawk of tall trees occurs within the Project Area. Appropriate nesting habitat for great horned owl of trees, rocky ledges, and artificial platforms occur within the Project Area. Appropriate nesting habitat for red-tailed hawk and rough-legged hawk of tall trees and cliffs occurs within the Project Area. Appropriate nesting habitat for turkey vulture of trees, snags, and ground occur within the Project Area.

During the raptor survey in July 2006, a drowned owl was found in the second of three troughs at Long Canyon Spring. The owl's body measured three inches in length and the head was less than two inches in length. No other measurements (e.g., wing length) were taken. No ear tufts were visible and eye color could not be determined. The photographs were submitted by email to NDOW biologists for identification (Jenni Jeffers, Fallon, and Pete Bradley, Elko). The owl could be either a northern saw-whet (*Aegolius acadicus*) or a northern pygmy owl (*Glaucidium gnoma*). Based on head size, short tail, light face, and small body size, the owl is most likely a

northern saw-whet. Habitat affinities of the two species do not differ significantly enough to rule out occurrence of either species. The habitat in the vicinity of the troughs consists primarily of sagebrush. Both the northern saw-whet owl and the northern pygmy owl have foraging habitat and nesting habitat of abandoned woodpecker holes or snags within the Project Area.

Mammals

Common mammal species such as coyote (*Canis latrans*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), woodrat (*Neotoma* sp.), cliff chipmunk (*Eutamias dorsalis*), long-tailed weasel (*Mustela frenata*), golden-mantled ground squirrel (*Spermophilus lateralis*), deer mouse (*Peromyscus maniculatus*), kangaroo rat (*Dipodomys* spp.), and least chipmunk (*Tamias minimus*) have been detected within the Project Area either directly or by observation of tracks, scat, carcass, prey remains, burrow, or other sign.

Game Species

Big game species detected within the Project Area during wildlife surveys include mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), and elk (*Cervus canadensis*). Mule deer occur throughout the Elko district. The NDOW conducted post-season survey flights of the Northeastern Elko County area, Units 071 through 079, and Unit 091. A total of 1,563 mule deer was classified during the survey with a resulting ratio of 18 bucks to 100 does to 50 fawns (NDOW 2010). Spring surveys were flown in late March and early April. A total of 1,643 mule deer was classified during the survey yielding a ratio of 36 fawns to 100 adults. Although over-winter survival was good for fawns this winter, fawn ratios going into the winter were below average. This year's recruitment rate of 36 fawns to 100 adults was slightly below the previous five-year average of 38 fawns: to 100 adults. It was the first time the spring fawn ratio increased in the last four years. The population model for Units 071 through 079, and Unit 091, predicts a pre-hunt adult mule deer population slightly lower than the previous year (NDOW 2010). The deer in these unit groups have been reduced following wildland fires that have occurred in the area since 1999. Invasive weeds have invaded some of the burned areas and in areas where perennial grasses and forbs are found; however in time the shrubs are expected to recover to pre-burn levels.

The Project Area is located within known mule deer winter range for the Area 7 deer herd. Mule deer scat, tracks, and disarticulated skeletal remains were observed throughout the Project Area during wildlife surveys. Two does were observed before dawn on July 30 and 31, 2009, watering at Long Canyon Spring and a three-point buck was recorded in the upper elevations of the eastern drainage to Long Canyon. There is a migration of mule deer north and west of the Pequop Mountains through the Snake Mountains in the vicinity of the Project Area. Historic studies and current satellite telemetry studies have documented that the deer wintering in the Pequop Mountains have summer ranges to the north and west in the Jarbidge Mountains. Deer from the Jarbidge Mountains, located in NDOW Management Unit 072, and the Snake Range, located in NDOW Management 075, migrate to the south and east in the fall, through NDOW Management Unit 077 and onto their winter ranges located in NDOW Management Unit 078.

Unlike other deer migrations in northeastern Nevada, this migration begins before winter weather forces the deer to migrate. Typically, the migration southward begins in early October. The deer arrive on the winter ranges sometime before the end of October or the early part of November. The deer then remain on the winter ranges until early April when they begin their return migration to the summer ranges in and around the Jarbidge Area. During the migration, a

number of deer are struck by vehicles on Highway 93 and I-80. The NDOW and NDOT are working on projects to reduce deer mortality due to vehicle collisions, including a big game overpass on Highway 93. Additional data on deer/vehicle incidents is discussed in Section 3.4 under cumulative impacts.

Pronghorn antelope have been observed in the lower elevations of the eastern portion of the Project Area and scat and tracks have been detected throughout the lower elevations of the Project Area during wildlife surveys. Pronghorn antelope can be found within the lower elevations of the Project Area year-round (NDOW 2009). The Project Area falls within Hunt Units 076, 077, 079, 081, and 091-Northeastern Elko County (NDOW 2010). Post-season surveys in August and September resulted in 204 antelope being classified. The resulting gender and age ratios for the sample were 46 bucks to 100 does to 27 fawns. The buck ratio was the same as last year; however, the fawn ratio increased for the first time in three years, up 42 percent from last year's ratio of 19 fawns to 100 does (NDOW 2010).

The Hunt Units 076, 077, 079, 081, and 091 pronghorn antelope herd appears to be stable to slightly increasing. The 2009 population estimate for the 078, 105-107, and 121 Unit Group is almost unchanged from the prior year. Although good precipitation occurred the spring of 2009, low recruitment in both 2008 and 2009 appear to be preventing this population from continuing its previously observed growth trend. Fawn ratios for 2008 and 2009 are well below the long-term average of 30 fawns:100 does. Despite the poor recruitment observed in the last few years, the population demonstrates a positive long-term trend. This trend was bolstered by high fawn ratios in 2004 and 2005 (NDOW 2010).

Elk scat and tracks have been found throughout the Project Area during wildlife surveys and a single fork bull elk was observed before dawn on July 30 and 31, 2009, watering at Long Canyon Spring. Elk typically would stay at the higher elevations of Long Canyon (NDOW 2009). The elk within the Project Area fall within Hunt Units 078, 104, 105, 106, and 107 (NDOW 2010). Post season surveys resulted in the classification of 336 elk yielding age and gender ratios of 10 bulls to 100 cows to 21 calves. The calf ratio was down from the 2009 observed ratio of 28 calves to 100 cows. The 2010 ratio is consistent with historic trends of weak calf ratios for this unit group (NDOW 2010).

Although production remains low, several mature bulls have been observed and harvested. Continued elk observations documented in Unit 078 indicate the herd is still expanding its distribution and range. Despite the low levels of calf recruitment observed in this unit, the 2009 population estimate shows an 11 percent increase over 2009 and may be attributed in part, to ingress from adjacent Unit 121. Harvest management has been designed to promote herd growth towards the population objective of 340 elk (NDOW 2010).

Small game species that have been detected within the Project Area during wildlife surveys include blue grouse (*Dendragapus obscurus*), California quail (*Callipepla californica*), chukar (*Alectoris chukar*), greater sage-grouse, pygmy rabbit, and mourning dove (*Zenaida macroura*). Greater sage-grouse and pygmy rabbit are BLM special status species and are discussed in Section 3.2.17. According to the NDOW, gray partridge (*Perdix perdix*) is present within the Project Area (NDOW 2009).

3.2.23.2 Environmental Consequences

Direct impacts to wildlife would consist of temporary habitat loss and disturbance from human activity and noise. Approximately 69.43 acres of existing wildlife habitat would be temporarily impacted by exploration activities over the ten-year life span of the Project. No long-term impacts to wildlife habitat are likely to occur since reclamation and reestablishment of vegetation would take place between one and three years after Project completion.

Wildlife sensitive to human activity and noise could be temporarily displaced as a result of the Project. Construction of roads and drill pads and the operation of drilling equipment could disturb wildlife due to the presence of humans and by creating noise and dust. Wildlife foraging activities within the Project Area could continue since a maximum of six drill rigs would be operating at one time, in diverse locations, allowing wildlife to move around and between Project activities. The animals could still be frightened by noise and not utilize the area during drilling. Wildlife habitat fragmentation would be unlikely to occur because the drill program would be dispersed over the 7,664-acre Project Area with a maximum of 69.43 acres (or one percent) of disturbance over the life of the Project. Therefore, the Project would have minimal direct impacts on wildlife species.

Indirect impacts to wildlife would occur due to the temporary loss of vegetation as a result of Project-related surface disturbance. There could be a long-term improvement of habitat in the Project Area as surface disturbance is reclaimed and revegetated establishing a greater amount of herbaceous species for wildlife foraging.

Fronteer would not conduct surface disturbing activities when snow conditions result in mule deer using the Project Area as winter habitat. Surface disturbing activities would not take place until snow conditions allowed. These seasonal restrictions on creating new surface disturbance would be implemented in coordination with BLM wildlife specialists in response to site-specific, on-the-ground conditions. Fronteer, the NDOW, and the BLM are currently discussing how Fronteer could provide funding or resources to augment the BLM's and the NDOW's efforts to track the deer herd that utilizes the Pequop Mountains.

Impacts as a result of the Proposed Action are expected to be similar for all wildlife species encountered in the Project Area. Any disturbance to mule deer, coyotes, rodents, and birds would likely be limited to temporary auditory and visual perturbation of individuals in or near the Project Area. Individuals foraging in the Project Area during exploration activities would likely leave the immediate area resulting in a temporary spatial redistribution of individuals or habitat-use patterns during the Project; this would not be a long-term effect since there is undisturbed and suitable habitat around the Project Area. If displaced animals move into habitat already at carrying capacity, there could be a higher mortality rate among the displaced individuals and an impact to the resident population. This in turn would cause a reduction of viable young at least for the next breeding season in the area. The disturbance due to Project-related activities would be short term. No long-term impacts are likely to occur since reclamation and reestablishment of vegetation would take place within several years of Project completion. The quality, quantity, and distribution of suitable wildlife habitat are not expected to be substantially altered by Project implementation. A minor increase in traffic would occur; however, the likelihood of deer-vehicle collisions would be minimized by the speed limit restrictions in the Project Area.

3.3 Effects of the No Action Alternative

As described earlier, under the No Action Alternative, the Proposed Action would not be approved. Fronteer could continue exploration activities under their existing approved Plan (#NVN-82445) and would be limited to a maximum of 44.93 acres of surface disturbance on public land. In addition, Fronteer could continue exploration on private land and on Fronteer's private mineral estate and create up to 54.93 acres of disturbance as approved under BMRR Permit No. 0256 without modifying this reclamation permit. This acreage on both public and private land could be reclaimed and released by the BLM and BMRR, based on compliance with the revegetation success release criteria; thereby, allowing Fronteer to create sequential acreage of disturbance. Activities associated with this total disturbance of 99.86 acres of surface disturbance include maintaining existing access roads, construction of exploration roads and drill pads, trenching and bulk sampling, and the use of two staging areas.

Activities currently permitted in the Project Area, which are similar to those described for the Proposed Action, would continue. Disturbance from the No Action Alternative would be less than those associated with the Proposed Action (99.86 acres rather than 169.29 acres) for the following resources: Air and Atmospheric Resources; Forestry and Woodlands; Lands and Realty; Invasive, Lands with Wilderness Characteristics, Nonnative Species; Migratory Birds; Range Resources; Social Values and Economics; Soils; Special Status Species; Vegetation; Visual Resources; Water Resources; and Wildlife as described in the 2008 EA (BLM 2008).

As with the Proposed Action, the No Action Alternative would not result in impacts to historic properties because Fronteer has committed to avoidance of all eligible and unevaluated cultural sites. The No Action Alternative would not result in impacts to Recreation because access for recreation would not be restricted. No impacts to Wild Horses and Burros would result from the No Action Alternative as the existing Plan boundary is not located within an HMA. No impacts to Geology and Mineral Resources as the approved activities consist of mineral exploration activities and no mining and no removal of resources. No impacts to Lands with Wilderness Characteristics would result from the No Action Alternative because no proposed or existing disturbance is planned or present within the Pequop LWC Unit. No impacts to Fire Management would result from the No Action Alternative because there are no active fuel treatment areas within the approved Plan boundary; the same protection measures are in place as the Proposed Action and the activities would not preclude fire management activities. No impacts from Wastes would result from the No Action Alternative as the same protection measures are in place as the Proposed Action. In addition, no impacts to Native American Religious Concerns would be expected as a result of the No Action Alternative.

3.4 Cumulative Impacts

As defined in 40 CFR 1508.7 (Council on Environmental Quality [CEQ] regulations for implementing the NEPA) a cumulative impact is an impact on the environment that results from the incremental impact of the action when added to other past, present, and RFFAs, regardless of which agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

The resources to be analyzed in the cumulative impacts section are those for which the Proposed Action would have an impact and include the following: Air and Atmospheric Values, Cultural Resources, Migratory Birds, Noxious Weeds and Invasive Nonnative Species, Lands with

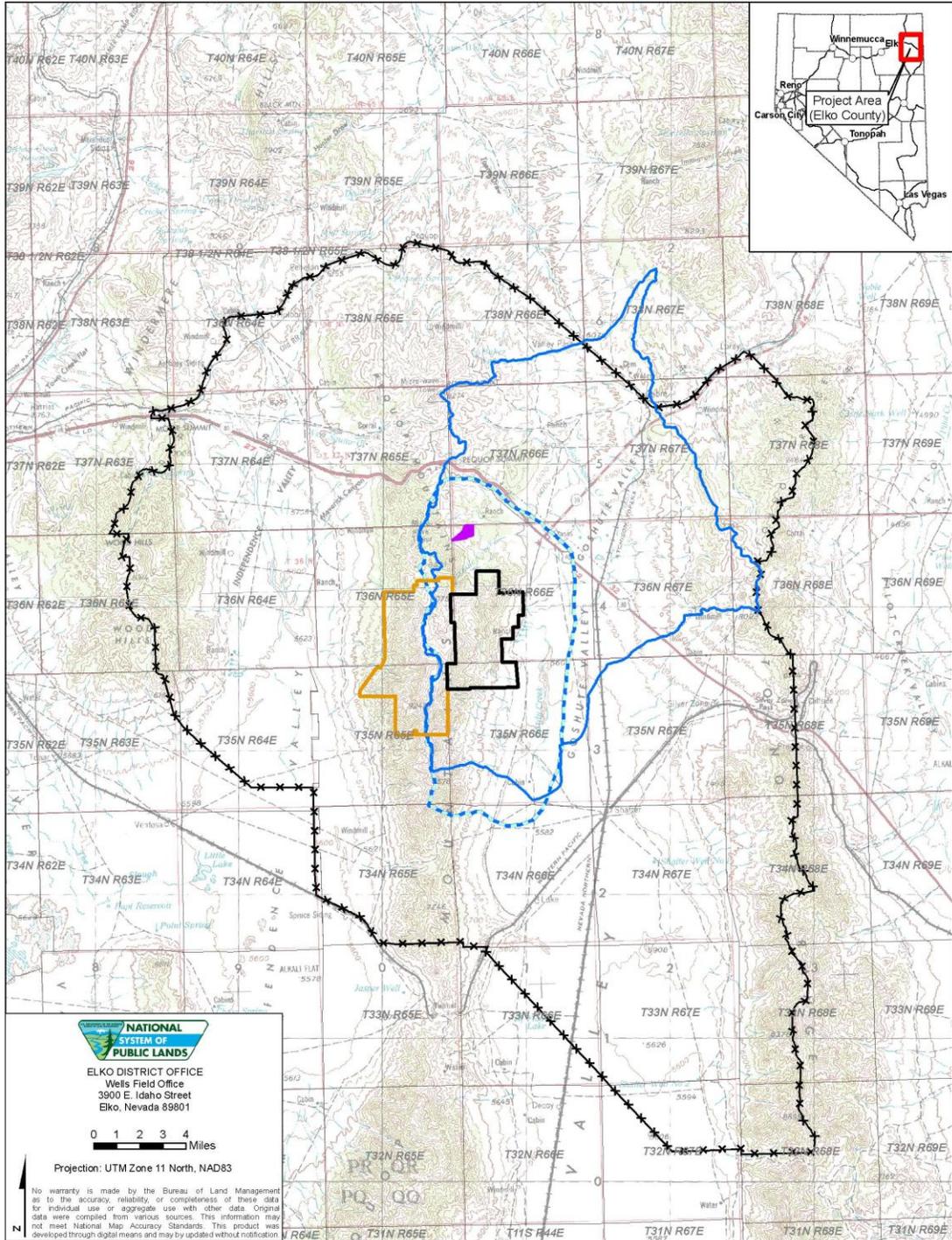
Wilderness Characteristics (LWC), Range Resources, Recreation, Soils, Special Status Species (includes Greater Sage-grouse), Vegetation, Visual Resources, Water Resources, and Wildlife. Although the Proposed Action would result in impacts to Social Values and Economics, these impacts would be both minor and beneficial; therefore, this resource is not analyzed in the cumulative impacts section.

