

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

**Preliminary Environmental Assessment
DOI-BLM-NV-L030-2013-0020-EA
January 3, 2014**

SOUTHPAW/LOGAN PASS EXPLORATION PROJECT

Location: Southpaw Area:
Sections 19 and 20, and 29 and 30,
Township 3 South, Range 59 East, MDBM

Logan Pass Area:
Sections 1, 2, 11, and 12
Township 4 South, Range 58 East, MDBM

Sections 6 and 7
Township 4 South, Range 59 East, MDBM

Lincoln County, Nevada

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LIST OF ACRONYMS & ABBREVIATIONS

°F	Degrees Fahrenheit
2013 Plan	Southpaw/Logan Pass Exploration Project Plan of Operations/Nevada Reclamation Permit Application
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
AIRFA	American Indian Religious Freedom Act of 1978
AMSL	Above mean sea level
ARPA	Archaeological Resources Protection Act of 1979
AUM	Animal Unit Month
Aurion	Aurion Resources Ltd.
BLM	Bureau of Land Management
BMP	Best Management Practice
BMRR	Bureau of Mineral Regulation and Reclamation
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
CO₂	Carbon Dioxide
DR	Decision Record
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPM	Environmental Protection Measure
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
LR2000	BLM's Land and Mineral Legacy Rehost 2000 System
LWC	Lands with Wilderness Characteristics
MDBM	Mount Diablo Base and Meridian
MOU	Memorandum of Understanding
MSHA	Mining Safety and Health Administration
NAAQS	National Ambient Air Quality Standards

NAC	Nevada Administrative Code
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NNHP	Nevada Natural Heritage Program
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
OHV	Off-Highway Vehicle
PGH	Preliminary General Habitat
PLUAC	Public Land Users Advisory Committee
PPH	Preliminary Priority Habitat
Project	Southpaw/Logan Pass Exploration Project
PSD	Prevention of Significant Deterioration
RMP	Resource Management Plan
ROW	Right-of-Way
SHPO	State Historic Preservation Office
SPCP	Spill Prevention and Control Plan
SR-318	State Highway 318
SR-375	State Route 375
TBD	To Be Determined
TCP	Traditional Cultural Property
US 93	United States Highway 93
USC	United States Code
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VRM	Visual Resource Management
WMA	Wildlife Management Area
WSA	Wilderness Study Area

**SOUTHPAW/LOGAN PASS EXPLORATION PROJECT
PRELIMINARY ENVIRONMENTAL ASSESSMENT
AURION RESOURCES LTD.**

1.0 INTRODUCTION

This Environmental Assessment (EA) has been prepared to analyze Aurion Resources Ltd.'s (Aurion) proposed mineral exploration activities for the Southpaw/Logan Pass Exploration Project (Project). The Project is located approximately 50 miles west of Caliente, Nevada, on private land as well as public land administered by the United States Department of the Interior, Bureau of Land Management (BLM) Ely District Office in Lincoln County, Nevada. The proposed Project would consist of approximately 50 acres of surface disturbance associated with mineral exploration activities. The *Southpaw/Logan Pass Exploration Project Plan of Operations/Nevada Reclamation Permit Application (2013 Plan)* was submitted to the BLM on July 29, 2013. The EA is a site-specific analysis of potential impacts that could result with the implementation of a Proposed Action or alternatives to the Proposed Action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act of 1969 (NEPA), and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in Chapter 40 of the Code of Federal Regulations (CFR) §§1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI).

1.1 BACKGROUND

Aurion submitted the 2013 Plan to the BLM on July 29, 2013.

The northern block, the Southpaw Area, includes part or all of Sections 19, 20, 29, and 30, Township 3 South (T3S), Range 59 East (R59E), Mount Diablo Base and Meridian (MDBM). The Southpaw Area encompasses approximately 285 acres. The southern block, the Logan Pass Area, includes part or all of Sections 1, 2, 11, and 12, T4S, R58E; and Sections 6 and 7, T4S, R59E, MDBM. The Logan Pass Area covers approximately 908 acres. Together, the total Southpaw and Logan Pass areas (Project Area) boundary includes approximately 1,193 acres (Figure 1). Figures 2 and 3 show access and land status for the Southpaw and Logan Pass areas, respectively.

As outlined in the 2013 Plan, Aurion proposes a total of 50 acres of surface disturbance in a phased exploration program. Phased Project activities would take place over 10 years. Under Phase I, approximately 0.47 acre of new surface disturbance would be created to conduct exploration drilling, construct drill trails, drill sites, and sumps, as well as the maintenance of pre-1981 roads. Phase II activities would consist of the remaining approximately 49.53 acres of

the same types of activities as Phase I. These activities would comprise the Proposed Action for the Project.

The Project Area is within the Mount Irish Area of Critical Environmental Concern (ACEC). This area was designated as an ACEC based on cultural sites within the area, which include remnants of the Pahranaगत Mining District, Crescent Mill, and Logan City, along with potential for prehistoric artifacts associated with the Mount Irish Archaeological District. The Mount Irish ACEC has not been withdrawn from mineral entry, therefore, locatable mineral development is not prohibited on lands within the ACEC (JBR, 2013).

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The BLM's purpose is to provide Aurion with the opportunity to explore their valid existing mining claims on BLM lands. The need for the action is established by the BLM's responsibility under the Mining Law of 1872, Section 302 of the Federal Land Policy and Management Act (FLPMA), and the BLM Surface Management Regulations at 43 CFR 3809. Under these statutes and regulations, the BLM is required to review the 2013 Plan to ensure that Aurion's exploration activities do not cause unnecessary or undue degradation of the public lands and include appropriate reclamation.

1.3 DECISION TO BE MADE

The decision that BLM will make based on the NEPA analysis would be to approve the 2013 Plan with no modifications to authorize the exploration activities; approve the 2013 Plan with additional mitigation measures to prevent unnecessary or undue degradation of public lands and/or protect sensitive resource values, and to provide for reclamation of disturbed areas; or disapprove the 2013 Plan if mitigation measures would not prevent unnecessary or undue degradation of public lands.

1.4 BLM RESPONSIBILITIES AND RELATIONSHIP TO PLANNING

The BLM is responsible for the preparation of this EA, which was prepared in conformance with the policy guidance provided in the BLM NEPA Handbook H-1790-1 (BLM, 2008a) and Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500-1508). This EA will assist the BLM in project planning and in determining whether the Proposed Action is consistent with BLM policies. Pursuant to NEPA (40 CFR 1502.13), this EA has been prepared to provide sufficient evidence and analysis for 1) determining whether to prepare a more detailed EIS or 2) issuing a FONSI.

1.5 CONFORMANCE WITH BLM LAND USE PLAN(S)

The Proposed Action and the No Action Alternative described below are in conformance with the 2008 Ely RMP (BLM, 2008b). Goals and objectives in the 2008 Ely RMP for mineral

extraction are listed on pages 92 through 103. The goal listed on page 92 states the following: “Allow development of solid leasable and locatable minerals in a manner to prevent unnecessary or undue degradation” to the public lands. The objective and minerals decision (MIN-14) listed on page 100 states the following: “Allow locatable mineral development on approximately 9.9 million acres of federal mineral estate, subject to the prevention of unnecessary or undue degradation of the public lands” (BLM, 2008b). The RMP states in MIN-15 that the Mount Irish ACEC be closed to locatable minerals (BLM, 2008b; page 100); however, mineral withdrawal in the Mount Irish ACEC was never completed. In crafting the RMP, it was anticipated that the ACEC would be withdrawn from mineral entry subsequent to its creation. Since the withdrawal has not been completed and Aurion has located lode mining claims in the ACEC, Aurion has valid existing mineral rights under 43 CFR 3800 *et alia*.

The BLM is responsible for administering access to mineral rights on certain federal lands as authorized by the General Mining Law. Under the law, reasonable access to mineral deposits is entitled on public domain lands that have not been withdrawn from mineral entry. The BLM is also responsible for reviewing surface resources pursuant to the FLPMA (43 United States Code [USC] 1701 et seq.) and the attendant regulations for surface management of lands on mining claims under the General Mining Law (43 CFR 3809). The surface management regulations require the BLM to comply with NEPA, as amended (42 USC 4321 et seq.), and to ensure that the operator “conduct all operations in a manner that complies with all pertinent federal and state laws” (43 CFR 3809.420) and would not cause unnecessary or undue degradation of the public lands.

1.6 RELATIONSHIP TO STATUTES, REGULATIONS, OR OTHER PLANS

The NEPA is one of many authorities that contain procedural requirements that pertain to treatment of elements of the environment when the BLM is considering a federal action. The Proposed Action and the No Action Alternative are consistent with federal, state, and local laws; regulations; and plans and programs. Appendix 1 of the BLM NEPA Handbook H-1790-1 contains a list of many of the supplemental authorities that may apply to BLM actions.