The geographic extent of resources potentially affected varies by the type of resource and impact. Nine different cumulative effects study areas (CESAs) have been developed and are listed with their total acreage in Table 3.4-1. The CESAs include the HUC5 Watershed CESA (116,525 acres), Cultural Resources/Recreation CESA (141,389 acres), Grazing CESA (492,881 acres), Lands with Wilderness Characteristics CESA (63,235 acres), Soils CESA (7,664 acres), Sage Grouse CESA (191,898 acres), Visual Resources CESA (28,731 acres), the Immediate Watershed CESA (51,668 acres), and the Mule Deer CESA (723,871 acres). The Deer CESA includes the summer range (281,279 acres), winter range (129,374 acres) and the migration corridor (313,218 acres). Figures 3.4.1 and 3.4.2 are large scale depictions of CESA areas including HUC5 Watershed, Soils, Visual Resources, Cultural and Recreation Resources, Range Resources, and the Immediate Watershed CESAs. Figures 3.4.3 and 3.4.4 are small scale depictions of CESA areas including the Greater Sage-grouse, Lands with Wilderness Characteristics CESA, and Mule Deer CESAs.

Table 3.4-1 lists the CESA for each of the potentially impacted resources. The timeframe for the cumulative effects analysis is 14 years to account for reclamation.

Table 3.4-1: Cumulative Effects Study Areas

Resource	Cumulative Effects Study Areas		
	Name	Acres	Description
Air and Atmospheric Values	HUC5 Watershed CESA	116,525	Hydrologic Unit Code (HUC) Level 5 Watershed-East Side of Pequop Mountain Range (Figure 3.4.1)
Invasive, Nonnative Species			
Migratory Birds			
Special Status Species			
Vegetation			
Wildlife – Small Mammals			
Cultural Resources and Recreation	Cultural/Recreation CESA	141,389	Cultural Resource Area including Ethnographic Relationships between Pequop Mountains and Goshute Valley and local recreational use area (Figure 3.4.2)
Lands with Wilderness Characteristics (LWC)	LWC CESA	63,235	Wilderness Characteristics Inventory Area (Figure 3.4.3)
Range Resources	Grazing CESA	492,881	West Big Springs Grazing Allotment and East Big Springs Grazing Allotment (Figure 3.4.1)
Soils	Soils CESA	7,664	Project Area (Figure 3.4.1)
Special Status Species-Greater Sage-grouse	Sage Grouse CESA	191,898	Sage Grouse Area of Concern (Figure 3.4.3)
Visual Resources	Visual Resources CESA	28,731	Local VRM Area (Figure 3.4.2)
Water Resources	Immediate Watershed CESA	51,668	Immediate Watershed (Figure 3.4.1)
Wildlife-Mule Deer	Mule Deer CESA	723,871	Mule Deer Range (summer and winter) and Migration Corridor (Figure 3.4.5)



NATIONAL SYSTEM OF PUBLIC LANDS
 ELKO DISTRICT OFFICE
 Wells Field Office
 3900 E. Idaho Street
 Elko, Nevada 89801

0 1 2 3 4 Miles

Projection: UTM Zone 11 North, NAD83

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.

Explanation		Other Land Management Features/Projects	
	EA Analysis Area		West Pequoop Exploration Project Area (Proposed)
	Soils CESA (Resources Analyzed: Soils)		Payne Basin Treatment Area
	Range Resources CESA (Resources Analyzed: Grazing)		
	Immediate Watershed CESA (Resources Analyzed: Surface Water Resources)		
	HUC5 Watershed CESA (Resources Analyzed: Air & Atmospheric Resources, Invasive, Nonnative Species, Migratory Birds, Special Status Species, Vegetation, Wildlife - Small Mammals)		

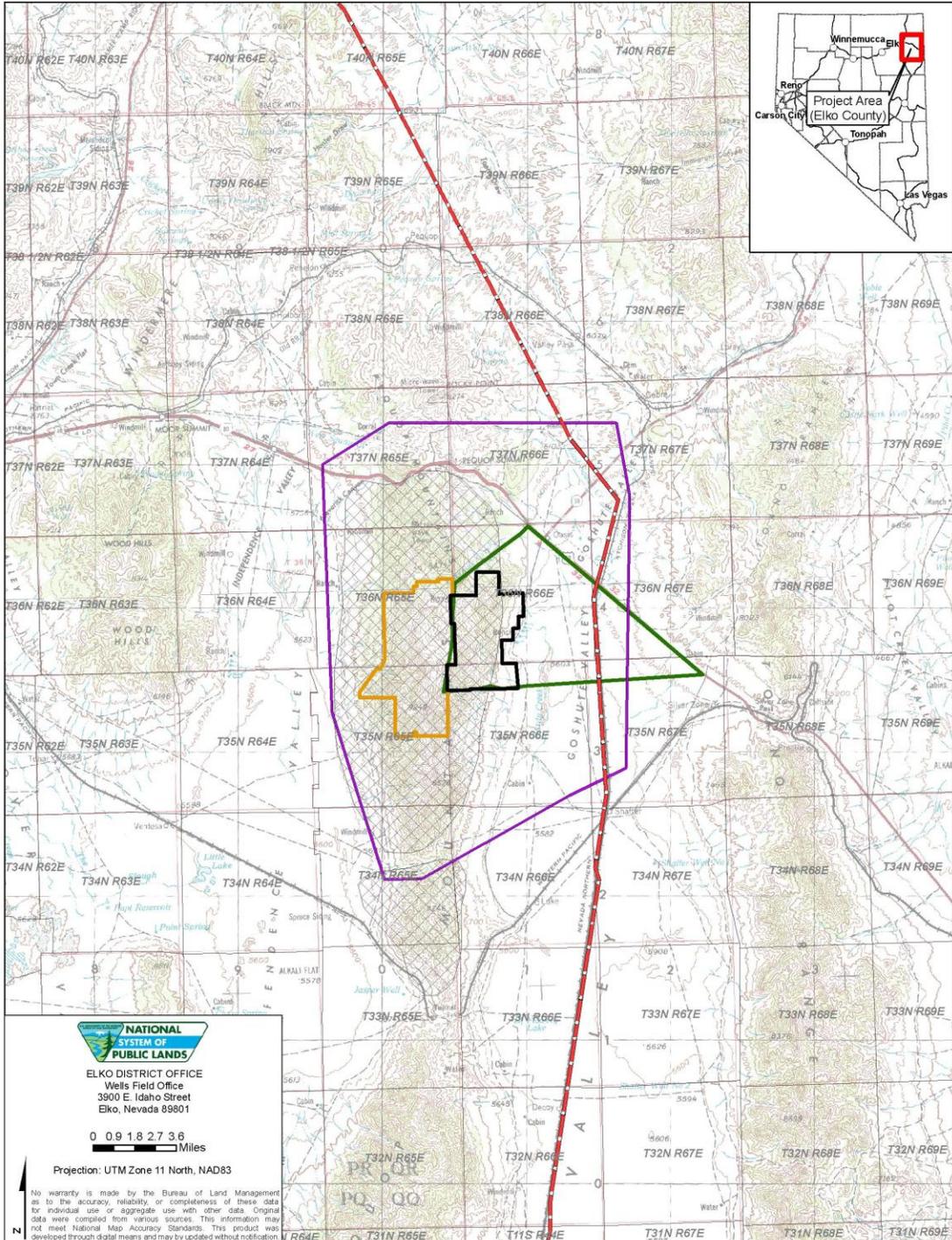
BUREAU OF LAND MANAGEMENT

EXPANDED LONG CANYON EXPLORATION PROJECT

Cumulative Effects Study Areas Large Scale, Part 1

Figure 3.4.1

04/20/2011



Explanation

- EA Analysis Area
- West Pequo Exploration Project Area (Proposed)

Cumulative Effects Study Areas

- Cultural/Recreation CESA (*Resources Analyzed: Recreation & Cultural Resources*)
- Visual Resources CESA (*Resources Analyzed: Visual Resources*)

Other Land Management Features/Projects

- SWIP Corridor
- Christmas Tree Cutting Area

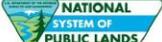
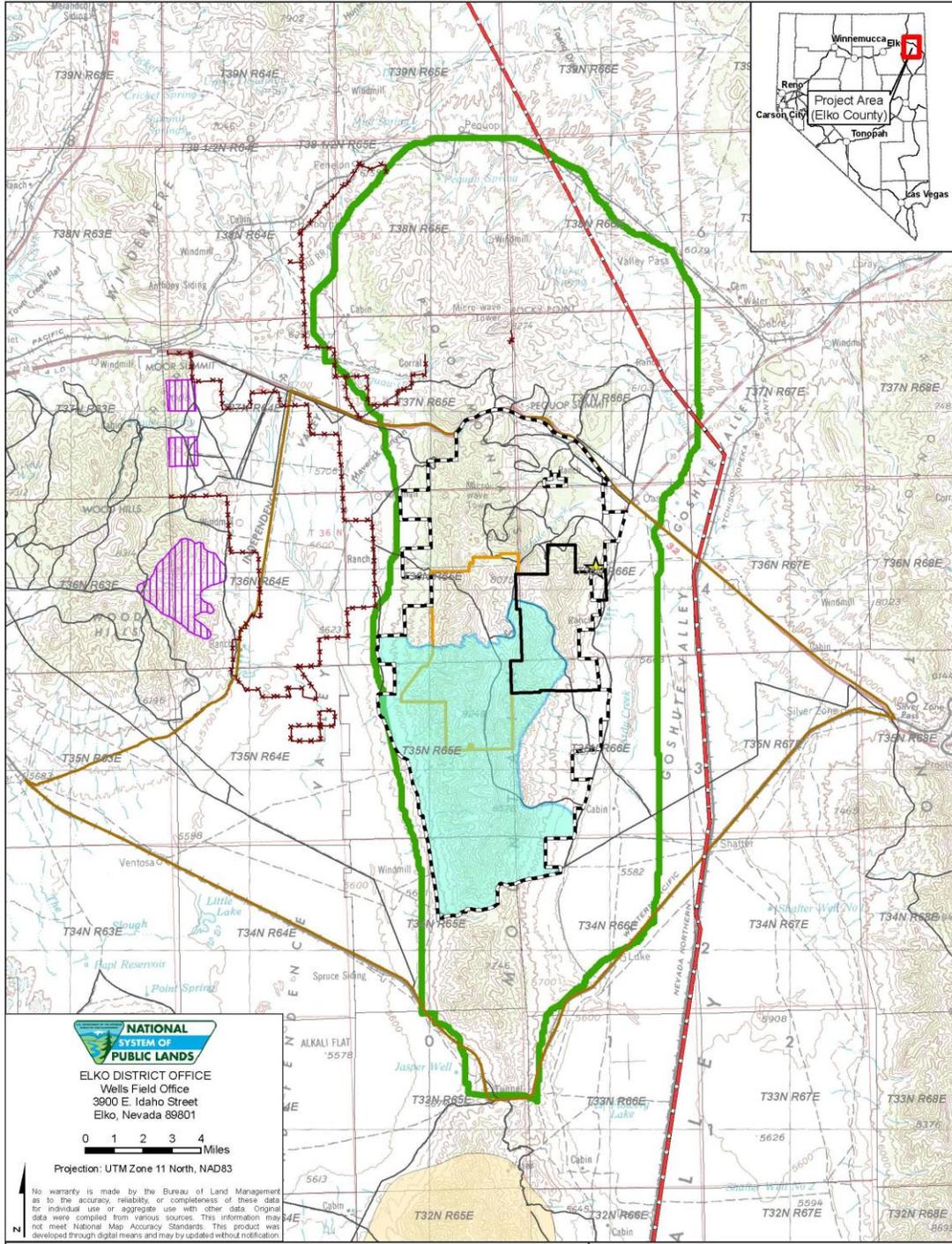
BUREAU OF LAND MANAGEMENT

**EXPANDED LONG CANYON
EXPLORATION PROJECT**

**Cumulative Effects Study Areas
Large Scale, Part 2**

Figure 3.4.2

04/20/2011



ELKO DISTRICT OFFICE
Wells Field Office
3900 E. Idaho Street
Elko, Nevada 89801

0 1 2 3 4 Miles

Projection: UTM Zone 11 North, NAD83

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.