The Proposed Action and the No Action Alternative are consistent with these federal statutes and regulations. The Proposed Action and the No Action Alternative are also consistent with state plans and policies for the management of mineral and water resources, conservation of special status species, and cultural resource protection (Nevada State Historic Preservation Office), as well as with the Lincoln County Master Plan (Lincoln County, 2007) and Lincoln County Public Lands Policy Plan (Lincoln County, 2010).

1.7 IDENTIFICATION OF ISSUES

While many issues may arise during scoping, not all of the issues raised warrant analysis. Issues raised through scoping are analyzed if:

- Analysis of the issue is necessary to make a reasoned choice between alternatives;
- The issue is significant (an issue associated with a significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of impacts); or
- If there is a disagreement about the best way to use a resource, or resolve an unwanted resource condition or potentially significant effects of a Proposed Action or alternative.

1.7.1 Internal Scoping

Internal scoping was conducted by an interdisciplinary team that discussed the potential consequences of the Proposed Action on September 24, 2013. Potential impacts to the following resources/concerns were evaluated in accordance with criteria listed above to determine if detailed analyses were required (Table 1). Consideration of some of these items is to ensure compliance with laws, statutes or Executive Orders that impose certain requirements upon all Federal actions. Other items are relevant to the management of public lands in general, and to the BLM Ely District in particular. Table 1 lists the resources considered and the resources analyzed in the EA.

Table 1 List of Resources Evaluated

Resource/Concern	Issue(s) Analyzed? (Y/N)	Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
Air Quality	Y	Potential impacts are analyzed in the EA.
Cultural Resources	Y	Potential impacts are analyzed in the EA.
Forest Health	N	Project does not meet criteria for the Healthy Forest Restoration Act.
Migratory Birds	Y	Potential impacts are analyzed in the EA.
Rangeland Standards and Guidelines	Y	Potential impacts are analyzed in the EA.
Native American Religious and other Concerns	Y	Potential impacts are analyzed in the EA.
FWS Listed or proposed for listing Threatened or Endangered Species or critical habitat. Also, ACECs designated to protect Desert Tortoises and Southwest Willow Flycatcher, Big Spring spinedace (Caliente) and Pahrump Poolfish (Schell) critical habitat.	N	This resource is not present in the Project Area.
Wastes, Hazardous or Solid	Y	Potential impacts are analyzed in the EA.
Water Quality, Drinking/Ground	Y	Potential impacts are analyzed in the EA.

Resource/Concern	Issue(s) Analyzed? (Y/N)	Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
Environmental Justice	N	No minority or low-income groups would be disproportionately affected by health or environmental effects.
Floodplains	N	Resource is not present in the Project Area.
Farmlands, Prime and Unique	N	Resource is not present in the Project Area.
Wetlands/Riparian Zones	N	There are no wetlands/riparian zones within the Project Area (USFWS, 2013).
Invasive Non-native Species	Y	Potential impacts are analyzed in the EA.
Wilderness/WSA/Lands with Wilderness Characteristics (LWC)	N	The Project is not located within or adjacent to a designated Wilderness or Wilderness Study Area (WSA). The Project Area intersects two LWC inventory units, which were both found to be lacking in wilderness character in the original 1979/1980 inventory. An inventory update was completed for the Logan Pass area and was found to be lacking wilderness character. The Southpaw area received a desk review and it was found to be lacking wilderness character in the Project Area.
Heritage Special Designations (Historic Trails, ACEC's designated for Cultural Resources, White River Archaeological District and Rock Animal Corral Archaeological Area)	Y	Potential impacts are analyzed in the EA,
Swamp Cedar and Blue Mass ACECs (Schell)	N	The Project is not located in a biological ACEC. This resource is not present in the Project Area.
Human Health and Safety	N	No impacts to health and human safety have been identified.
Wild and Scenic Rivers	N	Resource is not present in the Project Area.
Special Status Animal Species, other than those listed or proposed by the FWS as Threatened or Endangered. Also, Rose Guano Cave ACEC (Schell)	Y	Potential impacts are analyzed in the EA.
Special Status Plant Species, other than those listed or proposed by the FWS as Threatened or Endangered. Also, ACECs designated to protect special status plant species.	Y	Potential impacts are analyzed in the EA.
Fish and Wildlife	Y	Potential impacts are analyzed in the EA.
Wild Horses	N	This resource is not present in the Project Area. The Project Area is not located within or adjacent to a Herd Management Area.
Soils/Watershed	Y	Potential impacts are analyzed in the EA.
Visual Resources	Y	Visual resources are managed as a Class II within the Project Area.
Grazing Uses/Forage	Y	Potential impacts are analyzed in the EA.
Land Uses	Y	Potential impacts are analyzed in the EA.
Transportation/Access	N	No impacts to transportation/access from the Project have been identified.

Resource/Concern	Issue(s) Analyzed? (Y/N)	Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
Recreation Uses including Back Country Byways, Caves, Rockhounding Areas	Y	Potential impacts are analyzed in the EA.
Public Safety	Y	Potential impacts are analyzed in the EA.
Fire Management	Y	Potential impacts are analyzed in the EA.
Socioeconomics	N	No impacts to socioeconomics from the Project have been identified.
Paleontological Resources	N	There are no known paleontological resources in the Project Area. An environmental protection measure is included in the Proposed Action for unanticipated discoveries. No further analysis is required.
Water Resources (Water Rights)	N	Water would be obtained from the local ranchers and/or municipalities, and would be stored on-site in a 5,000-gallon water truck. A water production well would not be drilled as part of the Proposed Action. No further analysis is required.
Mineral Resources	Y	Potential impacts are analyzed in the EA.
Vegetative Resources	Y	Potential impacts are analyzed in the EA.
Forest/Woodland Products	N	Up to 50 acres of singleleaf pinyon, Utah juniper, and mountain mahogany would be lost. Impacts would be minimal to forest/woodland products; therefore, no further analysis is required.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 INTRODUCTION

As outlined in the 2013 Plan, Aurion proposes a total of 50 acres of surface disturbance in a phased exploration program. Phased Project activities would take place over 10 years in two areas, the Logan Pass Area and the Southpaw Area. Under Phase I, approximately 0.47 acre of new surface disturbance would be created to conduct exploration drilling, construct drill trails, drill sites, and sumps, as well as the maintenance of pre-1981 roads. Phase II activities would consist of the remaining approximately 49.53 acres of similar activities to Phase I.

This EA analyzes the Proposed Action and the No Action Alternative. The No Action Alternative is considered and analyzed to provide a baseline against which to compare the impacts of the Proposed Action. No other alternatives were brought forward for detailed analysis (see Section 2.4 for further details and rationale concerning alternatives eliminated from detailed analysis).

2.2 ALTERNATIVE A – PROPOSED ACTION

The Project Area consists of two separate blocks of land on the northern and southern flanks of Mount Irish in the Mount Irish Mountain Range approximately 50 miles west of Caliente, Nevada. Elevations range from approximately 5,560 feet above mean sea level (AMSL) to approximately 8,050 feet AMSL. Aurion plans a total of 50 acres of disturbance for exploration activities. The surface disturbance would occur in phases over 10 years.

Table 2 outlines the total acreage of proposed surface disturbance for the phased Project, by type of disturbance and corrected for slope. Under Phase I, approximately 0.47 acre of new surface disturbance would be created associated with construction of four drill sites and a drill trail to drill hole Spaw-1. (The term "drill trail" refers to access constructed with only enough surface disturbance to ensure safe passage of equipment; a typical drill trail is only one bulldozer blade width.) Locations of the proposed drill holes, drill trail, and access road are shown on Figure 4. In addition, Aurion would use approximately 1,892 feet of existing road, including maintenance and repair activities on a washed-out section of existing road between drill holes Spaw-3 and Spaw-4.

Table 2 Authorized and Proposed Project Surface Disturbance

Disturbance Component	New Surface Disturbance (acres)		
	Proposed Phase I	Proposed Phase II	Total
Constructed Drill Trail	0.19	TBD	TBD
Constructed Drill Sites and Sumps	0.28	TBD	TBD
Overland Travel and Pump Sites	0.00	TBD	TBD

Disturbance Component	New Surface Disturbance (acres)		
	Proposed Phase I	Proposed Phase II	Total
Private Overland Travel	0.00	TBD	TBD
Total	0.47	49.53	50.00

TBD: to be determined

Drill Trail: access with only enough disturbance for safe passage of equipment, typically single dozer blade width.