Explanation

- EA Analysis Area
- West Pequoop Exploration Project Area (Proposed)
- Summit Project
- Cumulative Effects Study Areas**
- Lands with Wilderness Characteristics CESA
(Resources Analyzed: Special Status Species - Greater Sage-grouse)
- Sage Grouse CESA

Other Land Management Features/Projects

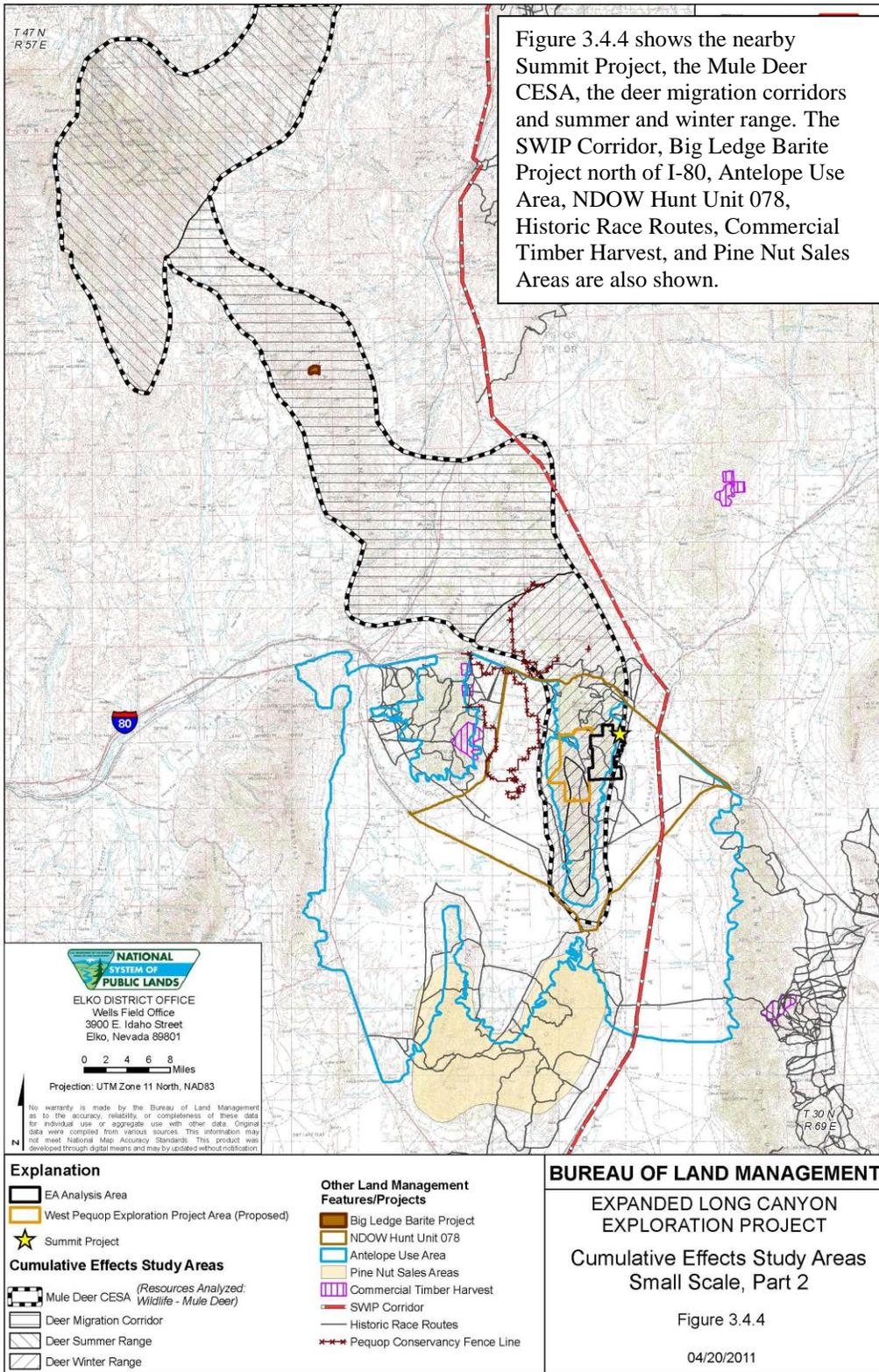
- Pequoop Conservancy Fence Line
- SWP Corridor
- Pequoop LWC Unit (NV-EK-03076)
- NDOW Hunt Unit 078
- Historic Race Routes
- Commercial Timber Harvest
- Pine Nut Sales Areas

BUREAU OF LAND MANAGEMENT

EXPANDED LONG CANYON
EXPLORATION PROJECT
Cumulative Effects Study Areas
Small Scale, Part 1

Figure 3.4.3

04/20/2011



HUC5 Watershed CESA

The HUC5 Watershed encompassing the Project Area was used to analyze cumulative effects to Air and Atmospheric Values, Invasive, Nonnative Species, Migratory Birds, Special Status Species (excluding greater sage-grouse), Vegetation, and Wildlife (small mammals). This area was chosen to analyze these resources due to the appropriate size and functionality of this area.

Lands with Wilderness Characteristics (LWC) CESA

The LWC CESA represents the Pequop LWC Inventory Area, which generally covers the areas of the West Pequop Mountains that are managed by the BLM. One private parcel totaling 160 acres is excluded from the northern portion of the CESA. Activities in the CESA include mineral exploration, approximately 230 miles of routes and roads used for exploration project access, motorized recreation, and access to non-motorized recreation. Several off-highway motorcycle race routes are also located in the LWC CESA.

Cultural Resources/Recreation CESA

For the purpose of this analysis, the Cultural Resources and Recreation CESA boundaries encompass very similar use areas and were, therefore, analyzed under one CESA. The Cultural CESA addresses the ethnographic connection between the Goshute Valley and the Pequop Mountains. This CESA also addresses the major recreational uses in the area, which are motorcycle and mountain bicycle use. The mountain bike routes in the area are located to the north of the Project Area and just south of I-80 including Six Mile Canyon. Mountain bicycle races occurred in this area from 1991 through 2006.

The majority of the motorcycle routes are located north of the Project Area; however, some routes cross the Project Area in the far western and eastern portions. Motorcycle races occurred in the area from 1989 through 2004. Motorcyclists ride up Long Canyon from the Project Area and drop down into Six Mile Creek.

Grazing CESA

The Grazing CESA is made up of the East and West Big Springs Allotments. These allotments were formerly one large allotment, the Big Springs Allotment.

Soils CESA

The Project Area was used as the Soils CESA.

Sage Grouse CESA

The Sage Grouse CESA boundary was developed to address impacts to the birds located in the vicinity of the Project Area. The Project Area is on the eastern most edge of greater sage-grouse distribution in Nevada. The eastern boundary of the CESA was selected because it is unlikely that the greater sage-grouse in the area travel past the middle of Goshute Valley. The southern boundary of the CESA was selected to segregate the birds in the vicinity of Project Area from the population found on Spruce Mountain. According to the NDOW, these two populations are distinct and very little movement occurs between these birds. The western boundary of the CESA is the eastern edge of Independence Valley and the western base of the Pequop Range as

it has been documented that greater sage grouse migrate over the entire Pequop Range. The northern boundary of the CESA was selected to segregate the Long Canyon population from the populations located in Tecoma Valley and Toano Draw.

Visual Resources CESA

The Visual Resources CESA was created to analyze impacts in the viewshed encompassing the Project Area as seen by travelers on westbound I-80 and from local access roads within Goshute Valley.

Immediate Watershed CESA

The immediate watershed encompassing the Project Area was used as the CESA to analyze cumulative effects to surface and ground water resources. This smaller watershed allows for a discrete analysis of surface disturbance activities that may contribute to a degradation of surface water quality and quantity within this area.

Mule Deer CESA

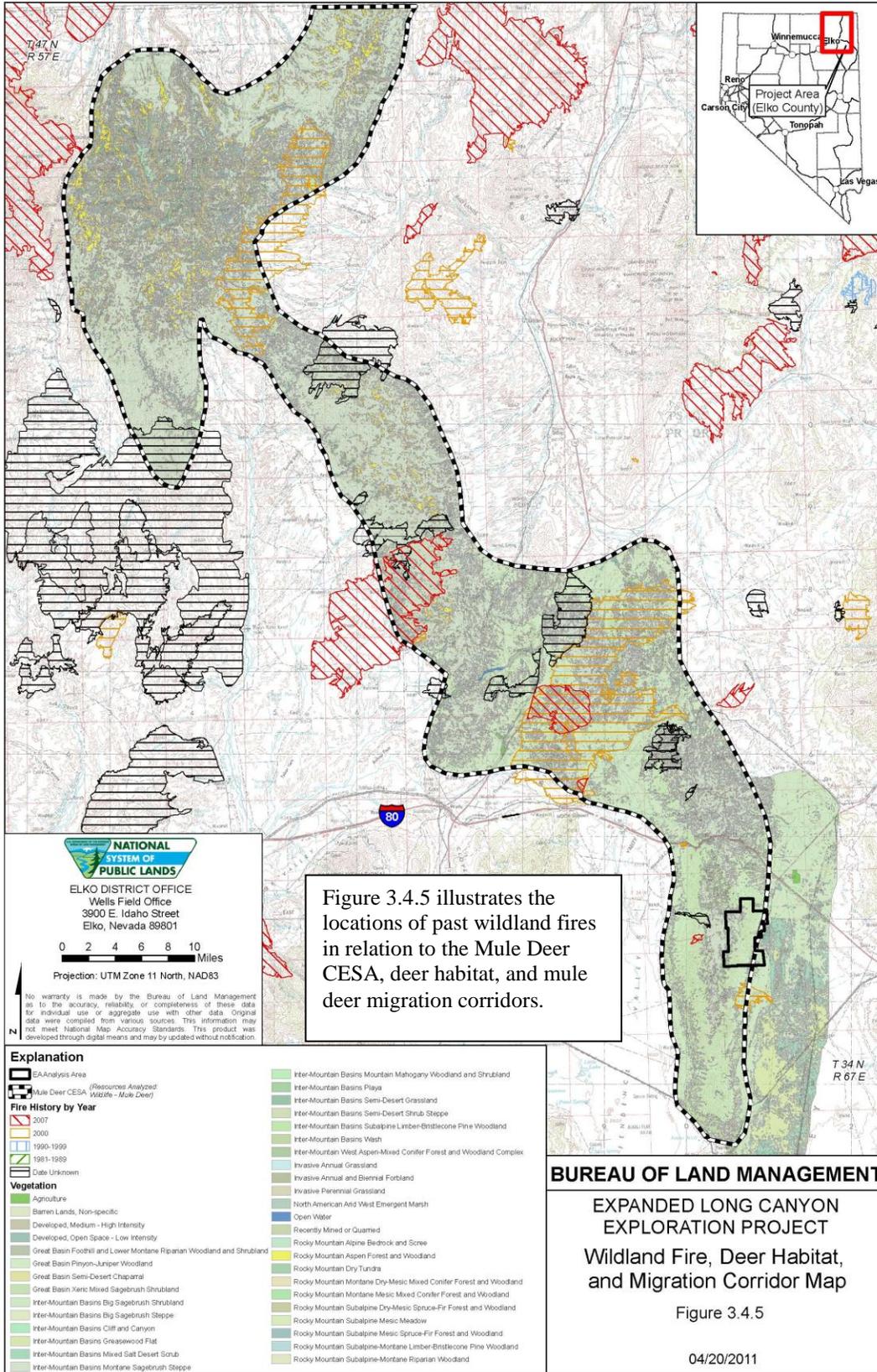
The Mule Deer CESA was developed to assess impacts from Project activities and other actions to the Area 7 mule deer herd that resides in Nevada in the summer and winter ranges as well as the migration corridor between these two areas. To accomplish this, the entire range that the deer herd utilizes in their annual life cycle within Nevada was used as the basis for the CESA boundary. Historic studies have documented that the deer migrating through the Project Area have summer ranges to the north and west. Deer from the Jarbidge Mountains located in NDOW Management Unit 072 and the Snake Range located in NDOW Management Unit 075 migrate to the south and east in the fall, through NDOW Management Unit 077 and onto their winter ranges located in NDOW Management Unit 078. Unlike other mule deer migrations in northeastern Nevada, this herd begins their migration before winter weather forces the deer to migrate (early October). The deer would arrive on the winter ranges before the end of October or the early part of November. The herd would remain on the winter ranges until early April when they would begin their return migration to the summer ranges. Figure 3.4.5 shows the deer CESA. The mule deer summer range depicted extends into Idaho; however, for the purpose of this document analysis has been restricted to Nevada.

3.4.1 Past and Present Actions

Past and present actions in the nine CESAs include the following: livestock grazing and range improvements, wildland fires, wildlife and game habitat management, fire treatment/seedings, recreation, railroads, utility and other rights-of-way (ROWs), mineral exploration (including approved exploration within the Project Area and the adjoining West Pequop Project), and mining.

Livestock Grazing and Range Improvements

Historical use in the Big Springs Allotment has consisted of livestock wintering on the white sage and salt desert shrub flats located in the extreme southern portions of the allotment, with spring, summer and fall use occurring elsewhere on the allotment. Livestock have made little use of the upper elevation of the Pequop Range south of I-80 and the upper elevation of the Toano Range north and south of the I-80 (BLM 2005). Authorized use in the two allotments in the



Grazing CESA on public land (East and West Big Springs) is 10,150 and 3,651 AUMS, respectively. There are an additional 6,448 and 1,734 suspended AUMs on these allotments, a portion of which could be restored resulting in active use levels of 12,175 AUMs on the East Big Springs Allotment and 4,788 AUMs on the West Big Springs Allotment on public land. When including livestock use in on private land, the potential total use in the West Big Springs Allotment is 7,352 AUMs and the total potential livestock use on the East Big Springs Allotment is 13,985 AUMs. The total potential livestock use of both the East and West Big Springs Allotment is 21,337 AUMs, of which 16,963 AUMs are on public land and 4,374 AUMs are on private land. Based on the potential active use AUMs there are approximately 23 acres per AUM.

There are 25 BLM-administered grazing allotments that are within or overlap the Deer CESA. The Deer CESA includes 723,871 acres. Range improvements within the Grazing and Deer CESAs include wells/storage tanks, reservoirs, pipelines, seedings, fences, spring/riparian enclosures, spring developments and noxious weed treatments.

The Pequop Conservancy has erected 61.5 miles of fencing on private land located west and northwest of the Project Area as shown in Figures 3.4.3 and 3.4.4.

Wildland Fires

Although there have been no recorded wildland fires or fire treatments in the Project Area, there has been disturbance associated with wildland fires in the Mule Deer, Sage Grouse, Cultural and Recreation, Range Resources, HUC5 Watershed, and Immediate Watershed CESAs. Table 3.4-2 summarizes the disturbance acres from historic fires (1981-2009), and fire treatments/seedings in these six CESAs. Most of these fires were small lightning strikes associated with precipitation and burned less than one-half acre each. However, several fires from 100 to 300 acres in size and from 1,000 to 3,500 acres in size have occurred. Historic fires in the CESA in the region are shown on Figure 3.4.5.

Table 3.4-2: Wildland Fire Disturbance Acres in the CESAs

CESA	Historic Fires (1981-2009)
HUC5 Watershed	1,619
Cultural/Recreation	2,456
Grazing	8,669
Lands with Wilderness Characteristics	1,931
Soils	0
Sage Grouse	7,924
Visual Resources	0
Immediate Watershed	1,619
Mule Deer - Summer Habitat	22,714
Mule Deer - Winter Habitat	7,702
Mule Deer - Migration Corridor	120,185
Mule Deer CESA - Total	150,601

Wildlife and Game Habitat Management

Research and management of big game and wildlife are undertaken by NDOW. The BLM manages wildlife habitat on public land, which may include modification to existing habitat and rangeland facilities. The Project Area is located in NDOW Hunt Unit 078 as shown in Figures

3.4.3 and Figures 3.4.4. However, cumulative impacts take into consideration Hunt Units 072, 073, 075, 077, and 078. Deer harvest data was supplied by NDOW and shows relatively low harvest numbers in 2009 for Hunt Unit 078 (only nine bucks were harvested). This low number reflects that most people think they are in Hunt Unit 077 when reporting their data and that these numbers are recorded before the majority of the deer migrate into Unit 078 (personal communication, Katie Miller and Kari Huebner, NDOW, June 29, 2010). In 2009, the total number of bucks harvested for Hunt Units 072, 072, 075, 077 was 485. All or portions of the NDOW Hunt Unit 078 are located within the Mule Deer (Winter Range) CESA, Sage Grouse CESA, Cultural-Recreation CESA, Immediate Watershed CESA, HUC5 Watershed CESA, Grazing CESA, Soils CESA, Visual CESA.

Pronghorn antelope are also present in primarily in the valley floors on the east and west sides of the Pequop ranges as shown in Figure 3.4.4. This Antelope Use Area was delineated by NDOW and BLM biologists and demonstrates that pronghorn antelope primarily use a very limited part of the lower slopes in the Project Area. The pronghorn antelope use area is not considered a separate CESA, but overlaps portions of the Mule Deer (Winter Range) CESA, Sage Grouse CESA, Cultural-Recreation CESA, Immediate Watershed CESA, HUC5 Watershed CESA, Grazing CESA, Soils CESA, LWC CESA, and Visual CESA.

The Payne Basin Treatment Area is located approximately two miles north of the Project Area. The Payne Basin was originally chained in the 1960s to early 1970s to enhance wildlife habitat within the area. The Payne Basin project lies entirely within a fenced wildlife enclosure. In 2006, the BLM maintained the original project by hand thinning the piñon and juniper trees within the treatment area. Hand thinned areas were piled and burned in 2009 and 2010. Some wood piles were chipped along the perimeter where pile burning posed a threat to adjacent private land. This project was completed in May 2010. The Payne Basin Treatment Area located north of the Project Area is shown in Figure 3.4.1 and the historic fires are shown in Figure 3.4.5.

Recreation

Historic recreational use includes hunting, Christmas tree cutting, dispersed OHV use as well as organized mountain bicycle and motorcycle races. The Christmas tree cutting area (represented by Commercial Tree Harvest on associated figures) and historic race routes are shown in Figures 3.4.3 and 3.4.4. Dispersed uses in the area have resulted in new trails, which are vulnerable to the introduction of nonnative, invasive, species and which may have contributed to the loss of soils and vegetation and increased erosion. There have not been any organized motorcycle or bicycle races in the area since 2006; however, there is continued dispersed use of the Recreation CESA and access through the Project Area.

Rights-of-Way

The LR2000 database was used to query the various types of ROWs that have been approved in the nine CESAs by Sections, Township and Ranges, and include the following: railroad; irrigation and water facilities; telephone; federal aid for highways; material sites; federal roads; communication; power lines; roads; wind energy test sites, geothermal leases, other federal ROWs; and other (undefined) ROWs. The approximate acreage of each ROW within each CESA associated with these ROWs is listed in Table 3.4-3. The acreage of surface disturbance associated with these ROWs cannot be quantified; however it is assumed that these types of ROWs and the construction and maintenance associated with these facilities would create a level

Table 3.4-3: Past and Present ROW Acres in the CESAs by Type of ROW

CESA	ROW Type										
	Railroad	Water/Irrigation Facility	Telephone	Federal Aid-Highway	Material Sites	Roads	Communication	Power line	Wind & Geothermal	Other	Total
HUC5 Watershed	774	70	1,376	1,646	595	13	9	3,824	13	0	8,320
Cultural-Recreation	0	70	2,693	2,121	910	23	9	7,428	13	0	13,267
Grazing	2,119	142	1,834	3,527	1,321	590	14	3,931	129	0	13,607
Soils	0	0	0	0	0	0	0	0	0	0	0
Sage Grouse	1,533	0.33	2,069	1,891	316	159	9	3,863	26	1	9,867
Visual Resources	121	72	418	1,682	456	0	0	3,881	0	0.9	6,631
Immediate Watershed	0	0.33	1,345	1,057	80	25	3	217	15	0	2,742
LWC	0	0	1013	380	80	15	3	265	0	0	1,756
Mule Deer	2,452	23	2,088	3,626	298	1046	9	6,607	7,445	2	23,596

Source: LR2000 Database June and July 2010

Table 3.4-4: Past and Present Minerals Disturbance Acres in the Affected CESAs

CESA	Authorization Status	Total Acres of Disturbance
HUC 5 Watershed	Closed Notices (0)	0
	Expired Notices (0)	0
	Authorized Notices (1)	4.70
	Approved Plans (1)	100
	Long Canyon Approved Disturbance	99.86
	HUC5 Watershed CESA Total	204.56
Cultural-Recreation	Closed Notices (5)	19.9
	Expired Notices (1)	4.96
	Authorized Notices (3)	12.93
	Approved Plans (1)	100
	Long Canyon Approved Disturbance	99.86
	Cultural-Recreation CESA Total	237.65
Grazing	Closed Notices (15)	25.90
	Expired Notices (1)	4.96
	Authorized Notices (3)	12.93
	Approved Plans (3)	1,325
	Long Canyon Approved Disturbance	99.86
	Grazing CESA Total	1,468.86
Soils	Closed Notices (0)	0
	Expired Notices (0)	0
	Authorized Notices (0)	0
	Approved Plans (0)	0
	Long Canyon Approved Disturbance	99.86
	Soils CESA Total	99.86
Sage Grouse	Closed Notices (5)	19.85
	Expired Notices (1)	4.96
	Authorized Notices (3)	12.93
	Approved Plans (1)	100
	Long Canyon Approved Disturbance	99.86
	Sage Grouse CESA Total	237.60
Visual Resources	Closed Notices (0)	0
	Expired Notices (0)	0
	Authorized Notices (0)	0
	Approved Plans (0)	0
	Long Canyon Approved Disturbance	99.86
	Visual Resources CESA Total	99.86
Immediate Watershed	Closed Notices (3)	12.75
	Expired Notices (0)	0
	Authorized Notices (3)	12.93
	Approved Plans (0)	0
	Long Canyon Approved Disturbance	99.86
	Immediate Watershed CESA Total	125.54
Lands With Wilderness Characteristics (LWC)	Closed Notices (4)	17.25
	Expired Notices (2)	9.92
	Authorized Notices (3)	12.93
	Approved Plans (2)	144.93
	LWC CESA Total	185.03
Mule Deer	Closed Notices (32)	85.10
	Expired Notices (7)	21.36
	Authorized Notices (5)	21.58
	Approved Plans (2)	148
	Long Canyon Approved Disturbance	99.86
	Mule Deer CESA Total	375.90

Source: LR2000 Database June and July 2010 (and March 2011 for LWC CESA).

of surface disturbance that would contribute to cumulative impacts to various resources. In addition, certain types of ROWs can fragment habitat or create barriers or hazards for wildlife passage. The LR2000 database was queried on June 30, 2010, July 15, 2010, and on March 22, 2011 (specific to the LWC CESA). Any new approved ROWs that have been added to the LR2000 database after July 15, 2010 and March 22, 2011 (in the LWC CESA), are not included in this analysis.

Mineral Exploration and Mining

The LR2000 database was used to query the past and present mineral exploration or mining activities (authorized Notices, expired Notices, closed Notices, approved Plan of Operations) that have been approved in the nine CESAs by Sections, Township, and Ranges. Past and present minerals activities in the nine CESAs include historic exploration and mining operations. Table 3.4-4 is a summary of the past and present mineral activities within each CESA based on the LR2000 database used by the BLM. The LR2000 database was queried on June 30, July 15, 2010, and on March 22, 2011 (specific to the LWC CESA). Any new approved Notices or Plans of Operations that have been added to the LR2000 database after July 15, 2010 and March 22, 2011 in the LWC CESA, are not included in this analysis.

Gold, silver, barite and tungsten were mined within the Jarbidge Mining District, which is located on National Forest System (NFS) lands. Mining and exploration have also occurred at the Big Ledge Mine, Stormy Creek Mine, and the Dry Creek Mill Site on BLM-administered lands within the Mule Deer CESA. NOV Mineral's Big Ledge project has been authorized to conduct up to 193.3 acres of surface disturbance for exploration and mining on private and public lands within Sections 9, 10, 15, and 16 in T42N, R62E and Sections 22, 24, 26, 27, 34, and 35 in T42N, R61E (Figures 3.4.3 and 3.4.4). Disturbance would include exploration roads, overland travel, drill sites, trenching, access roads, haul road, stockpile removal area, and equipment staging area.

There are no historical mining or exploration features or disturbances in either the Long Canyon or the West Pequop Project Areas because mineral exploration activities in this part of the Pequop Mountains first started in the 1990s. Currently, Agnico-Eagle (West Pequop Project, LLC) has 100 acres of approved surface disturbance for mineral exploration involving exploration road and drill site construction at the West Pequop Project in the Pequop Range west of the Project Area (Figures 3.4.3 and 3.4.4). The West Pequop Project falls within all or portions of the HUC5 Watershed CESA, Cultural-Recreation CESA, Grazing CESA, Sage Grouse CESA, the Immediate Watershed CESA, LWC CESA, and the Mule Deer CESA. Agnico-Eagle (USA) Ltd. has an acknowledged Notice for 4.7 acres of surface disturbance for mineral exploration including the construction of drill roads and drill pads at the Summit Exploration Project. The Summit Exploration Project is located in Sections 8, 10, 16, and 18, T36N, R66E in the Pequop Range north of the Project Area (Figure 3.4.3). Fronteer has 99.86 acres of approved activities for mineral exploration within the 2008 Plan Boundary and on private land. These approved activities consist of surface disturbance and include maintenance of existing access roads, construction of exploration roads, construction of drill pads, and trenching and bulk sampling. These approved disturbance acres fall within all nine CESAs.

3.4.2 Reasonably Foreseeable Future Actions

The RFFAs include continued livestock grazing, wildland fire and emergency fire rehabilitation, wildlife game and habitat management, dispersed recreation, ROW authorizations, mineral exploration, proposed land sale, and mining.

Livestock Grazing

Livestock grazing and range improvement activities are expected to continue consistent with the past and present actions discussion.

Wildland Fires and Fire Rehabilitation

Wildland fires, fire suppression, and burned area rehabilitation are also likely to occur within some or all of the CESAs. This is likely to increase the changes in the plant community due to large fires but also result in somewhat less diverse communities in the short term because fire rehabilitation seed mixes include limited species. The BLM is currently planning a fuels treatment on Spruce Mountain to the south of the Project Area.

Wildlife and Game Habitat Management

Wildlife and game habitat management activities are expected to continue consistent with the past and present actions discussion.

Recreation

Recreation activities and impacts may increase as a result of population growth near Wells and Wendover. Impacts from recreation would be similar to those discussed under past and present actions.

Rights-of-Way

Data for the acres of RFFA ROWS in the CESAs is based on the LR2000 and proposed project information from the BLM. The LR2000 database was queried on June 30, 2010, July 15, 2010, and March 22, 2011 (for area in the LWC CESA boundary). Any new pending ROWs that have been added to the LR2000 database after July 15, 2010 and March 22, 2011 in the LWC CESA are not included in this analysis.

Great Basin Transmission, LLC is developing the Southwest Intertie Project (SWIP), a 500 kV AC transmission line stretching between Idaho and southern Nevada. The greater than 500-mile long line is being developed in response to the growing needs of the Desert Southwest and the Northwest. The proposed corridor for the SWIP line is located east of the project in the Goshute Valley as shown on Figure 3.4.2. The SWIP is still in the planning stages and level of surface disturbance and other impacts to resources due to the construction and, therefore, maintenance that would be associated with the SWIP project is unavailable at this time. The SWIP corridor does transect the Sage Grouse CESA (10.7 miles), Mule Deer CESA (5.8 miles), Visual Resources CESA (4.2 miles), Cultural-Recreation CESA (16.3 miles), Grazing CESA (35.9 miles), and the HUC5 Watershed CESA (15.1 miles).

Two pending Road ROWs totaling approximately 75.52 acres and one pending Telephone ROW for 101.92 acres are located within the Mule Deer CESA. One pending Road ROW for 6.99 acres is located within the Grazing CESA.

Mineral Exploration and Mining

Mineral exploration activities are expected to continue in response to robust commodity prices and based on current supply of and demand for minerals and commodities. Data for the acres of RFFA surface disturbance in the CESAs is based on the LR2000 and proposed project information from the BLM and the USFS. The LR2000 database was queried on June 30, July 15, 2010 and on March 22, 2011 for the LWC CESA. Any new pending Notices or Plans of Operations that have been added to the LR2000 database after July 15, 2010 and March 22, 2011 in the LWC CESA are not included in this analysis.

West Pequop Project, LLC has submitted a Plan of Operation Amendment to the BLM for the West Pequop Project which would create an additional 300 acres of surface disturbance associated with mineral exploration activities. This would bring the total surface disturbance within their operations area to 400 acres when combined with the approved 100 acres mentioned above. The eastern boundary of the West Pequop Project is coincident with the western boundary of the Expanded Long Canyon Project Area. Exploration activities proposed on the West Pequop Project would include drilling, constructing drill access roads, trenching, and bulk sampling. The West Pequop Project is anticipated to have similar environmental protection measures as the Proposed Action for the Project analyzed in this EA. Portions or all of the West Pequop Project are located within the Immediate Watershed CESA, Sage Grouse CESA, HUC5 Watershed CESA, Lands with Wilderness Characteristics CESA, Mule Deer CESA (Winter Range), Cultural-Recreation CESA, and Grazing CESA.

In the Deer Summer Range (located primarily on NFS Lands), Atna Resources, Inc. has proposed continued mineral exploration within the Jarbidge Exploration area located approximately 60 miles northwest of Wells, Nevada, in the vicinity of the town of Jarbidge. The proposed project is located on NFS lands in Sections 9 through 11, 15, 16, 21 through 23, 26 through 28, 33, and 34 of T46N, R58E. The proposed project would disturb a maximum of 27.8 acres in phases over a five year period and include disturbance from drill sites, sumps, constructed roads, and reopened reclaimed roads. The activities proposed in the Deer Summer Range are not tracked on the LR2000; therefore the total proposed disturbance for mineral and mining activities is not available.

One pending Plan of Operations, submitted by All Mineral Corp., for mineral exploration is located in Sections 1 and 26 in T41N, R62E. The proposed project would disturb a maximum of 140 acres. This project falls within the Mule Deer CESA. In addition, two pending Notices totaling 4.86 acres of proposed disturbance for mineral exploration are located within the Mule Deer CESA.

No additional pending Notices or Plans of Operation, other than those for the Proposed Action, were noted on the LR2000 database within the Immediate Watershed CESA, Sage Grouse CESA, HUC5 Watershed CESA, Cultural-Recreation CESA, LWC CESA, Soils CESA, Visual CESA, and Grazing CESA.

Proposed Land Sale

Fronteer has submitted a request to BLM to consider the sale of 480 acres of split estate lands in NE/4 Section 29, and W/2 Section 21 T36N, R66E pursuant to Section 203 of FLPMA. Fronteer owns the mineral estate on these lands and BLM acquired the surface estate in the 1999 Big Springs Land Exchange. BLM is currently considering this request and would prepare a NEPA document to evaluate and analyze the requested purchase. If BLM authorizes the sale, Fronteer would purchase the lands at the Fair Market Value determined by BLM and would continue to pursue mineral activities on these lands.