Phase II activities would consist of the remaining approximately 49.53 acres of the same types of activities as Phase I and may include the following: exploration drilling; road, drill site, and sump construction; overland travel; and the maintenance of existing pre-1981 roads. The locations of Phase II activities would be submitted as separate work plans to the BLM, as these locations would depend on the results of Phase I exploration activities. The work plans would include maps that show locations of any proposed surface disturbance.

2.2.1 Project Access

The Southpaw Area can be accessed by traveling approximately 35 miles west on United States Highway 93 (US 93) from Caliente, Nevada to the intersection with State Highway 318 (SR-318). Turn right on SR-318 and travel for approximately 10.9 miles to the intersection of SR-318 and Mail Summit Road. Turn left and travel west and northwest on Mail Summit Road for approximately 8.5 miles, to the intersection of Mail Summit Road and Silver Canyon Road. Turn left and travel west and southwest on Silver Canyon for approximately 5.7 miles to the intersection between Silver Canyon Road and an unnamed road to the right (west). Turn right on this unnamed road, and travel for approximately 1.9 miles to enter the northern portion of the Southpaw Area. Note there is a fork in the road at approximately 0.6 mile and the driver should bear left at this fork.

The Logan Pass Area can be accessed by traveling approximately 35 miles west on US 93 from Caliente, Nevada, to the intersection with SR-318. Turn right on SR-318 and travel for approximately 0.75 mile before taking the left fork onto State Route 375 (SR-375). Travel west on SR-375 for approximately 21 miles, then turn right onto Silver Tank Road. Travel north to northeast approximately 12 miles along this road to enter the western portion of the Logan Pass Area.

2.2.2 Equipment and Personnel

Aurion anticipates that the following types of equipment may be used at the Project:

- One motor grader;
- One tracked excavator with a bucket and a hydraulic hammer;
- One tracked dozer;
- One 4x4 backhoe;

- One 10-yard dump truck;
- One small low-impact tractor and attachments;
- Up to two drill rigs (reverse circulation and core);
- One 5,000-gallon water truck;
- One pipe truck;
- One booster truck;
- One auxiliary air compressor;
- Up to two portable light plant/generators;
- One service truck; and
- Up to three light vehicles (pickup trucks).

The Project work force would include up to two crews of three drillers each, and three geologists. Generally, earthwork would be completed with a Caterpillar motor grader, backhoe, excavator, tracked dozer, or equivalent equipment, and an all-terrain vehicle. Aurion would take steps to prevent fires by ensuring that each field vehicle carries hand tools and a fire extinguisher. Water trucks at the Project Area 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.

2.2.3 Road Construction and Access

The Southpaw Area can be accessed by traveling approximately 35 miles west on US 93 from Caliente, and north and west for another approximately 28 miles on SR-318 and secondary improved and unimproved roads, as described in Section 2.2. This access route would be utilized by large trucks and machinery. The Logan Pass portion of the Project Area would be accessed as described in Section 2.2.1.

Approximately 1,892 linear feet of existing pre-1981 road within the Project Area would be utilized for Project access. This road would be repaired within the prism of the existing road bed as required to allow access/passage of drilling equipment. Aurion proposes to construct approximately 272 linear feet of drill trail from the existing pre-1981 road bed to the location of drill hole Spaw-1. This drill trail would have an average running width of 15 feet during Phase I. The other three drill holes would be drilled within the footprint of the existing pre-1981 road disturbance. Planned disturbance associated with road construction is shown in Table 2. The proposed drill trail would be bladed using either a mid-sized dozer or excavator, using typical construction practices for temporary mineral exploration roads to minimize surface disturbance, erosion, and visual contrast, as well as to facilitate reclamation. The drill trail is anticipated to have an average grade of approximately 25 percent. With an average running width of 15 feet, this results in an average disturbance width of approximately 20 feet. The anticipated length of the drill trail is 272 feet. Construction of the drill trail and associated drill pad for Spaw-1 is estimated to result in a total maximum disturbance of 0.31 acre. Estimated disturbance for all four sites in the initial operation proposed here will total 0.47 acre.

Balanced cut and fill construction would be used to the extent practicable in order to minimize the exposed cut slopes and the volume of fill material. Since the depth of the cut would be kept to a minimum, growth media removed during construction would be stockpiled as the fill slope to be used during reclamation. Road construction within drainages is not anticipated.

2.2.4 Drill Sites and Drilling Procedures

Aurion plans to utilize constructed drill sites of the minimum size necessary for safe access and to provide a safe working area for equipment and crews. Drill sites would have working areas that measure approximately 30 feet wide by 40 feet long, and would be constructed such that drilling equipment can be safely leveled. Aurion proposes to construct four drill sites with these surface disturbance dimensions during Phase I activities. The proposed disturbance associated with the drill sites has been categorized by slope angle and the total disturbance of each segment calculated accordingly as outlined in the 2013 Plan. It is anticipated that, of the four proposed Phase I drill sites, the three sites would have an average slope of 20 percent and one site would have an average slope of 30 percent. Sumps would be installed at each drill site to contain cuttings and manage drilling fluids and are included within the disturbance of each drill site. Sump sites would measure approximately 10 feet wide, 20 feet long, and six feet deep.

Drilling of exploration holes (boreholes) would be completed by up to two track- or truck-mounted core drill rigs or reverse circulation drill rigs and support equipment. Boreholes would be angled 50 to 70 degrees from horizontal, with drill depths of up to approximately 1,500 feet below ground surface. Boreholes would have an average diameter of four inches excluding the surface casing, which would be approximately six inches for the first 30 to 50 feet of the hole. Generally, all boreholes would be plugged prior to the drill rig moving from the drill site, in accordance with Nevada Revised Statutes (NRS) 534 and Nevada Administrative Code (NAC) 534.4369 and NAC 534.4371. If casing is set throughout a borehole, the borehole would be completed as a well pursuant to the provisions of Chapter 534. The borehole would be plugged pursuant to NAC 534.420, or the casing would be removed from the borehole when it is plugged. Although it is not anticipated, if groundwater is encountered, the hole would be plugged pursuant to NAC 534.420. A single hole may remain open at any one time for each drill rig that may be on site. Up to two boreholes may remain open at any one time if there are two drill rigs.

Aurion would follow standard drilling procedures and require that a company representative remain on-site or on call throughout drilling activities. The company representative would monitor and coordinate the layout and construction of each drill site, the setup of the drill rig, drilling progress, demobilization, and cleanup of the drill site. A company geologist would also coordinate drilling activities, log each hole according to the geologic features encountered, determine the maximum depth of each hole, and advise the drill operator as needed. The

company representative and geologist would travel to and from the drill site in separate four-wheel drive pickup trucks.

Standard drill rig crews would consist of a drill operator and one or two helpers. The helpers normally remove and box the recovered core samples and the cuttings from reverse circulation rigs, mix drilling fluids in the portable mud tank, operate the water truck, assist with drilling operations, and conduct maintenance as necessary. The crew would be transported to and from the drill site in up to three four-wheel drive vehicles per drill rig or a drilling company-operated crew van.

2.2.5 Water Management

Water would be used for dust suppression (if necessary) and during drilling to cool the drill bit and remove drill cuttings. Water would be utilized with or without nontoxic drilling additives. Water would be obtained from the local ranchers and/or municipalities, and would be stored on-site in a 5,000-gallon water truck. Aurion estimates that approximately 8,000 to 12,000 gallons of water per day would be utilized for drilling activities, which would entail the water truck making three to five trips daily to and from the site during Phase I activities.

Drill fluids would be managed with the use of sumps and/or portable mud pits at each drill site and all cuttings would be contained. Best Management Practices (BMPs) for sediment control would be utilized during construction, operation, and reclamation to minimize sedimentation from disturbed areas. Proposed construction and drilling activities would avoid springs and seeps, if present. In order to facilitate proper drainage and prevent erosion, construction of the bladed drill trail would include waterbars, as needed, at BLM-recommended spacings.

Sediment control structures may include, but not be limited to, fabric or certified weed-free straw bale filter fences, siltation or filter berms, sumps, and downgradient drainage channels in order to prevent unnecessary or undue degradation to the environment. Sumps, constructed as necessary, would be used to contain drill cuttings within the drill site disturbance.

2.2.6 Solid and Hazardous Materials

All refuse generated by the Project would be disposed of at an authorized landfill facility off-site, consistent with applicable regulations. No refuse would be disposed of on-site. Water or nontoxic drilling fluids, additives, gels, and abandonment materials would be utilized as necessary during drilling and would be stored at the Project Area.