3.4.3 Air and Atmospheric Resources

The CESA for air and atmospheric resources is the HUC5 Watershed which includes 116,525 acres and is shown on Figure 3.4.1.

Past and Present Actions: Present actions within the HUC5 Watershed CESA that are likely to be contributing to air quality impacts include wildland fire, dispersed recreation, minerals exploration, and road construction and maintenance. These activities are principally contributing point source particulate matter emissions and fugitive dust to the air quality impacts; however, products of combustion are also emitted.

Historic Fires (1981-2009) have burned approximately 1,619 acres in the HUC5 Watershed CESA (one percent of the CESA). Approved, closed or expired mineral exploration and mining Notices or Plans total 204.79 acres of surface disturbance (0.2 percent of the CESA). Approximately 8,320 acres of ROWs were issued within the HUC5 Watershed CESA that have the potential to create surface disturbance or impact air quality. Approximately 79 miles of historic race routes are present within the HUC5 Watershed CESA.

RFFAs: RFFAs within the HUC5 CESA that may contribute to impacts to air quality include dispersed recreation, transportation, mineral exploration, transmission line construction, wind energy projects, and wildland fires. These impacts result in impacts to air quality from the emissions of point source particulate matter, fugitive dust, and the products of combustion.

The West Pequop Project operations area is located partially within the HUC5 Watershed CESA (3,054 acres) and has proposed a total of 300 acres of surface disturbance. Approximately 15.1 miles of the proposed SWIP corridor is located within the HUC5 Watershed CESA. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the HUC5 Watershed CESA that would impact air quality.

Cumulative Impacts: Cumulative impacts to air quality within the HUC5 Watershed CESA would result from the past and present actions and RFFAs when combined with the Proposed Action. The incremental contribution of the Proposed Action's particulate and combustion emissions and fugitive dust would be relatively small and the cumulative emissions are generally dispersed. Stationary sources would be regulated by the Bureau of Air Pollution Control (BAPC) under individual permits to ensure that impacts would be reduced to levels that are consistent with the ambient air quality standards. The Dust Control Plan for the Project and speed limits are measures that would minimize the potential effects of fugitive dust on air quality. Reclamation of Project-related proposed surface disturbance would gradually eliminate fugitive dust from wind erosion. There are no issues of concern related to the cumulative impacts on air quality.

3.4.4 Cultural Resources

The CESA for cultural resources is a BLM defined area which includes 141,389 acres and is shown on Figure 3.4.2.

Past and Present Actions: Cultural properties tend to degrade over time due to natural forces; however, many survive for hundreds or thousands of years. Modern human activity tends to exacerbate the damage and as a consequence cultural resources are being damaged and disappearing at an ever increasing rate. Many of the recorded cultural resources in the CESA exhibit impacts resulting from modern use of the land. Grazing damage is found at virtually all recorded sites, and sites are likely to have sustained damages from previous mining exploration, road construction, NDOT gravel pits, fences, agricultural practices, oil and gas seismic exploration, recreation, tree removal by chaining, wildfires and erosion resulting from these activities. Although difficult to quantify, the paucity of artifacts at some sites may be due to removal by artifact collectors.

Past and present activities within the Cultural and Recreation CESA that have the potential to contribute to degradation of cultural artifacts include the 237.65 acres of approved mineral exploration or mining disturbance (less than 0.2 percent of the CESA), 2,456 acres of historic fires (two percent of the CESA), and 13,267 acres of ROWs that have the potential to create surface disturbance. The recent vegetation removal associated with the 224 acre Payne Treatment Basin (less than 0.2 percent of the CESA) was unlikely to do any harm to cultural resources since it lies within an old chaining area where any cultural resources that were present are assumed to have been destroyed. In addition, approximately 112,700 acres of the NDOW 078 Hunt Unit is located within the CESA and 138 miles of historic race routes. Approximately, 7.6 miles of the Pequop Conservancy fencing is located within the CESA, although this is on private land.

Another factor that leads to the loss of cultural resources and archaeological data is the imperfect nature of cultural resource management and archaeological research. Intensive cultural resource inventories (100 feet between transects) are meant to identify most cultural resources within the inventory boundary, but result in some smaller sites and low density sites being overlooked. The overall success rate depends on many factors including transect spacing, training/experience of the field crew, surface visibility, lighting, time of day, difficulty of the terrain, etc. Once a cultural resource is discovered, information is gathered by closely scrutinizing the site area and sometimes excavating small probe units to determine if subsurface deposits are present. This information is documented in site forms and inventory reports which include National Register eligibility recommendations. The federal agency then makes a formal determination of eligibility and project effects based on the report and any other available data. Given that eligibility determinations are based primarily on sites' surface characteristics, there is room for error given that surface manifestations do not always accurately reflect the nature and density of subsurface deposits. Other factors at play are the differences of opinion among professional archaeologists as to what research (and therefore archaeological sites) is important, and the evolving nature of archaeological research. In some cases, sites now thought to be lacking the ability to answer important questions may become important as archaeological method and theory progress but may not be preserved. The courts have determined that cultural resource management standards such as those employed for the current project meet the objectives of the NHPA and other pertinent statutes, but this does not necessarily imply that there are not project-specific or cumulative losses of cultural resources or information important to understanding the past.

Reasonably Foreseeable Future Actions: Grazing, other agricultural activities and wildfires are likely to continue within the cultural resource CESA but probably, on average, with fewer impacts to cultural resources than in the past because the more severe damage has already been done. Agricultural activities and other actions on private land have considerable potential to seriously damage cultural resources that are part of the prehistoric settlement system within the CESA, but private development plans, if any, are unknown and outside the purview of BLM responsibility and this Project analysis.

The West Pequop Project operations area is located entirely within the Cultural and Recreation CESA and has proposed a total of 300 acres of surface disturbance (0.2 percent of the CESA). Approximately 16.3 miles of the proposed SWIP corridor is located within the Cultural-Recreation CESA. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the Cultural-Recreation CESA.

Cumulative Impacts: The condition of cultural resources within the CESA would likely continue to deteriorate due to both human and natural causes. While the Project would contribute to the overall decline, environmental protection measures would prevent the majority of damage and overall incremental impacts would be comparatively minor.

3.4.5 Invasive, Nonnative Species

The CESA for Invasive, Nonnative Species is the HUC5 Watershed which includes 116,525 acres and is shown on Figure 3.4.1.

Past and Present Actions: Past and present actions with impacts created from invasive, nonnative species (noxious weeds) have been limited and include mineral exploration, wildfires, ranching operations (grazing), road construction and maintenance, or dispersed recreation that could have disturbed vegetation and soils creating an opportunity for invasive plant colonization and introduced noxious weed seeds. Cheatgrass, an invasive species, has spread due to wildland fires. There are no specific data that quantify impacts from invasive, nonnative species as a result of grazing or recreation within the CESA. West of the Project Area invasive or nonnative species such as hoary cress, scotch thistle and black henbane infestations have been identified in the Pequop Mountain range along existing roads. The Scotch thistle infestation is less than four acres in size, the hoary cress infestation is approximately nine acres in size, and the black henbane infestation is 0.25 acre in size.

Historic Fires (1981-2009) have burned approximately 1,619 acres in the HUC5 Watershed CESA (1.4 percent of the CESA). As shown on Table 3.4-4, approved, closed, or expired mineral exploration and mining Notices or Plans total 204.56 acres (0.2 percent of the CESA). State and federal regulations require project operators of Notices and Plans to provide financial assurance to guarantee that surface disturbance due to mineral activities will be reclaimed. Therefore, the Notices and Plans within the HUC5 Watershed CESA have reclamation bonds to guarantee that the 204.56 acres of authorized surface disturbance will be reclaimed when mineral exploration and mining activities have been completed. Approximately 8,320 acres of ROWs were issued within the HUC5 Watershed CESA that have the potential to create surface disturbance and introduce invasive species. Approximately 21,077 acres of the Christmas Tree Cutting Area and 52,206 acres of the NDOW Hunt Unit 078 are located within the CESA which have the potential to create surface disturbance and associated off road vehicular traffic can introduce invasive species. The majority of the HUC5 Watershed CESA is located within the Big

Springs Grazing Allotment and livestock grazing and associated management contributes to the spread of invasive species. In addition, approximately 79 miles of historic race routes are present within the HUC5 Watershed CESA.

Reasonably Foreseeable Future Actions: Potential impacts from invasive, nonnative species (noxious weeds) as a result of grazing, dispersed recreation including Christmas tree cutting, roads, ROWs, minerals activities or loss of native vegetation associated with potential wildland fires could occur. There are no specific data on the potential impacts resulting from invasive, nonnative species due to dispersed recreation, grazing, or potential wildfires.

The West Pequop Project operations area is located partially within the HUC5 Watershed CESA (3,054 acres) and has proposed a total of 300 acres of surface disturbance. Approximately 15.1 miles of the proposed SWIP corridor is located within the HUC5 Watershed CESA. No quantifiable impacts pertaining to invasive species and surface disturbance from the SWIP is available at this time. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the HUC5 Watershed.

Cumulative Impacts: Disturbance to soils and vegetation from past and present actions has created the opportunity for invasive species to colonize some areas. Disturbed sites and recently seeded areas associated with reclamation are candidates for invasion by undesirable species such as noxious weeds and cheatgrass. Over time, reclamation, seeding, and monitoring of disturbed areas would reduce the potential for the introduction and colonization of weed species. The past and present actions have disturbed only a small portion of the CESA, and all RFFAs would require BMPs such as washing equipment before entering the property and the use of certified weed-free straw bales and seed mixes, as well as mitigation for the control of invasive, nonnative species.

The Proposed Action would create an additional 69.43 acres of surface disturbance (0.06 percent of the CESA). The surface disturbance associated with the Proposed Action would be localized and potential infestations by noxious weeds and invasive species would be minimized due to implementation of the environmental protection measures as outline in Section 2.2.8. Therefore, incremental cumulative impacts from invasive, nonnative species as a result or the Proposed Action when added to the past and present actions and RFFAs would be minimal.

3.4.6 Lands with Wilderness Characteristics

The CESA for Lands with Wilderness Characteristics (LWCs) is the boundary of the Pequop LWC Inventory Area and contains 63,235 acres, in which 27,835 acres were found to have wilderness characteristics (Pequop LWC Unit NV-EK-03076). Therefore, approximately 44 percent of the CESA contains LWC areas.

Past and Present Actions: Past and present actions that could impact wilderness characteristics (e.g., naturalness, opportunities for solitude) include mineral exploration, road construction, and off-road motor vehicle recreation. Mineral exploration activities include the 199.86 acres of approved disturbance associated with the Long Canyon Exploration Project and Pequop Exploration Project. However, none of the existing disturbance associated with the Long Canyon Exploration Project is located within the Pequop LWC Unit. Approximately 17.5 acres of existing disturbance from the Pequop Exploration Project is located within the Pequop LWC Unit. In addition, approximately 230 miles of routes and roads used for motorized recreation and

access to recreational sites are located within the CESA; however, a majority of the roads are present in areas of the CESA that do not possess wilderness characteristics.

Reasonably Foreseeable Future Actions: Potential impacts to wilderness characteristics from road construction and maintenance and mineral exploration activities could occur. There are no specific guidelines to evaluate potential impacts to LWC areas from mineral exploration activities; however, disturbance would be temporary and impacts would be mitigated by post-project reclamation as required by law. The proposed West Pequop Exploration Project is located entirely within the LWC CESA and has proposed an additional 300 acres of surface disturbance, which could occur anywhere within their expanded project boundary including the Pequop LWC Unit. An additional 19.39 acres of approved disturbance from the Pequop Exploration Project could occur within the Pequop LWC Unit. No additional pending ROWs or other proposed mineral exploration or mining activities were reported in the LWC CESA.

Cumulative Impacts: The exploration activities of the Proposed Action include drill site construction and drill access road construction within the Pequop LWC Unit, but would total no more than 14.26 acres of surface disturbance. When combined with existing disturbance from the Pequop Exploration Project and proposed disturbance from the West Pequop Exploration Project, a maximum of 351.15 acres of surface disturbance could occur within the Pequop LWC Unit, which equates to approximately 1.26 percent of the Pequop LWC Unit. Based on the above analysis and findings, incremental and temporary impacts to wilderness characteristics as a result of the Proposed Action when added to the past and present actions and RFFAs would be minimal.

3.4.7 Migratory Birds

The CESA for migratory birds is the HUC5 Watershed which includes 116,525 acres and is shown on Figure 3.4.1.

Past and Present Actions: Past and present actions that have potentially impacted migratory birds include mineral exploration, wildland fires, ranching operations (grazing), road construction and maintenance, or dispersed recreation. Impacts to migratory birds have resulted from the following: 1) destruction of habitat associated with road building and cutting trees; 2) disruption from human presence or noise such as drill rigs, water trucks and four-wheel drive pickups; or 3) direct impacts/harm to migratory birds that would result if trees containing viable nests were cut down or ground nests destroyed by construction or ranching equipment. There are no specific data that quantify impacts to migratory birds as a result of grazing or recreation. However, impacts to migratory birds from recreation activities would include destruction of native vegetation or nesting areas from off road vehicles that traveled off of established roadways. Impacts to migratory birds from grazing include trampling and consumption of vegetation or nesting areas near streams, springs, or riparian areas. Impacts from wildland fires would include total destruction of the existing habitat and alteration of the habitat thereafter.

Historic Fires (1981-2009) have burned approximately 1,619 acres in the HUC5 Watershed CESA (1.4 percent of the CESA). As shown on Table 3.4-4, approved, closed or expired mineral exploration and mining Notices or Plans total 204.56 acres (0.2 percent of the CESA). State and federal regulations require project operators of Notices and Plans to provide financial assurance to guarantee that surface disturbance due to mineral activities will be reclaimed. Therefore, the Notices and Plans within the HUC5 Watershed CESA have reclamation bonds to guarantee that

the 204.56 acres of authorized surface disturbance will be reclaimed when mineral exploration and mining activities have been completed. Approximately 8,320 acres of ROWs were issued within the HUC5 Watershed CESA that have the potential to create surface disturbance and disturb migratory bird habitat and vegetation. Approximately 21,077 acres of the Christmas Tree Cutting Area and 52,206 acres of the NDOW Hunt Unit 078 are located within the CESA which have the potential to create noise and disturb to migratory birds, and to remove or alter habitat. The majority of the HUC5 Watershed CESA is located within the Big Springs Grazing Allotment and livestock grazing and associated management contributes to the spread of invasive species which can have an indirect effect on migratory birds. In addition, approximately 79 miles of historic race routes are present within the HUC5 Watershed CESA which has created habitat fragmentation or disturbance to vegetation structure.

However, disturbance to migratory birds from past and present actions would have been reduced through reclamation and seeding of disturbed areas and natural recolonization of native species. The past and present actions that are quantifiable have disturbed only a small portion of the CESA, approximately one percent.

Reasonably Foreseeable Future Actions: Potential impacts to migratory birds from grazing, dispersed recreation, roads, ROWs, minerals activities or loss of native vegetation associated with potential wildland fires could occur. There are no specific data on the potential impacts to migratory birds or their habitat as a result of dispersed recreation, grazing, or potential wildfires.

The West Pequop Project operations area is located partially within the HUC5 Watershed CESA (3,054 acres) and has proposed a total of 300 acres of surface disturbance. Approximately 15.1 miles of the proposed SWIP corridor is located within the HUC5 Watershed CESA. No quantifiable impacts pertaining to migratory birds and habitat from the SWIP is available at this time. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the HUC5 Watershed. RFFAs would be required to implement mitigation measures and abide by the MBTA, which would minimize impacts.

Cumulative Impacts: Impacts to migratory birds and their habitat from the Proposed Action would be limited to the removal of vegetation, or destruction of habitat (up to 69.43 acres), and noise associated with exploration. These impacts would be localized and minimized due to implementation of environmental protection measures and mitigation measures required by the BLM (e.g., migratory bird nest surveys during the nesting season to comply with the MBTA). The Proposed Action would affect approximately 0.06 percent of the HUC5 Watershed CESA. Based on the above analysis and findings incremental impacts to migratory birds as a result of the Proposed Action when added to the past and present actions and RFFAs are expected to be minimal.

3.4.8 Range Resources

The Grazing CESA consists of the East and West Big Springs Grazing Allotments which includes 492,881 acres as shown on Figure 3.4.1. Authorized use in the Grazing CESA is on both public and private land totals 21,337 AUMs. Based on potential active use AUMs there are approximately 23 acres per AUM.

Past and Present Actions: Past and present actions that have potentially impacted range resources include mineral exploration, road construction and maintenance, ROWs, wildfires,

fencing, or dispersed recreation that could have impacted water sources or reduced forage. There are no specific data that quantify impacts from roads, ROWs, or recreation in the CESA; however, the actual building of roads, sumps, fences other linear features, or off road traveling would destroy habitat or disrupt movement of grazing animals.

Historic Fires (1981-2009) have burned approximately 8,669 acres in the Grazing CESA (two percent of the CESA). As shown on Table 3.4-4, approved, closed, or expired mineral exploration and mining Notices or Plans total 1,468.86 acres (0.3 percent of the CESA). State and federal regulations require project operators of Notices and Plans to provide financial assurance to guarantee that surface disturbance due to mineral activities will be reclaimed. Therefore, the Notices and Plans within the Grazing CESA have reclamation bonds to guarantee that the 1,468.86 acres of authorized surface disturbance will be reclaimed when mineral exploration and mining activities have been completed. Approximately 13,607 acres of ROWs were issued within the Grazing CESA that have the potential to affect livestock movement and disturb forage habitat. Based on a survey conducted of the fence line, the Pequop Conservancy has erected 61.5 miles of fencing on private land in the Grazing CESA and some sections of this fencing adjoin BLM land. In addition, approximately 238 miles of historic race routes are present within the Grazing Watershed CESA which has created habitat fragmentation or disturbance to vegetation structure.

Reasonably Foreseeable Future Actions: Potential impacts to range resources could result from dispersed recreation, roads, wildfires, ROWs, expanded Pequop Conservancy fencing, and minerals activities. There are no specific data on the potential impacts to range resources from dispersed recreation or wildfires.

Cumulative Impacts: Impacts to water sources or a reduction in forage from past and present actions have impacted livestock grazing. However, less than two percent of the CESA was disturbed and some of the disturbance has been reclaimed, seeded, or otherwise naturally revegetated, which would decrease the impacts. In addition, stocking rates for the grazing allotment are based on the availability of water and forage, which may be influenced by natural forces.

The Proposed Action would result in a loss of potential forage up to 69.43 acres, which equates to less than three AUMs and should have no impacts to water sources used for livestock watering primarily because water resources are very limited in the Project Area. In addition, special precautions would be taken to avoid disturbance to the BLM's livestock key area located in the southeast quarter of the northeast quarter of Section 30, T36N, R66E. This may include limiting activity in this area during active grazing periods or other means established by the BLM's rangeland specialists. Therefore, incremental impacts to range resources as a result of the Proposed Action when added to the past and present actions and RFFAs would be minimal.

3.4.9 Recreation

The CESA for recreation is the local recreational use area which includes 141,389 acres as shown on Figure 3.4.2.

Past and Present Actions: Past and present actions that have potentially impacted recreation have been limited and include mineral exploration, road construction and maintenance, ranching operations (grazing), ROWs, fence construction, or wildfires that may have restricted access or

reduced recreation opportunities within the CESA. There are no specific data that quantify impacts to recreation from grazing, ROWs, or roads; however, the greatest impact would be related to limitations on access.

Past and present activities within the Cultural and Recreation CESA that have the potential to affect access or recreational opportunities or experiences include the 237.65 acres (less than 0.2 percent of the CESA) of approved mineral exploration or mining disturbance (including the West Pequop Project), 2,456 acres of historic fires (two percent of the CESA), and 13,267 acres of ROWs that have the potential to impede access. Approximately 7.6 miles of the Pequop Conservancy fencing is located within the CESA; although this is on private land, it may block access to public lands open for recreation.

Reasonably Foreseeable Future Actions: Potential impacts to recreation from grazing, road construction and maintenance, ROWs, minerals activities, expanded Pequop Conservancy fencing limiting access to public lands, and potential wildfires could occur. There are no specific data on the potential impacts to recreation from grazing, ROWs or roads; however, they would be similar to the impacts described for past and present actions.

The West Pequop Project operations area is located entirely within the Cultural and Recreation CESA and has proposed a total of 300 acres of surface disturbance (0.2 percent of the CESA). Approximately 16.3 miles of the proposed SWIP corridor is located within the Cultural and Recreation CESA. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the Cultural and Recreation CESA.

Cumulative Impacts: The Project would not limit access for recreation; therefore, the only potential impacts would be as a result of noise and activity in the area. The primary recreation use in the CESA includes off highway vehicles or motorcycle use, and mountain biking, and hunting. The majority of these activities would not be impacted by noise and human presence in the area. Noise could affect hunting; however, the Proposed Action would only result in localized temporary disturbance from noise and would therefore have minimal impacts on hunting. Based on the above analysis and findings, incremental impacts to recreation as a result of the Proposed Action when added to the past and present actions and RFFAs would be minimal.

3.4.10 Soils

The Soils CESA is defined by the Project Area which includes 7,664 acres and is shown on Figure 3.4.1.

Past and Present Actions: Past and present actions that have potentially impacted soils include mineral exploration, ranching operations (grazing), road construction and maintenance, ROWs, wildfires, or dispersed recreation. Impacts from these activities include loss of soils productivity due to changes in soil physical properties, soil fertility, soil movement in response to water and wind erosion, and loss of soil structure due to compaction. There are no specific data that quantify impacts from grazing, roads, ROWs, or recreation.

No ROWs or mineral exploration activities have been conducted within the Soils CESA other than the approved exploration activities associated with the Project (99.86 acres of surface disturbance). No historic fires have impacts soils within the Soils CESA. Approximately

5,690 acres of the Christmas Tree Cutting Area and 7,586 acres of the NDOW Hunt Unit 078 are located within the CESA which have the potential to create disturbance to soils from off road vehicular traffic and vegetation removal. In addition, the dispersed recreation and approximately 5.8 miles of historic race routes are present within the Soils CESA contribute to the erosion and degradation of the access roads. The Soils CESA is located within the Big Springs Grazing Allotment and livestock grazing and associated management contribute to the erosion of soils particularly in drainages or riparian areas.

Reasonably Foreseeable Future Actions: Potential impacts to soils could result from grazing, dispersed recreation, roads, wildfires, ROWS, and minerals activities. There are no specific data on the potential impacts to soils from dispersed recreation, grazing, or potential wildfires. Impacts associated with RFFAs would be similar to the impacts described for past and present actions.

No pending ROWs or mineral activities were noted within the Soils CESA other than the Proposed Action. Continued reclamation of past mining and exploration disturbance and future restoration activities would mitigate soil movement and productivity loss. Soil salvaged and used in reclamation would become viable and would be expected to return to pre-disturbance productivity once vegetation was established. Seeding and revegetation of areas that have been burned would reduce soil movement and loss.

Cumulative Impacts: The Proposed Action would disturb up to 69.43 acres of soils, which is approximately one percent of the CESA. In addition, these impacts would be localized and minimized due to implementation of environmental protection measures and BMPs, which include concurrent reclamation and the use of silt fences or certified weed-free straw bales to prevent erosion. Therefore, the incremental impacts to soils as a result of the Proposed Action when added to the past and present actions and RFFAs would be minimal.

3.4.11 Special Status Species

The CESA for Special Status Species includes both the HUC5 Watershed and the Sage Grouse CESA. The HUC5 Watershed includes 116,525 acres as shown in Figure 3.4.1. The Sage Grouse CESA includes 191,898 acres as shown on Figure 3.4.3.

Past and Present Actions: Past and present actions that have potentially impacted special status species, (e.g., bats, greater sage-grouse, pygmy rabbits, ferruginous hawks, bald eagles, and Mattoni's blue butterfly), include mineral exploration, ranching operations (grazing), road construction and maintenance, or dispersed recreation. Impacts to special status species from these activities include loss of forage, cover, and habitat as well as disturbance of mating and brood rearing practices. There are no specific data that quantify impacts to special status species as a result of grazing or recreation; however, the greatest impact would be from off road use that destroyed habitat.

Historic Fires (1981-2009) have burned approximately 7,924 acres in the Sage Grouse CESA (four percent of the CESA) and 1,619 acres in the HUC5 Watershed CESA used to analyze all other sensitive species (1.4 percent of the CESA). As shown in Table 3.4-4, approved, closed, or expired mineral exploration and mining Notices or Plans total 237.60 acres in the Sage Grouse CESA (0.1 percent of the CESA) and 204.56 acres in the HUC5 Watershed CESA (less than 0.2 percent of the CESA). State and federal regulations require project operators of Notices and

Plans to provide financial assurance to guarantee that surface disturbance due to mineral activities will be reclaimed. Therefore, the Notices and Plans within the HUC5 Watershed CESA have reclamation bonds to guarantee that the 204.56 acres and 237.60 acres in the Sage Grouse CESA of authorized surface disturbance will be reclaimed when mineral exploration and mining activities have been completed. A total of 9,867 acres of ROWs were issued within the Sage Grouse CESAs and 8,320 acres of ROWs were issued within the HUC5 Watershed CESA that has the potential to create surface disturbance and habitat fragmentation and degradation for sensitive species. Approximately 127 miles and 79 miles of historic race routes are present within the Sage Grouse and HUC5 Watershed CESAs, respectively. Approximately 68,434 acres of the Christmas Tree Cutting Area and 113,289 acres of the NDOW Hunt Unit 078 are located within the Sage Grouse CESA and approximately 21,077 acres of the Christmas Tree Cutting Area and 52,206 acres of the NDOW Hunt Unit 078 are located within the HUC5 Watershed CESA. Activities associated with these management units have the potential to create noise and disturbance to sensitive species and remove or alter habitat. The majority of the HUC5 Watershed CESA and Sage Grouse CESA are located within the Big Springs Grazing Allotment and livestock grazing and associated management contributes to the spread of invasive species and change vegetation structure which can have an indirect effect on sensitive species.

Reasonably Foreseeable Future Actions: Potential impacts to special status species from grazing, dispersed recreation, roads, ROWs, fence building, minerals activities or loss of cover, forage, or habitat associated with future wildland fires could occur. There are no specific data on the potential impacts to special status species as a result of dispersed recreation, ROWs or fence construction, grazing, or potential wildfires.

The West Pequop Project operations area is located partially within the HUC5 Watershed CESA (3,054 acres) and entirely within the Sage Grouse CESA and has proposed a total of 300 acres of surface disturbance. Approximately 15.1 miles of the proposed SWIP corridor is located within the HUC5 Watershed CESA and 10.7 miles is located within the Sage Grouse CESA. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the HUC5 Watershed.

The greatest impact to special status species is habitat alteration, which would occur from the past, present and RFFA's from reclamation of exploration areas and disturbance associated with ROWS and seeding in burn areas that would favor herbaceous species over shrubs. The primary impact relates to changes in dominant plant communities that affect habitat for wildlife (i.e., conversion from sagebrush to grasslands). Wildfires combined with displacement of native species by invasive annual grasses such as cheatgrass are the primary factors that have altered the structure, composition, and ecology of plant communities in the CESA. Vegetation from exploration reclamation of roads and drill pads would initially alter the dominant Great Basin Piñon Juniper Woodland vegetation with grass and forb species that can exist in the environment of northeastern Nevada, are proven species for revegetation, or are native species found in the existing plant communities. This conversion of habitat is favorable to the greater sage grouse. In time, the reclaimed and seeded areas should result in stable plant communities with densities that are similar to the pre-disturbance plant densities. Impacts to vegetation from recreation activities would include destruction of native vegetation from off-road vehicles that travel off of established roadways. Impacts to vegetation from grazing would include trampling of vegetation near streams, springs, or riparian areas. Disturbed sites and recently seeded areas are candidates for invasion by undesirable species such as noxious weeds and cheatgrass.

Cumulative Impacts: Loss of forage, cover, and habitat from quantifiable past and present actions have impacted special status species total four percent of the Sage Grouse CESA and less than two percent of the HUC5 Watershed CESA. It can be assumed that some of the disturbance has been reclaimed, seeded, or otherwise revegetated, which would decrease the impacts further. In addition, all RFFAs would require avoidance or other mitigation for the protection of special status species and their habitat.

The Proposed Action would disturb up to 69.43 acres of potential sensitive species habitat (approximately 0.06 percent of the HUC5 Watershed CESA and approximately 0.04 percent of the Sage Grouse CESA). There would be no cumulative adverse impacts to any listed threatened or endangered species as none of these species are known to reside within the CESAs. Sensitive bat species, pygmy rabbits, raptors, Mattoni's blue butterfly, and greater sage-grouse are the only special status animal species known to occur in the Project Area. Based on the above analysis and findings and implementation of the environmental protection measures outlined in Section 2.2.8 including a pre-disturbance migratory bird nesting survey, a pygmy rabbit clearance survey, clearing proposed drill site areas prior to construction, flagging areas to avoid, and observing speed limit restrictions in the Project Area, incremental impacts to special status species as a result of the Proposed Action when added to the past and present actions and RFFAs are expected to be limited.

3.4.12 Vegetation

The CESA for vegetation is the HUC5 Watershed which includes 116,525 acres and is shown in Figure 3.4.1.

Past and Present Actions: Past and present actions that have potentially impacted vegetation have been limited and include mineral exploration, road construction and maintenance, ranching operations (grazing), ROWs, dispersed recreation, or wildland fires and treatments that altered the structure, composition, and ecology of plant communities in the CESA. There are no specific data that quantify vegetation and habitat loss from grazing, ROWs, or recreation.