Hazardous materials utilized at the Project Area would include diesel fuel, gasoline, and lubricating grease. Approximately 500 gallons of diesel fuel would be contained in fuel delivery systems on vehicles and drill rigs. Approximately 100 gallons of gasoline would be contained 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, handled, and stored in accordance with Nevada Department of Transportation (NDOT) and Mining Safety and Health Administration (MSHA). In the event that a reportable quantity of hazardous or regulated materials, such as diesel fuel, is spilled, measures would be taken to control the spill, and the BLM, Nevada Division of Environmental Protection (NDEP), and the Emergency Response Hotline would be notified, as required. If any oil, hazardous material, or chemicals are spilled during operations, they would be cleaned up in a timely manner. After clean up, the oil, toxic fluids, or chemicals and any contaminated material would be removed from the site and disposed of at an approved disposal facility.

2.2.7 Reclamation Plan

During exploration activities, reclamation would involve management of drilling to contain cuttings and manage drilling fluids, monitoring road conditions, recontouring and reseeding sites concurrently where practicable, and keeping sites clean and safe. During seasonal closure of the Project and periods of inactivity between drilling phases, reclamation would involve filling sumps and cleaning sites. The BLM and NDEP would be notified prior to any periods of inactivity not due to weather lasting greater than 120 days.

After exploration activities are terminated, reclamation would involve regrading disturbed areas related to this Project to their approximate original contour. Fill material 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. The Project would then be broadcast-seeded using the approved reclamation seed mixture and application rates outlined in the 2013 Plan. The post-exploration and post-reclamation topography would be essentially the same as the pre-exploration topography because only a limited amount of linear surface disturbance is planned.

Exploration activities would occur over a maximum of 10 years. All reclamation work, with the exception of revegetation monitoring, would be completed no later than two years after the completion of activities under the 2013 Plan. Aurion would conduct reclamation of disturbed areas once it is determined that the disturbance is no longer required for Project activities.

All boreholes would be plugged in accordance with NRS 534, NAC 534.4369, and NAC 534.4371. If any drill hole produces artesian flow, the drill hole would be contained pursuant to NRS 534.060 and NAC 534.378 and would be sealed by the method described in Subsection 2 of NAC 534.4371. If casings are set in a drill hole, either the drill hole must be completed as a well and plugged pursuant to NAC 534.420 or the casings would be completely removed from the

drill hole and the drill hole plugged as a borehole in accordance with NAC 534.4369 and NAC 534.4371.

2.2.8 Post-Reclamation Management and Monitoring

Post-closure management would commence on any reclaimed area following completion of the reclamation work for the area. Post-closure management would extend until the reclamation of the site or component has been accepted by both the BLM and Bureau of Mining Regulation and Reclamation (BMRR). A three-year post-closure management period is assumed following completion of reclamation construction on any site. For sites reclaimed early in the operations, management of the reclaimed sites would occur concurrently with operational site management. Annual reports showing reclamation progress would be submitted to the BLM and BMRR.

Site monitoring for stability and revegetation success would be conducted once per year, during the spring or fall, for a minimum of three years until attainment of the revegetation standards established in the Nevada Guidelines for Successful Revegetation for the NDEP, the BLM, and the United States Forest Service (USFS) (Instruction Memorandum #NV 99-013).

2.2.9 Applicant Committed Environmental Protection Measures

Aurion commits to the following Environmental Protection Measures (EPMs) to prevent unnecessary or undue degradation to the environment during construction, operation, and reclamation of the Project. The EPMs 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 water and air quality, and other environmental protection regulations.

2.2.9.1 Water Quality

- Storm water BMPs would be used at drill sites to minimize erosion from storm water;
- Drill cuttings would be contained on-site and the fluids managed utilizing appropriate control measures;
- Sediment traps would be used as necessary and reclaimed at the end of the drill program;
- Aurion would follow the Spill Prevention and Control Plan (SPCP) included in Appendix B of the 2013 Plan; and
- Only nontoxic fluids would be used in the drilling process.

2.2.9.2 Migratory Birds

- Land clearing or other surface disturbance associated with the activities within the Project Area would be conducted outside of the avian breeding season, whenever feasible, to avoid potential destruction of active bird nests or young birds in the area. Although not anticipated for Phase I activities, if surface disturbance must be created during the avian

breeding season (March 1 through August 31 annually), a qualified biologist would survey the area prior to land clearing activities (Great Basin Bird Observatory [no date]). Avian surveys would be conducted only during the avian breeding season and immediately prior (within 7 days) to Aurion conducting surface disturbance. If active nests are located, or if other evidence of nesting (i.e., carrying nesting material, carrying fecal sac, carrying food, distraction displays, occupied nest indicated by adult entering or leaving nest site in circumstances where the nest cannot be directly observed [e.g., cavities], nest with young seen or heard, or recently fledged dependent young or downy young) is observed, a protective buffer (the size of which depending on the “BLM Ely District Recommended Bird Nest Buffer Sizes” document) would be delineated and the entire area avoided to prevent destruction or disturbance to nests until they are no longer active (i.e., young are fledged, capable of sustained flight, and have moved out of the natal area or the nest is abandoned [fails]). The start and end dates of the seasonal restriction may be based on site-specific information, such as elevation and winter weather patterns, which affect breeding chronology.

2.2.9.3 Cultural and Paleontological Resources

- Aurion would avoid all National Register of Historic Places (NRHP) historic and prehistoric eligible cultural sites and/or contributing elements of eligible cultural sites by a buffer zone of 100 feet. If eligible sites or contributing elements cannot be avoided, they would be mitigated through a data recovery plan approved by the BLM in consultation with the State Historic Preservation Office (SHPO). The BLM would provide a review of the work plan for each phase prior to Aurion initiating activities under that phase to ensure the protection of all NRHP eligible sites and/or contributing elements of eligible sites.
- Pursuant to 43 CFR 10.4(g), Aurion 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). Further pursuant to 43 CFR 10.4 (c) and (d), the operator would immediately stop all activities in the vicinity of the discovery and not commence again for 30 days or when notified to proceed by the BLM-authorized officer.
- In the event that previously undiscovered paleontological resources are discovered during any surface disturbing activities, the item(s) or condition(s) would be left intact and immediately brought to the attention of the authorized officer of the BLM. If significant paleontological resources are found, avoidance, recordation, and data recovery would be required.
- Any cultural resource discovered by the permit holder, or any person working on their behalf, during the course of activities on federal land would be immediately reported to the authorized officer by telephone, with written confirmation. The permit holder would suspend all operations in the immediate area of such discovery and protect it until an evaluation of the discovery can be made by the authorized officer. This evaluation would determine the significance of the discovery and any mitigation measures necessary to allow activities to proceed. The holder is responsible for the cost of evaluation and

mitigation, if the proposed work would directly impact cultural resources. Operations may resume only upon written authorization to proceed from the authorized officer.

2.2.9.4 Public Safety and Access

- Public safety would be maintained throughout the duration of the Project. All equipment and other facilities would be maintained in a safe and orderly manner.
- All unattended, unreclaimed sumps would be adequately fenced to preclude access.
- Any survey monuments, witness corners, or reference monuments would be protected to the extent economically and technically feasible.
- All solid wastes would be disposed of in a state, federal, or local designated site.
- Pursuant to 43 CFR 8365.1-1(b)(3), no sewage, petroleum products, or refuse would be dumped from any trailer or vehicle at the site.
- Aurion would comply with all applicable state and federal fire laws and regulations and all reasonable measures would be taken to prevent and suppress fires in the Project Area.

2.2.9.5 Air Quality

- Emissions of fugitive dust from disturbed surfaces would be minimized by utilizing appropriate control measures. Reduced driving speeds and surface application of water from a water truck would be the primary methods of dust control.
- A Surface Area Disturbance Permit would be required when the proposed surface disturbance exceeds five acres in one calendar year.

2.2.9.6 Noxious Weeds

- Noxious weeds would be controlled through implementation of the following BMPs: concurrent reclamation efforts; operator control; removal of invasive non-native, and noxious weeds on reclaimed areas; washing heavy equipment prior to entering the Project Area; and avoiding areas of known invasive non-native, and noxious weeds during periods when the weeds could be spread by vehicles.

2.3 ALTERNATIVE B – NO ACTION

Under the No Action Alternative, the BLM would not approve the Proposed Action; however, the area would remain available for other multiple-use activities as approved by the BLM.

2.4 ALTERNATIVES CONSIDERED, BUT ELIMINATED FROM FURTHER ANALYSIS

2.4.1 Helicopter Drilling Alternative

This alternative would involve conducting exploration by using a helicopter to access the entire Project Area rather than construct roads. This would involve slinging or transporting a drill rig, fuel, supplies, laborers for pad construction, and drilling personnel via helicopter to all of the proposed drill sites. Water for drilling purposes would be transported by sling to the drill site. All drill samples would have to be removed from the drill sites with the use of a helicopter. New surface disturbance would still result from this alternative from construction of all the drill sites, the exploration drilling that occurred on existing roads, and from the development of staging areas.

The Helicopter Drilling Alternative for the entire Project Area was considered but eliminated from full analysis since the first phase of drilling would occur entirely on existing roads. While future phases would include road construction, these roads would be built along existing roads and would be reclaimed at the end of the Project. Additionally, helicopter drilling would be less efficient. It would take longer to collect the same information, potentially require additional drill holes, and require many more helicopter trips (i.e., to transport the equipment and associated support supplies) with increased noise impacts. Therefore, helicopter drilling was determined not to be beneficial over the Proposed Action.

3.0 AFFECTED ENVIRONMENT/ENVIRONMENTAL IMPACTS

3.1 INTRODUCTION

This chapter presents the existing environment (i.e., the physical, biological, social, and economic values and resources) of the Project Area and environmental impacts that could occur as a result of the Proposed Action and No Action Alternative.

The affected environment section describes the existing conditions and trend of issue-related elements that may be affected by implementing the Proposed Action. Description of the affected physical, biological, and human resources is based upon data gathered from field investigations, BLM and other agency files, and baseline data.

To comply with NEPA, the BLM must address specific elements of the environment subject to requirements defined by Supplemental Authorities associated with each element as specified by statutes, regulations, or executive orders (BLM, 2008a).

Table 1 identifies the Supplemental Authority elements that are addressed in this EA. Supplemental Authority elements determined to be not present or present yet not affected were not carried forward for analysis or discussed further in the EA. Supplemental Authority elements determined to be present that may be affected were carried forward for analysis in the EA, and are further discussed in Section 3.3. The elimination of elements determined to be not present or not affected follows the CEQ policy, as stated at CFR 1500.4.

In addition to the resources or elements managed under Supplemental Authorities, the BLM considers other resources and uses that occur on public land and the issues that may result from the implementation of the Proposed Action. Other elements or resources of the human environment that have been considered for analysis in this EA are also listed in Table 1 as well as rationale for each element that would not be affected by the Proposed Action or No Action Alternative.

The environmental impact analysis describes the direct and indirect environmental consequences that would result from authorization of the Proposed Action and the No Action Alternative.

Direct effects are those that are caused by the action and occur at the same time and place. Indirect effects are those impacts that are caused by the action and occur later in time or further removed in distance; however, they are still reasonably foreseeable. Indirect impacts may include growth-inducing effects such as 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.

Effects resulting from actions may have beneficial or detrimental effects, even if on balance, the agency believes that the effect would be beneficial (40 CFR 1508.8).

Review of the environmental consequences identified direct, indirect, temporary, and permanent impacts resulting from the Proposed Action and No Action Alternative. In this NEPA document, the word “adverse” is used in characterizing minor (non-significant) detrimental effects to a resource, and “negligible” is used in characterizing minor (non-significant) detrimental effects to a resource that are generally undetectable. “Beneficial” effects would have a positive effect on the resource. In this document, the terms “effect” and “impact” are used synonymously. The Proposed Action for each resource includes implementation of the EPMs identified in Section 2.2.9. Mitigation measures, in addition to the EPMs, are recommended in this chapter where actions may be taken to further minimize potential adverse effects to the resources.

When applicable, the short-term or long-term aspects of impacts are described. Short-term or temporary impacts occur during or after the activity or action. Long-term impacts would last longer, generally beyond the first two years.

3.2 GENERAL SETTING

The Project Area consists of approximately 1,193 acres of land located on the northern and southern flanks of Mount Irish in the Mount Irish Mountain Range of Lincoln County, Nevada. Elevations range from approximately 5,560 feet to 8,750 feet AMSL. Terrain in the Project Area is steep. Ephemeral drainages in the Logan Pass Area generally run east to west and eventually flow southwest into Tikaboo Valley. Ephemeral drainages in the Southpaw Area run south to north and eventually run north into Coal Valley.

Average annual precipitation in Hiko, Nevada, (located approximately 10 miles to the east of the Project Area) is 6.99 inches. Average maximum temperatures are approximately 72.8 degrees Fahrenheit (°F) and average minimum temperatures are approximately 41.2°F (WRCC, 2013).

The Project Area is located within the Intermountain Region, Great Basin Division, Central Great Basin Section floristic zone. Vegetation communities within the Project Area consist of pinyon-juniper woodland and mixed conifer woodland (Enviroscientists, Inc., 2012).

3.3 RESOURCES/CONCERNS ANALYZED

3.3.1 Air Quality

The analysis area for impacts to air quality consists of the 12-digit hydrologic unit code (HUC12) subwatersheds including Little Cut Spring (HUC 160600140303), Logan Canyon-Logan Creek (HUC 150100111403), and Crescent Spring (HUC 160600141305), which encompass approximately 2,960,520 acres. This area was chosen because the Project Area

overlaps with the three subwatersheds and the area represents an ecologically connected area with clear topographical boundaries against which to measure impacts to air quality and visibility from the Proposed Action.

3.3.1.1 Affected Environment

The regulatory framework for air quality includes state and federal statutes, regulations, and standards. The Environmental Protection Agency (EPA) codifies the air quality framework and delegates the NDEP, Bureau of Air Quality Planning, and Bureau of Air Pollution Control to implement and enforce the state and federal statutes, regulations, and standards. The legal requirements applicable to the Proposed Action and alternatives include the following: The Clean Air Act (CAA), as amended (42 USC 7401 et seq.), National Ambient Air Quality Standards (NAAQS), National Emission Standards for Hazardous Air Pollutants, Federal Operating Permit Program (Title V), and State of Nevada air quality regulation and standards for permits to operate under NAC 445B Air Controls.

The CAA required the EPA to establish the NAAQS for pollutants considered harmful to public health and the environment. These pollutants are referred to as criteria pollutants and include carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter 10 microns in diameter or less, particulate matter 2.5 microns in diameter or less, and sulfur dioxide. The EPA also regulates 187 hazardous air pollutants that are known or suspected to cause cancer or other serious health effects.

The EPA developed a classification system for distinct air pollution control regions pursuant to the CAA. In Nevada, the regions are based on geographical boundaries and hydrographic basins. Each region has been classified as Attainment, Non-Attainment, or Maintenance for each of the criteria air pollutants. Regions classified as Attainment are areas in which a pollutant has either not exceeded the NAAQS or there has not been sufficient ambient monitoring data to further classify the region. A Non-Attainment classification represents an area in which a pollutant has exceeded the NAAQS. The Maintenance designation is used for areas in which a pollutant has exceeded the NAAQS, but has since been reduced to attainment levels.

The CAA also required the EPA to significantly limit the deterioration of air quality in specific areas. The EPA has developed a classification system of areas for the Prevention of Significant Deterioration (PSD) regulations. The most restrictive category is the Class I Area and the least restrictive category is the Class III Area. The Class I Areas include National Parks, Wilderness Areas, which exceed 5,000 acres and were in existence prior to 1977, and areas that have been designated as Class I Areas under the PSD regulation in 40 CFR 52.21. All regions not designated as Class I Areas are considered Class II Areas. No Class III Areas have been designated.

Local Climatological Air Quality

The Project Area is located between 5,560 feet to 8,050 feet AMSL in the Mount Irish Mountain Range in the Humboldt River Basin. Terrain throughout the Project Area is steep. Winds are affected by the local terrain and topography, and generally flow from the south (WRCC, 2013). Wind speeds are generally more moderate in the daylight hours and lighter throughout the night.

Baseline meteorological conditions near the Project Area are characterized from ambient monitoring data taken at a nearby monitoring station in Hiko, Nevada, which is located approximately 10 miles to the east of the Project Area. Average annual precipitation in Hiko is 6.99 inches. Average maximum temperatures are 72.8°F and average minimum temperatures are approximately 41.2°F (WRCC, 2013). The climate in the area is classified as semi-arid or steppe. These climates are characterized by low rainfall, low humidity, clear skies, and relatively large annual and diurnal temperature ranges.

Region Air Quality

Lincoln County (including the Project Area) is classified as attainment or unclassified for all criteria pollutants (NDEP, 2011). No data are available regarding emissions and concentrations of criteria pollutants within the analysis area specifically.

Regional haze refers to haze that impairs visibility in all directions over a large area. The EPA's Regional Haze Regulations affect only Class I areas. There are no Class I areas within the Project Area or its vicinity (NDEP, 2009).

Climate Change

According to the BLM's Instruction Memorandum 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 Instruction Memorandum states that ongoing scientific research indicates that anthropogenic greenhouse gas (GHG) emissions and changes in biological carbon sequestration due to land management activities potentially impact global climate. Through complex interactions on a global scale, GHG emissions and net losses of biological carbon sinks lead to a net warming of the atmosphere. GHGs have been found to be capable of trapping heat in the atmosphere by decreasing the amount of heat radiated by the Earth out to space.