Historic Fires (1981-2009) have burned approximately 1,619 acres in the HUC5 Watershed CESA (1.4 percent of the CESA). As shown in Table 3.4-4, approved, closed or expired mineral exploration and mining Notices or Plans total 204.56 acres (less than 0.2 percent of the CESA). State and federal regulations require reclamation; therefore, it is reasonable to assume that some areas have been reclaimed and some areas have naturally revegetated over time. Approximately 8,320 acres of ROWs were issued within the HUC5 Watershed CESA that have the potential to create surface disturbance and remove or alter vegetation structure. Approximately 79 miles of historic race routes are present within the HUC5 Watershed CESA. Approximately 21,077 acres of the Christmas Tree Cutting Area and 52,206 acres of the NDOW Hunt Unit 078 are located within the CESA which have the potential to create surface disturbance and associated off road vehicular traffic can introduce invasive species and trample vegetation. The recent vegetation removal associated with the 224 acre Payne Basin Treatment area (0.2 percent of the CESA) has modified woodland and forest habitat. The majority of the HUC5 Watershed CESA is located within the Big Springs Grazing Allotment and livestock grazing and associated management contributes to changes in vegetation structure and the spread of invasive species. In addition, approximately 79 miles of historic race routes are present within the HUC5 Watershed CESA which has created habitat fragmentation or disturbance to vegetation structure.

Reasonably Foreseeable Future Actions: Potential impacts to vegetation from grazing, road construction and maintenance, ROWs, dispersed recreation, or wildland fires that alter the structure, composition, and ecology of plant communities in the CESA could occur. There are no specific data on the potential impacts to vegetation from dispersed recreation, grazing, or potential wildland fires.

The West Pequop Project operations area is located partially within the HUC5 Watershed CESA (3,054 acres) and has proposed a total of 300 acres of surface disturbance. Approximately 15.1 miles of the proposed SWIP corridor is located within the HUC5 Watershed CESA. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the HUC5 Watershed.

Cumulative Impacts: Vegetation alteration would occur from the past, present and RFFAs due to reclamation of exploration areas and disturbance associated with ROWs and seeding in burn areas that would favor herbaceous species over shrubs. The primary impact to vegetation relates to changes in dominant plant communities that affect habitat for wildlife (i.e., conversion from sagebrush to grasslands). Wildfires combined with displacement of native species by invasive annual grasses such as cheatgrass are the primary factors that have altered the structure, composition, and ecology of plant communities in the CESA. Vegetation impacts from reclamation of exploration roads and drill pads would initially alter the dominant Great Basin Piñon Juniper Woodlands, which would be converted to grass and forb species that can exist in the environment of northeastern Nevada, are proven species for revegetation, or are native species found in the existing plant communities. In time, the reclaimed and seeded areas should result in stable plant communities with densities that are similar to the pre-disturbance plant densities. Impacts to vegetation from recreation activities would include destruction of native vegetation from off-road vehicles that travel off of established roadways. Impacts to vegetation from grazing would include trampling of vegetation near streams, springs, or riparian areas. Disturbed sites and recently seeded areas are candidates for invasion by undesirable species such as noxious weeds and cheatgrass.

Quantifiable past and present actions (2,048 acres) have disturbed less than two percent of the CESA. Some of the past actions are expected to have occurred far enough in the past that the disturbance has stabilized (e.g., fire areas that have been reseeded).

The Proposed Action would disturb up to 69.43 acres of vegetation (approximately 0.6 percent of the HUC5 Watershed CESA). This disturbance would not occur all at one time but potentially over a ten-year period followed by up to four years of reclamation and revegetation. In addition, the reclamation bond for the Proposed Action would not be released until the revegetation success criteria have been met. The incremental impacts to vegetation from the Proposed Action when added to the past and present actions and RFFAs would be minimal.

3.4.13 Visual Resources

The CESA for Visual Resources is the local VRM area which includes 28,731 acres and is shown in Figure 3.4.2.

Past and Present Actions: Past and present actions that have potentially impacted visual resources include minerals activities, ranching activities, road construction and maintenance, railroad construction, ROWs, or wildfires that may have altered the visual elements of line, form,

color, and texture within the CESA. There are no specific data that quantify impacts to visual resources from grazing, ROWs, or roads within the CESA. Impacts to visual resources from the past and present activities are dependent upon the four categories of the BLM's VRM program, which allows minimal to major modifications of the landscape. Man-made features tend to be linear or rectangular in character, while natural events such as wildland fires or landslides tend to be patchy in character.

No wildland fires have burned since 1981 within the Visual Resources CESA. No approved, closed or expired mineral exploration and mining Notices or Plans other than those associated with the Project have been reported on LR2000. Approximately 6,631 acres of ROWs were issued within the Visual Resources CESA that have the potential to affect lines and contrasting forms and textures. Approximately 19 miles of historic race routes are present within the Visual Resources CESA which may have added to additional lines to the viewshed.

Reasonably Foreseeable Future Actions: Potential impacts to visual resources from road construction and maintenance, ROWs, minerals activities, ranching, and potential wildfires could occur. There are no specific data on the potential impacts to visual resources from, ROWs or roads.

The proposed SWIP corridor measures approximately 4.2 miles within the Visual Resources CESA and would be seen in the foreground of the Project when travelling on I-80. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the Visual Resources CESA.

Cumulative Impacts: The visual resources in the Project Area are consistent with BLM prescribed Visual Resource Inventory Class IV objectives. The objective of Class IV is to provide for managing activities that require major modification of the existing character of the landscape. The change to the characteristic landscape can be high; however, visual impacts in the Project Area would be minimized to the extent possible and to result in minimal changes to the landscape. Most of the activities would be partially concealed by trees. Upon completion of rehabilitation and reclamation, long term visual impacts would be minimized; therefore, impacts to visual resources from the Proposed Action in combination with the past and present actions and RFFAs would be minimal and meet the Class IV objectives.

3.4.14 Water Resources

The CESA for Water Resources is the Immediate Watershed which includes 51,668 acres and is shown on Figure 3.4.1.

Past and Present Actions: Past actions that have potentially impacted water resources include minerals activities, ranching operations including grazing and irrigation from wells, water use by the City, ROWs, road construction and maintenance, dispersed recreation, and wildland fires that introduced sediment to ephemeral streams or springs or consumed water within the Immediate Watershed CESA. Impacts from grazing could include cattle congregating around water sources causing bank trampling, which in turn can cause increased sedimentation. Increased sedimentation could also occur when vehicles or cattle use stream crossings or remove vegetation from the sides of the streams. There are no specific data that quantify the amount of sedimentation. In addition, cattle can degrade water quality by adding bacteria and nitrate from their waste.

Historical Fires (1981-2009) have burned approximately 1,619 acres in the Immediate Watershed CESA (1.4 percent of the CESA). As shown in Table 3.4-4, approved, closed or expired mineral exploration and mining Notices or Plans total 125.54 acres (0.2 percent of the CESA). State and federal regulations require project operators of Notices and Plans to provide financial assurance to guarantee that surface disturbance due to mineral activities will be reclaimed. Therefore, the Notices and Plans within the Immediate Watershed CESA have reclamation bonds to guarantee that the 125.54 acres of authorized surface disturbance will be reclaimed when mineral exploration and mining activities have been completed. Therefore, areas reclaimed, would become naturally stabilized, decreasing the amount of sediment that reaches the waterways. Approximately 2,742 acres of ROWs were issued within the Immediate Watershed CESA that have the potential to create surface disturbance that could lead to sedimentation of waterways. Approximately 23,503 acres of the Christmas Tree Cutting Area and 51,062 acres of the NDOW Hunt Unit 078 are located within the CESA which have the potential to disturb soils. The majority of the Immediate Watershed CESA is located within the Big Springs Grazing Allotment and livestock grazing and associated management contributes to the erosion of soils and degradation of stream zones. In addition, approximately 70 miles of historical race routes are present within the Immediate Watershed CESA which may have contributed to degradation of roads and sedimentation of drainages in the watershed.

Reasonably Foreseeable Future Actions: Potential impacts to water resources could result from minerals activities, ranching operations including grazing and irrigation from wells, water use by the City, ROWs, road construction and maintenance, railroad maintenance, wild land fires, and dispersed recreation that could introduce sediment to ephemeral streams or springs or consume water within the Immediate Watershed CESA. The West Pequop Project operations area is located partially within the Immediate Watershed CESA (3,210 acres) and has proposed a total of 300 acres of surface disturbance. There are no specific data on the amount of sedimentation or water use that could result from these activities. Impacts from RFFAs would be similar to those described for past and present actions. In addition, all RFFAs would require BMPs or other mitigation for the protection of water resources.

Cumulative Impacts: Disturbance to vegetation and soils and water consumption from past and present actions has impacted water resources. However, less than three percent of the CESA has been disturbed and some of the disturbance has been reclaimed, seeded, or otherwise revegetated, which would decrease the impacts from sedimentation. The Proposed Action would require approximately 2,000 to 3,000 gallons of water per drill rig per day. Fronteer has obtained a temporary waiver from the NDWR (Waivers MM-159 for 2009 and MM-166 for 2010) authorizing the use of water from the Oasis well for mineral exploration drilling and dust control at the Long Canyon Project. Fronteer may also purchase water from the City or develop its own water source. This is a minimal amount of water compared to the water available from nearby water wells associated with the Big Spring Ranch and the 820 to 2,100 gpm that Johnson Spring produces. In addition, Fronteer has committed to working with the City to mitigate potential impacts to the Johnson Springs system (Section 2.2.8). No impacts are expected to ground water; therefore, the incremental impacts to water resources as a result of the Proposed Action when added to the past and present actions and RFFAs would be minimal.

3.4.15 Wildlife

The CESA for small mammal wildlife is the HUC5 Watershed which includes 116,525 acres and is shown on Figure 3.4.1. The CESA for big game wildlife is the Mule Deer CESA which

includes 723,871 acres and is shown on Figure 3.4.4. In addition, an antelope use area is depicted on Figure 3.4.4.

Small Mammals

Past and Present Actions: Past actions that have potentially impacted small mammal wildlife include mineral exploration, ranching operations (grazing), road construction or maintenance, or dispersed recreation that impacted water resources or reduced wildlife habitat in the CESA.

Historic Fires (1981-2009) have burned approximately 1,619 acres in the HUC5 Watershed CESA (1.4 percent of the CESA). As shown in Table 3.4-4, approved, closed or expired mineral exploration and mining Notices or Plans total 204.56 acres in the HUC5 Watershed CESA (less than 0.2 percent of the CESA). State and federal regulations require project operators of Notices and Plans to provide financial assurance to guarantee that surface disturbance due to mineral activities will be reclaimed. Therefore, the Notices and Plans within the HUC5 Watershed CESA have reclamation bonds to guarantee that the 204.56 acres of authorized surface disturbance will be reclaimed when mineral exploration and mining activities have been completed. A total of 8,320 acres of ROWs were issued within the HUC5 Watershed CESA that has the potential to create surface disturbance and habitat fragmentation and degradation for wildlife species. Approximately 79 miles of historic race routes are present within HUC5 Watershed CESAs. Approximately 21,077 acres of the Christmas Tree Cutting Area and 52,206 acres of the NDOW Hunt Unit 078 are located within the HUC5 Watershed CESA. Activities associated with these management units have the potential to create noise and disturbance to wildlife species and remove or alter habitat. The majority of the HUC5 Watershed CESA is located within the Big Springs Grazing Allotment and livestock grazing and associated management contributes to the spread of invasive species and change vegetation structure which can have an indirect effect on wildlife species.

Reasonably Foreseeable Future Actions: Potential impacts to wildlife could occur from grazing, dispersed recreation, roads, ROWs, minerals activities or loss of wildlife habitat associated with future wildland fires. There are no specific data on the potential impacts that would result to small mammal wildlife as a result of dispersed recreation, grazing, or future wildfires.

The West Pequop Project operations area is located partially within the HUC5 Watershed CESA (3,054 acres) and has proposed a total of 300 acres of surface disturbance. Approximately 15.1 miles of the proposed SWIP corridor is located within the HUC5 Watershed CESA. These projects would result in modification to wildlife habitat, but are likely to incorporate wildlife protection measures and habitat restoration measures during and following construction to reduce impacts to wildlife. No additional pending ROWs or other proposed mineral exploration or mining activities were noted in the HUC5 Watershed.

Big Game

Past and Present Actions: Past actions that have potentially impacted mule deer include mineral exploration, ranching operations (grazing), road construction or maintenance, fence building, or dispersed recreation that impacted water resources or reduced wildlife habitat. There are no specific data that quantify habitat loss from grazing or recreation in the CESA. However, there are 25 BLM-administered grazing allotments that are within or overlap the Deer CESA. The total number of potentially active AUMs in the Deer CESA is 140,820 (including 20,588 suspended

AUMs). In addition, construction of ROWs and fences may have led to fragmentation of wildlife habitat as well as impacts to vegetation and soils leading to soil erosion and the increased potential for the introduction of invasive, nonnative species. Construction and use of the railroads and roads have created an ignition source for wildland fires, facilitated the introduction and proliferation of invasive, nonnative species, and impacted the deer herd by creating obstacles within the migration corridor leading to mortality (such as vehicle-related deaths).

Historic Fires (1981-2009) have burned approximately 150,601 acres within the Mule Deer CESA. As shown in Table 3.4-4, approved, closed, or expired mineral exploration and mining Notices or Plans total 375.90 acres in the Mule Deer CESA (0.05 percent of the CESA). State and federal regulations require project operators of Notices and Plans to provide financial assurance to guarantee that surface disturbance due to mineral activities will be reclaimed. Therefore, the Notices and Plans within the Mule Deer CESA have reclamation bonds to guarantee that the 375.90 acres of authorized surface disturbance will be reclaimed when mineral exploration and mining activities have been completed. A total of 23,596 acres of ROWs were issued within the Mule Deer CESA that have the potential to create surface disturbance and habitat fragmentation and degradation for big game species. Approximately 95 miles of historic race routes are present within Mule Deer CESA. Approximately 69,813 acres of the Christmas Tree Cutting Area is located within the Mule Deer CESA which has the potential to create noise and disturbance to big game species and remove or alter habitat. The Pequop Conservancy has erected approximately 17 miles of fencing within the winter range of the Mule Deer CESA which may preclude young big game animals from entering NDOW Hunt Unit 078 and has the potential to funnel the migrating big game into particular zones along the Interstate 80 (I-80).

According to data provided by the NDOW and received from the NDOT, approximately 95 deer were killed by vehicles (out of 86 total animal-related incidents) on United States Highway 93 (US93) between milepost 373 on the Pequop Summit and Mile Post 95 in the period from October 2006 to June 2010 (personal communication, Katie Miller and Kari Huebner, NDOW, June 29, 2010). These are the only reported vehicle collisions that NDOT has responded to and the actual number of deer strikes are expected to be much higher than these numbers imply.

Reasonably Foreseeable Future Actions: Potential impacts to mule deer could occur from grazing, dispersed recreation, roads, ROWs, continued fragmentation of habitat due to fencing, minerals activities or loss of native vegetation associated with potential wildland fires.

The SWIP corridor crosses a small portion, approximately 5.8 miles, of the migration corridor area within the Mule Deer CESA. Two pending Road ROWs totaling approximately 75.52 acres and one pending Telephone ROW for 101.92 acres are located within the Mule Deer CESA.