The GHG emissions are comprised of many separate chemicals, the most notable is carbon dioxide (CO₂) from fossil fuel development, large wildland fires, and activities using combustion engines. The leading causes of GHG emissions in 2005 for Nevada were attributed to electrical generation (approximately 48 percent) and transportation (approximately 30 percent). Lesser causes included resident/commercial fuel use (approximately seven percent), industrial fuel use

(approximately five percent), industrial processes (approximately five percent), agriculture (approximately three percent), waste (approximately two percent), and fossil fuel industry (approximately one percent). Nevada historical data measured since 2005 indicated CO₂ to represent approximately 91 percent of GHG emissions with methane, nitric oxide, and hydrofluorocarbons/perfluorocarbons representing approximately four percent, three percent, and two percent, respectively (NDEP, 2008). By 2020, transportation is expected to account for 33.2 percent of statewide GHG emissions.

Current emissions within the vicinity of the Project Area include vehicle combustion emissions, fugitive dust from travel on unimproved roads, and wildland fire. Emissions of all pollutants are generally expected to be low due to the seclusion and extremely limited number of sources located in the vicinity of the Project Area. Future actions would have incremental change in CO₂ emission; however, the tools necessary to quantify incremental climate impacts of specific actions are presently not available. Specific levels of significance have not been established.

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 area of analysis. Due to the nature and scale of the Proposed Action, effects on climate change are not further analyzed in the EA.

3.3.1.2 Impact Analysis

Proposed Action

Exploration activities would disturb up to 50 acres of soil for overland travel as well as construction of roads and drill sites. Construction and operations would create fugitive dust and engine exhaust emissions causing negligible impacts to air resources. Vehicular emissions would be the main contributors to greenhouse gas emissions in the Project Area.

Prevailing winds from the south are expected to dissipate fugitive dust emissions during most times of the year. Speed limits on access roads would be observed and travel on routes within the Project Area would be conducted at prudent speeds for safety. EPMs outlined in Section 2.2.9 would be applied where fugitive dust is encountered by using water trucks. Concurrent reclamation (Section 2.2.7) including revegetation of proposed surface disturbance would gradually eliminate any potential for long-term impacts to air resources. Therefore, impacts to air from the Proposed Action are expected to be negligible and this resource is not further evaluated in this EA.

No Action Alternative

Under the No Action Alternative, dispersed public use in the Project Area would continue. The level of impact to air quality would be proportionally less than those associated with the

Proposed Action. Engine emissions and fugitive dust caused by travel on dirt roads or other dispersed recreational travel within the Project Area would occur and cause impacts to air resources. The No Action Alternative would have negligible impacts to air quality.

3.3.2 Cultural Resources

The analysis area for impacts to cultural resources includes the approximately 1,145 acres of public land located within Project Area. The privately-owned parcel in the Logan Pass Area was not surveyed. The area surveyed represents the area of potential effects for purposes of review under Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), all of which has been inventoried for cultural resources by Chambers Group, Inc. (Chambers, 2012).

3.3.2.1 Affected Environment

Cultural resources and traditional cultural properties (TCPs) are protected under the NHPA, the Archaeological Resources Protection Act of 1979 (ARPA), the American Indian Religious Freedom Act of 1978 (AIRFA), and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). Federal regulations require federal agencies to protect and manage cultural resource properties.

Cultural resources are defined as any definite location of past human activity identifiable through field survey, historical documentation, and/or oral evidence. Cultural resources have many values and provide data regarding past technologies, settlement patterns, subsistence strategies, and many other aspects of human sociocultural development and adaptation. The term “Cultural Resources” can apply to “those aspects of the environment – both physical and intangible, both natural and built – that have cultural value to a group of people.” This can include spiritual places, historic resources, archaeological resources, Native American cultural items, historical objects, religious practices, cultural uses of the natural environment, community values, or historical documents (King, 2013).

A TCP is a property associated with cultural practices or beliefs of a living community that are rooted in that community’s history, and are important in maintaining the continuing cultural identity of the community (Parker and King, 1998). This property type may be determined eligible for the NRHP if it meets criteria found in 36 CFR 60.4 and NRHP’s Manual Number 38.

The NHPA sets forth procedures for considering effects to historic properties and supports and encourages the preservation of prehistoric and historic resources. It directs federal agencies to consider the impacts of their actions on historic properties. The NHPA established the Advisory Council on Historic Preservation (ACHP) and tasked the ACHP with administering and participating in the preservation review process established by Section 106 of the NHPA.

The purpose of ARPA is to secure the protection of archaeological resources and sites that are on public land and Indian land and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals having collections of archaeological resources.

The AIRFA was passed in 1978 to “protect and preserve for American Indians their inherent right to freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.”

The NAGPRA became law in 1990 and formally affirms the rights of Indian tribes, Native Alaskan entities, and Native Hawaiian organizations to custody of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony that have a relationship of cultural affiliation.

Chambers Group, Inc. conducted a Class III cultural resources inventory on public land within the Project Area in April 2012. Cultural resources identified in the Project Area consist of a variety of types of archaeological sites including mining features and complexes (some with associated refuse), historic refuse scatters, wood cutting sites, historic roads, and lithic scatter. The inventory resulted in the recordation of 36 new archaeological sites and the updating of one previously recorded site. Forty-nine historic and prehistoric isolated finds were also recorded during the inventory. Four sites and one feature within the Project Area are eligible to the NRHP. The 49 isolated finds are not eligible for the NRHP.

3.3.2.2 Impact Analysis

Proposed Action

To avoid impacts to eligible and unevaluated sites, the EPMs outlined in Section 2.2.9.3 would be implemented. Aurion would adjust their drilling schedule so as not to impact known eligible sites in the Project Area. Project-related disturbance would be phased and occur throughout the Project Area. Reclamation would occur in phases, which would reduce the amount of area disturbed at any one time. The BLM would review each work plan for each phase of the Project prior to Aurion initiating activities under that phase to ensure the protection of eligible cultural resources. Impacts to cultural resources from the Proposed Action would be negligible.

No Action Alternative

Under the No Action Alternative, impacts to cultural resources are unlikely; however, potential impacts could occur from vandalism or looting.

3.3.3 Migratory Birds

The analysis area for impacts to migratory birds includes the 1,193-acre Project Area. This area was chosen because it represents the area where impacts to migratory birds would likely occur.

3.3.3.1 Affected Environment

Migratory birds are those listed in 50 CFR 10.13 and include all native birds commonly found in the United States, with the exception of native resident game birds. Migratory birds are protected under the Migratory Bird Treaty Act (16 USC 701-718h), which prohibits the taking of migratory birds, their parts, nests, eggs, and nestlings without a permit. Federal agencies are directed to protect migratory birds by integrating bird conservation principles, measures, and practices under Executive Order 13186, signed January 10, 2001.

Additional direction comes from the Memorandum of Understanding (MOU) between the BLM and the United States Fish and Wildlife Service (USFWS), signed April 12, 2010. This MOU has management objectives and recommendations to avoid or minimize potential impacts to high priority migratory bird species. The purpose of the MOU is to strengthen migratory bird conservation through enhanced collaboration between the BLM and USFWS in coordination with state, tribal, and local governments.

Migratory birds include those species of birds that breed in the Project Area and then migrate south prior to the onset of winter. In addition to migratory bird species that arrive to nest in the area, several species of birds observed in the area are migratory species that only pass through the area.

The Project Area is located within the Great Basin subregion (Bird Conservation Region 9) of the Intermountain West Bird Conservation Region as defined by Partners in Flight, and represents the center of distribution for many migratory birds (NABCI, 2013). Over half of the biome's species of continental importance have 75 percent or more of their population in the Intermountain West (Beidleman, 2000). In general, avian diversity is lowest in Great Basin habitats during the winter season. Diversity increases as migratory species arrive to nest in the area with the onset of spring. Some species are year-round residents; however, migratory birds are typically only present during the breeding season through late summer.

There are two vegetation communities within the Project Area including pinyon-juniper woodland and mixed conifer woodland (Enviroscientists, Inc., 2012). Both communities are widespread and common throughout the area. There are no known naturally occurring springs or perennial drainages within the Project Area. The plant communities and absence of seasonal water within and directly adjacent to the Project Area provides limited foraging and nesting habitat for many migratory bird species.

Surveys of wildlife species, including migratory birds, within the Project Area were conducted by Enviroscientists, Inc. in June 2012. Fourteen migratory bird species were identified during the field surveys (Enviroscientists, Inc., 2012). The Nevada Department of Wildlife (NDOW) was consulted to identify potential wildlife species, including migratory birds, utilizing the Project Area. NDOW issued a letter of results on March 12, 2012, in which they identified a list of raptors, also considered to be migratory birds, that have the potential to occur within the Project Area and its three-mile vicinity. The NDOW noted that Cooper’s hawk (*Accipiter cooperii*) and golden eagle (*Aquila chrysaetos*) have been directly observed in the vicinity of the Project Area. The NDOW also identified golden eagle nests located within a 10-mile radius of the Project Area. One golden eagle nest is located approximately six miles south of the Project Area in Section 15, T5S, R58E (NDOW, 2012a). Potential golden eagle nesting habitat is located between the Logan Pass and Southpaw areas and a small portion of the Southpaw Area. The entire Project Area consists of suitable foraging habitat for golden eagles (Enviroscientists, Inc., 2012).

Table 3 lists the species observed within the Project Area during baseline surveys. The pinyon jay is considered to be a sensitive species; therefore, it is discussed in further detail in Section 3.3.10. Raptor species identified in NDOW's consultation letter that are known to reside within the Project Area and its three-mile radius are presented in Table 4.

Table 3 Migratory Bird Species Observed within the Project Area

Common Name	Scientific Name
Order Accipitriformes	
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Turkey Vulture	<i>Cathartes aura</i>
Order Caprimulgiformes	
Common Nighthawk	<i>Chordeiles minor</i>
Order Passeriformes	
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>
Black-throated Gray Warbler	<i>Setophaga nigrescens</i>
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>
Chipping Sparrow	<i>Spizella passerina</i>
Common Raven	<i>Corvus corax</i>
Pinyon Jay ¹	<i>Gymnorhinus cyanocephalus</i>
Mountain Chickadee	<i>Poecile gambeli</i>
Black-billed Magpie	<i>Pica pica</i>
Spotted Towhee	<i>Pipilo maculatus</i>
Order Piciformes	
Hairy Woodpecker	<i>Picoides villosus</i>
Northern Flicker	<i>Colaptes auratus</i>

¹BLM Ely District Special Status Species
Source: Enviroscientists, Inc., 2012

Table 4 Migratory Bird Species with Potential to Occur in the Vicinity of the Project Area

Common Name	Scientific Name
American Kestrel	<i>Falco sparverius</i>
Barn Owl	<i>Tyto alba</i>
Cooper’s Hawk	<i>Accipiter cooperii</i>
Ferruginous Hawk ^{1,2}	<i>Buteo regalis</i>
Golden Eagle ²	<i>Aquila chrysaetos</i>
Great horned Owl	<i>Bubo virginianus</i>
Long-eared Owl	<i>Asio otus</i>
Merlin	<i>Falco columbarius</i>
Northern Goshawk ^{1,2}	<i>Accipiter gentilis</i>
Northern Harrier	<i>Circus cyaneus</i>
Northern Saw-whet Owl	<i>Aegolius acadicus</i>
Osprey	<i>Pandion haliaetus</i>
Peregrine Falcon ^{1,2}	<i>Falco peregrinus</i>
Prairie Falcon	<i>Falco mexicanus</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Rough-legged Hawk	<i>Buteo lagopus</i>
Sharp-shinned Hawk	<i>Accipiter striatus</i>
Short-eared Owl ¹	<i>Asio flammeus</i>
Swainson’s Hawk ^{1,2}	<i>Buteo swainsoni</i>
Turkey Vulture	<i>Cathartes aura</i>
Western Burrowing Owl ^{1,2}	<i>Athene cunicularia</i>
Western Screech-owl	<i>Megascops kennicottii</i>

¹NDOW Species of Special Concern

²BLM Ely District Special Status Species

Source: NDOW, 2012a

3.3.3.2 Impact Analysis

Proposed Action

The Proposed Action would result in the direct loss of 50 acres of potential migratory bird habitat. Activities associated with the Proposed Action could potentially result in the destruction of active nests, disturb the breeding behavior of migratory bird species, or increase the potential for vehicle mortality. EPMs discussed in Section 2.2.9.2 state that Aurion would conduct migratory bird nest surveys prior to surface disturbance during the avian breeding season (March 1 through August 31 annually) and would observe prudent speed limits to reduce the potential for wildlife-vehicle collisions. Avian surveys would be conducted only during the avian breeding season and immediately prior (within 7 days) to Aurion conducting surface disturbance. If nests are located, or if other evidence of nesting (i.e., carrying nest material, carrying fecal sac, carrying food, distraction displays, occupied nest indicated by adult entering or leaving nest site

in circumstances where the nest cannot be directly observed [e.g., cavities], nest with young seen or heard, or recently fledged dependent young or downy young) 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 birds or nests until the nests are no longer active (i.e., young are fledged, capable of sustained flight, and have moved out of the natal area or the nest is abandoned [fails]).

The Proposed Action would have temporary impacts to migratory birds. Removal of 50 acres of potential habitat would be temporary and negligible, as all disturbed areas would be reclaimed.

Indirect impacts to raptors under the Proposed Action could include a temporary relocation of prey away from the Project Area due to an increase in activity in the area; however, there is suitable habitat for displaced prey adjacent to the Project Area that would be available for hunting. Exploration activities associated with the Proposed Action would be temporary and negligible.

No Action Alternative

Under the No Action Alternative, ongoing dispersed recreational activities in the Project Area would continue to occur, which could impact migratory bird habitat. Impacts to migratory birds are expected to be negligible for the No Action Alternative.

3.3.4 Rangeland Standards and Guidelines

The analysis area for impacts to rangeland standards and guidelines includes the 1,193-acre Project Area. This area was chosen because it represents the area of which impacts to range resources would be limited to.

3.3.4.1 Affected Environment

The Logan Pass Area is located within the Crescent N-4 and Irish Mountain grazing allotments. The Southpaw Area is located entirely within the Irish Mountain grazing allotment.

The Crescent N-4 Allotment has 951 active animal unit months (AUMs). There are 2,915 suspended AUMs. The allotment consists of 61,542 acres, 40 of which are state lands. The remaining 61,502 acres are public land. The Irish Mountain Allotment has 3,141 active AUMs. The allotment consists of 83,465 acres of public land. The management status code of both grazing allotments is “M” for “maintain.” Range conditions in this category should be maintained or improved. Both allotments have two grazing permittees: Double U Livestock LLC and Orren J. Nash (BLM, 2013a). Table 5 provides a list of permittees and grazing information for the Crescent N-4 and Irish Mountain allotments.

Table 5 Livestock Grazing Permits for the Crescent N-4 and Irish Mountain Allotments

Allotment	Permittee	Livestock Type	Number of Livestock	Season of Use	Active AUMs	Suspended AUMs	Permitted Use (AUMs)
Crescent N-4 (61,502 acres)	Double U Livestock LLC	Sheep	353	10/01-02/28	351	2,915	3,266
	Orren J. Nash	Cattle	50	03/01-02/23	600	0	600
Subtotal					951	2,915	3,866
Irish Mountain (83,465)	Double U Livestock LLC	Sheep	604	10/01-02/28	600	0	600
	Orren J. Nash	Cattle	211	03/01-02/23	2,532	0	2,541
Subtotal					3,141	0	3,141
Total					4,092	2,915	7,007

Source: BLM, 2013a

3.3.4.2 Impact Analysis

Proposed Action

The Proposed Action would result in the direct temporary loss of 50 acres of livestock grazing habitat; however, surface disturbance would be dispersed throughout the Project Area and grazing would be able to continue during Project-related activities.

There would be a direct loss of AUMs during the life of the Project. Because the future disturbance associated with Phase II of the Project is unknown, it is assumed that half the disturbance associated with the Project would be located within the Crescent N-4 Allotment and the other half would occur within the Irish Mountain Allotment. This results in an approximate loss of two AUMs in the Crescent N-4 Allotment and one AUM in the Irish Mountain Allotment. There is no anticipated reduction of the permitted AUMs for these allotments associated with the proposed Project. Indirect impacts would occur as a result of short-term and negligible loss of forage from surface disturbance; however, long-term benefits would occur with successful reclamation.

No Action Alternative

Under the No Action Alternative, ongoing dispersed recreational activities in the Project Area would continue to occur, which could impact rangeland. The level of impact to rangeland would be negligible for the No Action Alternative.

3.3.5 Native American Religious Concerns

The area of analysis for Native American religious concerns includes the 1,193-acre Project Area. The area was chosen because the BLM consulted with federally-recognized tribes that

have a cultural affiliation based on traditional use, ancestral ties, and/or oral histories associated with the area.

3.3.5.1 Affected Environment

Laws and regulations that require consideration of Native American concerns include NHPA, AIRFA, Executive Order 13007 (Indian Sacred Sites), Executive Order 13175 (Consultation and Coordination with Tribal Governments), NAGPRA, Secretarial Order 3317, ARPA as well as NEPA and FLPMA.