In the Deer Summer Range (located primarily on NFS Lands), Atna Resources, Inc. has proposed continued mineral exploration within the Jarbidge Exploration area located approximately 60 miles northwest of Wells, Nevada, in the vicinity of the town of Jarbidge. The proposed project would disturb a maximum of 27.8 acres in phases over a five-year period and include disturbance from drill sites, sumps, constructed roads, and reopened reclaimed roads. One pending Plan of Operations, submitted by All Mineral Corp., for mineral exploration would disturb a maximum of 140 acres and is located within the Mule Deer CESA. In addition, two pending Notices totaling 4.86 acres of proposed disturbance for mineral exploration are located within the Mule Deer CESA.

Cumulative Impacts: Impacts to wildlife (small mammals and big game) from the Proposed Action would be limited to the removal of vegetation, destruction of habitat (up to 69.43 acres), noise associated with exploration, and vehicular collisions. The Proposed Action would affect approximately 0.6 percent of the CESA for small mammals and less than 0.01 percent of the CESA for big game. Based on the above analysis and findings, incremental impacts to wildlife species (both small mammals and big game) as a result of the Proposed Action when added to the past and present actions and RFFAs are expected to be minimal.

3.5 Cumulative Impacts of the No Action Alternative

As described earlier, under the No Action Alternative, the Proposed Action would not be approved. Activities currently permitted in the Project Area, which are similar to those described for the Proposed Action, would continue. Disturbance from the No Action Alternative would be less than those associated with the Proposed Action (99.86 acres rather than 169.29 acres). The cumulative impacts of the No Action Alternative were analyzed in the 2008 Environmental Assessment document (BLM 2008). Cumulative impacts to all resources are minimal and are not a concern for either the Proposed Action or the No Action Alternative.

3.6 Mitigation and Monitoring

The Environmental Protection Measures described in the Proposed Action (Section 2.2.8) are sufficient for this action and no specific mitigation measures are necessary. However, measures to reduce expected impacts have been incorporated into the Proposed Action. Monitoring throughout the life of the Project will continue as stated with regards to invasive species management, road maintenance, dust reduction efforts, seeding and transplants during reclamation, and water resource protection.

4 CONSULTATION AND COORDINATION

The Plan was made available to the public on April 29, 2010 and comments were requested by June 15, 2010. Consultation with the Native American tribes is ongoing. Scoping letters were sent to interested parties on May 12, 2010 and comments were requested by June 15, 2010. Comments were received and incorporated as applicable into this EA. This EA will be available from the Elko District public webpage at www.blm.gov/nv prior to issuance of a decision concerning BLM's approval of the 2010 Plan Amendment.

4.1 Persons, Groups, and Agencies Consulted

Kari Huebner	NDOW, Elko, Nevada
Katie Miller	NDOW, Elko, Nevada
Shane Martin	NDEP/BMRR, Carson City, Nevada

4.2 List of Preparers

This EA was prepared at the direction of the BLM, Elko, Nevada, by Enviroscientists, Inc., under contract with Fronteer.

BLM, Elko District Office

Whitney Wirthlin	Project Lead, Geology, Hazardous Materials
Bryan Fuell	Native American Religious Concerns
Tim Murphy	Cultural Resources and Paleontology
Bryan Hockett	Native American Religious Concerns
Nycole Burton	Wildlife, Special Status Species, Migratory Birds
Matthew Murphy	Forestry, Woodlands, Fire and Fuel Management
JoeyJames Giustino	Lands, Realty, and Access
Sara Ferreira	Realty
Donna Jewell	Renewable Resources
Mark Dean	Air, Soils, Water Resources
Jeffrey Moore	Range Resources and Vegetation
Tamara Hawthorne	Recreation, Visual Resources, and Wilderness
Tyson Gripp	Invasive, Nonnative Species
Kirk Laird	NEPA Coordinator
Victoria Anne	Planning and Environmental Coordinator

Enviroscientists, Inc.

Opal Adams	Project Principal, Review
Michele Lefebvre	Project Manager, Review/editing
Melissa Sherman	Air and Atmospheric Resources, Cultural Resources, Environmental Justice, Fire Management, Forestry and Woodlands, Invasive and Nonnative Species, Lands and Realty, Migratory Birds, Native American Religious Concerns, Range Resources, Recreation, Social Values and Economics, Vegetation, Visual Resources, Wastes, Water Resources, Wild Horses and Burros, Cumulative Impacts, LR2000
Sara Thorne	Special Status Species, Wildlife
Kaitlin Sweet	Soils, Geology, and Mineral Resources
Gail Liebler	GIS
Jess Kohler	GIS

Fronteer Development (USA) Inc.

Dan Anderson	Water Resources, Review
Pete Shabestari	GIS
Debra Struhsacker	Plan of Operations, Review
Mark Stock	Hydrologist, Water Resources

5 REFERENCES

- Aqua Engineering, Inc. 2001. *Drinking Water Source Protection Plan for the City of West Wendover, Elko County, Nevada*. Prepared for the City of West Wendover, Nevada. January 2001.
- ASM Affiliates, Inc. (ASM) 2007. *A Class III Cultural Resources Inventory of Approximately 1,700 Acres for the Long Canyon Exploration Project, Elko County, Nevada*. BLM Report No. CRI-2580 submitted May 2007.
- AuEx, Inc. (AUX) 2006. *Amended Notice of Approximately 4.84 Acres for the Long Canyon Exploration Project, Elko County, Nevada*. BLM Report No. N-79949 submitted April 2006.
- Berg, A. 2008. *Cultural Resources Inventory Isolate Report: Class III Cultural Resources Inventory for the NewWest Gold Corporation/Fronteer Development Group – Long Canyon Exploration Project, Spring 2009 Permit Amendment*. BLM Report No. 1-2701.
- _____. 2009. (Draft) *A Class III Cultural Resources Survey of Three Proposed Hydrologic Well Locations and Associated Access Routes in Goshute Valley, Elko County Nevada*. BLM Report No. 1-2725.
- _____. 2010. (Draft) *A Class III Cultural Resources Inventory for the Fronteer Development USA, Long Canyon Venture Project, Elko County, Nevada*. BLM Report No. 1-2750.
- Bureau of Land Management (BLM). 1985. *Wells Resource Management Plan (RMP) Record of Decision*, approved 1985, page 25, Minerals and Energy
- _____. 1986. *Visual Resource Inventory*. BLM Manual Handbook 8410-1.
- _____. 1988. *National Environmental Policy Act Handbook*. BLM Handbook H-1790-1. October 15, 1988.
- _____. 1989. *Surface Management of Mining Operations Handbook H-3809-1*.
- _____. 1992. *Solid Minerals Reclamation Handbook #H-3042-1*.
- _____. 1996. *Partners Against Weeds: An Action Plan for the Bureau of Land Management*. Montana State Office, Billings, Montana.
- _____. 1997. *Nevada Noxious Weed Management Strategy*. Information Bulletin No. NV 97-137. Nevada State Office, Reno, Nevada.
- _____. 1999. *Revised Guidelines for Successful Mining and Exploration Revegetation*. BLM, USFS, and NDEP.
- _____. 2005. *Sheep Complex, Big Springs and Owyhee Grazing Allotments Sensitive Bird Species Draft Environmental Impact Statement*. Elko Field Office, Elko, Nevada. December 2005.

- _____. 2006. *Sheep Complex, Big Springs and Owyhee Grazing Allotments Sensitive Bird Species Final Environmental Impact Statement*. Elko Field Office, Elko, Nevada. May 2006.
- _____. 2006. *Volume II Appendix D Public Comment Letters and Responses for the Sheep Complex, Big Springs and Owyhee Grazing Allotments Sensitive Bird Species Final Environmental Impact Statement*. May 2006.
- _____. 2008. *Environmental Assessment, New West Gold USA, Inc., Long Canyon Exploration Project*. EA No. BLM/EK/PL-2008/011. July 2008.
- _____. 2010. *Land & Mineral Legacy Rehost 2000 System – LR2000*.
<http://www.blm.gov/lr2000/index.htm>
- Coats, R.R., 1987. *The Geology of Elko County, Nevada*. Bulletin 101 of the Nevada Bureau of Mines and Geology. University of Nevada, Reno. 112 pp.
- Council on Environmental Quality (CEQ). 1997. *Considering Cumulative Effects Under the National Environmental Policy Act*. Executive Office of the President.
- Cronquist, A., A.H. Holmgren, N.H. Holmgren, and J.L. Reveal. 1972. *Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A.* Volume 1.
- Desjean, Thomas and Robert Wilson. 1990. *Vandalism Behavior in the Southeast National Parks Diagnosis and Treatment*. In *Coping with Site Looting, Southeastern Perspectives* edited by John Ehrenhard. Web version December 2000 at <http://www.cr.nps.gov/seac/coping/2-des-wil.htm>
- Eakin, T.E., G.B. Maxey, and T.W. Robinson. 1949. *Groundwater in Goshute-Antelope Valley, Elko County, Nevada*. U.S. Geological Survey Professional Paper 201. 152pp.
- Environmental Protection Agency (EPA). 1998. Final Guidance For Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses. April 1998. http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_epa0498.p
- Enviroscientists, Inc. (Enviroscientists) 2006. *Memo Summarizing the Results for Long Canyon Project Special Status Survey*. Submitted to Nycole Burton, Elko BLM, August 29, 2006.
- _____. 2007. *Memo Summarizing the Results for the Long Canyon Project Bat Survey*. Submitted to Nycole Burton, Elko BLM, October 15, 2007.
- _____. 2009. *Memo Summarizing Results for the Long Canyon Biological Survey*. Submitted to Nycole Burton, Elko BLM, October 7, 2009.
- _____. 2010. *Memo Summarizing Results for the Long Canyon Biological Survey*. Submitted to Nycole Burton, Elko BLM, October 7, 2009.
- Fronteer Development (USA) Inc. (Fronteer). 2010. *Long Canyon Exploration Project Plan Of Operations (NVN-82455) and NDEP Reclamation Permit (No. 0284), 2010 Amendment Expanded Exploration and Groundwater Monitoring Well Drilling*. March 2010.

- Global Hydrologic Services Inc. 2010. *Hydrology Baseline Data Report for Northern Goshute Valley, Elko County, NV*. August 2010.
- Great Basin Bird Observatory. 2005. *Landbirds of Nevada and the Habitats They Need: A Resource Manager's Guide to Conservation Priority Species*. Great Basin Bird Observatory Technical Report No. 05-01. Great Basin Bird Observatory, Reno, Nevada.
- Ison, Cecil, Charles Norville, and David Pollack. 1981. *Vandalism of Rockshelter Sites Red River Gorge, Kentucky an Assessment*. Unpublished research report, Dept. of Anthropology, University of Kentucky, Lexington.
- LaPointe, D.D., Tingley, J.V., and Jones, R.B. 1991. *Mineral resources of Elko County, Nevada*. Nevada Bureau of Mines and Geology Bulletin 106. 236 p.
- Lyneis, M., D. Weide, and E. Warren. 1980. *Impacts Damage to Cultural Resources of the California Desert*. Department of Anthropology, University of Nevada, Las Vegas.
- Mine Development Associates (MDA). 2009. *Updated Technical Report on the Preliminary Economic Assessment of the Long Canyon Project, Elko County, Nevada, USA*. Reno, Nevada.
- Natural Resources Conservation Service (NRCS). 2010. *Soil Survey of Elko County, Nevada, Southeast Part*. <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>
- NatureServe. 2010. *NatureServe Explorer: An online encyclopedia of life* [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
- Neel, L.A. 1999. *Nevada Partners in Flight Bird Conservation Plan*. Nevada Department of Wildlife. November 29, 1999.
- Nevada Department of Wildlife (NDOW). 2006. *Nevada Wildlife Action Plan*.
- _____. 2009. *Long Canyon Project, Elko County, Nevada*. June 18, 2009.
- _____. 2010. Nevada Department of Wildlife. *2009-2010 Big Game Status*. <http://ndow.org/about/pubs/pdf/reports/biggame.pdf>.
- _____. 2011. *Mule deer winter Disturbance for Long Canyon and West Pequop Projects*. Letter to Brian Fuell from Katie Erin Miller, dated January 13, 2011.
- Nevada Division of Environmental Protection (NDEP) and the Nevada Division of Conservation Districts. 1994. *Handbook of Best Management Practices*. Adopted by the State Environmental Commission December 7, 1994. Updated 2008.
- Nevada Natural Heritage Program (NNHP). 2010a. *Rare Plant Fact Sheets*. Nevada Rare Plant Atlas. <http://heritage.nv.gov/atlas/atlasndx.htm>.

- _____. 2010b. *Data Request for the Long Canyon Project Area received 07 May 2010*. May 10, 2010.
- NewWest Gold USA Inc. 2007. *Long Canyon Exploration Project, Plan of Operations/Permit for Reclamation*. May 2007.
- Nickens, P.R. and S.L. Larralde, and G.C. Tucker. 1981. *A Survey of Vandalism to Archaeological Resources in Southwestern Colorado*. Bureau of Land Management – Colorado Cultural Resources Series, No. 11, Denver.
- Ports, M.A. 2010. *Relict Populations of Two Species of Mountain Snails (Oreohelicidae). Preliminary Report and Localities, Northern Pequop Mountains of Northern Nevada*. Reported by Great Basin Malacological Society, Great Basin College.
- Price, S. and T.R. Harris. 2007. *An Analysis of the Economic Impacts of the Hard Rock Mining Sector on the Elko Micropolitan Statistical Area*. Technical Report UCED 2007/08-03. University Center for Economic Development, Department of Resource Economics, University of Nevada, Reno. September 2007.
- Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Iñigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, T. C. Will. 2004. *Partners in Flight North American Landbird Conservation Plan*. Cornell Lab of Ornithology. Ithaca, NY. Partners in Flight website. http://www.partnersinflight.org/cont_plan/ (Version: March 2005).
- Smith, M.T. 2009. *Summary of geology and presentation of a geological model for Long Canyon, with emphasis on field surveys*. Fronteer Development Group Inc. internal report, 98 p.
- State of Nevada Demographer. 2010. <http://www.nsbdc.org/demographer/pubs>.
- Ulmschneider, H. 2004. *Surveying for Pygmy Rabbits (Brachylagus idahoensis)*. Fourth Draft. June 3, 2004.
- United States Census Bureau. 2010. <http://www.census.gov>
- United States Fish and Wildlife Service (USFWS). 2003. *Endangered and Threatened Wildlife and Plants; Final Rule to List the Columbia Basin District Population Segment of the Pygmy Rabbit (Brachylagus idahoensis) as Endangered*. Federal Register Vol. 68, No. 43, Wednesday March 5, 2003: 10388-10409.
- _____. 2010. *Species list request for Expanded Long Canyon Exploration Project, Elko County, Nevada*. May 14, 2010.
- Vierra R.K. and T.F. Langheim. 2000. *Cultural Resources Inventory of 1,120 Acres for the Long Canyon Exploration Project, Elko County, Nevada*. BLM Report No. CRI-2076.

Western Regional Climate Center. 2008. *Oasis, Nevada Period of Record Monthly Climate Summary*. <http://www.wrcc.dri.edu/cgi-bin/cliRECTM.pl?nv5722>.

Williams, L.R. 1978. *Vandalism to Cultural Resources of the Rocky Mountain West*. Cultural Resources Report No. 21. U.S.D.A. Forest Service, Southwest Region, Albuquerque.

This page has been left intentionally blank.