Certified letters regarding the Proposed Action initiating tribal consultation in compliance with Executive Order 13175 were mailed to the following tribes on February 5, 2012:

- Duckwater Shoshone Tribe of the Duckwater Reservation, Nevada;
- Skull Valley Band of Goshute Indians of Utah;
- Ely Shoshone Tribe of Nevada;
- Confederated Tribes of the Goshute Reservation, Nevada-Utah;
- Paiute Indian Tribe of Utah;
- Indian Peaks Band;
- Shivwits Band of Paiutes;
- Cedar City Band of Paiutes;
- Kaibab Band of Paiute Indians of the Kaibab Indian reservation, Arizona;
- Moapa Band of Paiute Indians of the Moapa River Indian Reservation, Nevada;
- Las Vegas Paiute Tribe of the Las Vegas Indian Colony;
- Battle Mountain Band Council;
- Te-Moak Tribe of the Western Shoshone Indians of Nevada;
- Wells Band Council;
- South Fork Band Council;
- Elko Band Council; and
- Yomba Shoshone Tribe of the Yomba Reservation, Nevada.

The Duckwater Shoshone Tribe responded on February 15, 2012, requesting a field trip to the Project Area prior to making a decision in regards to commenting on the Project.

3.3.5.2 Impact Analysis

Proposed Action

No issues concerning Native American religious concerns such as religion, spirituality, or sacredness were brought forward during the consultation efforts. Consultation would remain an on-going process throughout the life of the Project.

The effects of federal undertakings on properties of traditional religious and cultural importance to contemporary Native Americans are given consideration under the provisions of Executive Order 13007, the American Indian Religious Freedom Act, and recent amendments to the

NHPA. As amended, the NHPA now integrates Native American tribes into the Section 106 compliance process.

No concerns regarding Native American religious concerns were expressed by the Tribes.

No Action Alternative

No effects to Native American religious concerns would be expected as a result of the No Action Alternative.

3.3.6 Wastes, Hazardous or Solid

The analysis area for impacts to wastes, hazardous or solid, includes the Project Area and its access routes. This area was chosen because it incorporates areas in which there could be wastes, hazardous or solid, spilled.

3.3.6.1 Affected Environment

Hazardous materials that would be utilized during Project-related activities include diesel fuel, gasoline, and lubricating grease. Approximately 500 gallons of diesel fuel would be contained in fuel delivery systems on vehicles and drill rigs. Approximately 100 gallons of gasoline would be contained 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, handled, and stored in accordance with NDOT and MSHA regulations.

Self-contained, portable chemical toilets supplied and serviced by a contractor would be used for human waste. All refuse generated by the Project would be disposed of at an authorized landfill facility off-site, consistent with applicable regulations. No refuse would be disposed of on-site. Water or nontoxic drilling fluids, additives, gels, and abandonment materials would be utilized as necessary during drilling and would be stored at the Project Area.

3.3.6.2 Impact Analysis

Proposed Action

Hazardous substances including diesel fuel, gasoline, and lubricating grease, as well as non-toxic drilling fluids or products could spill during Project-related activities. A SPCP is included in Appendix B of the 2013 Plan 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, NDEP, EPA, and MSHA regulations.

In the event that a reportable quantity of hazardous or regulated materials, such as diesel fuel, is spilled, measures would be taken to control the spill, and the BLM, NDEP, and the Emergency

Response Hotline would be notified, as required. If any oil, hazardous material, or chemicals are spilled during operations, they would be cleaned up in a timely manner. After clean up, the oil, toxic fluids, or chemicals and any contaminated material would be removed from the site and disposed of at an approved disposal facility. Additionally, all refuse generated by the Project would be hauled off-site. Therefore, no impacts to the environment from wastes associated with the Proposed Action are anticipated.

No Action Alternative

No effects to hazardous or solid wastes would be expected as a result of the No Action Alternative.

3.3.7 Water Quality, Drinking/Ground

The analysis area for impacts to water quality consists of the 12-digit hydrologic unit code (HUC12) subwatersheds including Little Cut Spring (HUC 160600140303), Logan Canyon-Logan Creek (HUC 150100111403), and Crescent Spring (HUC 160600141305), which encompass approximately 2,960,520 acres. This area was chosen because the Project overlaps with these three subwatersheds and it is where impacts to water quality could occur.

3.3.7.1 Affected Environment

The Project Area is located within the Little Cut Spring (HUC 160600140303), Logan Canyon-Logan Creek (HUC 150100111403), and Crescent Spring (HUC 160600141305) 12-digit hydrologic unit code (HUC12) subwatersheds. Little Cut Spring and Crescent Spring are located within the Death Valley System and Logan Canyon-Logan Creek is located within the Colorado System.

Surface Water

The United States Geological Survey (USGS) National Hydrography Dataset (USGS, 2013a) and the USFWS National Wetlands Inventory were researched to identify potential wetlands and surface water resources in the area. There are no mapped or documented wetlands within the Project Area (USFWS, 2013).

Under section 303(d) of the Clean Water Act, all states, territories, and authorized tribes are required to identify any waterbody (including stream reaches, lakes, and waterbody segments) within their jurisdiction with chronic and recurring monitored violations of the applicable water quality criteria. No impaired waters have been reported to the EPA for drainages within the Little Cut Spring, Logan Canyon-Logan Creek, and Crescent Spring subwatersheds (EPA, 2013).

The nearest known surface water in relation to the Southpaw Area is Springer Spring, which is located over 0.50 miles to the east. The nearest known surface water in relation to the Logan

Pass Area is Crescent Spring, which is located over 0.80 miles to the south (USGS, 2013a). There are seven intermittent drainages within the Logan Pass Area and two within the Southpaw Area. Six of the seven drainages in the Logan Pass Area flow from the east to the west in the Crescent Spring watershed. The remaining drainage flows to the east in the Logan Canyon-Logan Creek subwatershed. The two drainages in the Southpaw Area flow to the north in the Little Cut subwatershed. These drainages are formed from runoff in the form of rain and winter snowpack making flowing water within these drainages occur at irregular intervals, which lasts only a short time.

Groundwater

Little information is available on groundwater in the area. According to the 2013 Plan, Aurion does not anticipate to encounter groundwater during any stage of the Proposed Action. There are no known wells in the vicinity of the Project Area. According to the USGS National Water Information System Web Interface, the closest groundwater wells are located approximately 10 miles to the east in Hiko (USGS, 2013b).

3.3.7.2 Impact Analysis

Proposed Action

The Proposed Action would utilize water for dust suppression and drilling to cool the drill bit and remove drill cuttings. Aurion estimates approximately 8,000 to 12,000 gallons of water per day would be obtained from local ranchers and/or municipalities for use on Project-related activities.

Activities conducted under the Proposed Action would avoid surface water resources, since there are no seeps, springs, or perennial drainages within the Project Area. As outlined in Section 2.2.9.1, Aurion has committed to EPMS during construction, operation, and reclamation that are expected to minimize sedimentation or erosion resulting from overland flow events. Therefore, impacts from the Proposed Action to surface water are expected to be negligible.

A SPCP is included as Appendix B of the 2013 Plan and would be implemented to control potential pollutants discharged to ground or surface water. All containers of hazardous substances would be labeled, handled, and stored in accordance with NDOT and MSHA regulations. Impacts would be negligible due to the use of non-toxic drilling fluids.

Impacts to groundwater quality could occur if groundwater is intercepted during drilling; however, this is not anticipated. If groundwater is encountered, the drilled borehole would be plugged pursuant to NAC 534.420. If any drill hole produces artesian flow, the drill hole would be contained pursuant to NRS 534.060 and NAC 534.378 and would be sealed by the method

described in Subsection 2 of NAC 534.4371. Adhering to these polices would minimize groundwater impacts from the Proposed Action, which are expected to be negligible.

No Action Alternative

No effects to water quality would be expected as a result of the No Action Alternative.

3.3.8 Invasive Non-Native Species

The analysis area for invasive non-native species includes the 1,193-acre Project Area. This area was chosen because it represents the geographic area of which impacts from invasive non-native species would be limited to.

3.3.8.1 Affected Environment

An “invasive species” is defined as a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Invasive non-native species are species that reproduce quickly, mature rapidly, and spread aggressively. They include fungi, feral animals, some invertebrates, and weeds designated as “invasive,” “noxious,” or “pests” by federal, state, or other legally responsible authority. There are no known invasive non-native animal species (pests), fungi, or invertebrates that are mandated for control in the Project Area; therefore, they are not addressed further in this EA.

A noxious weed is defined by the BLM as “a plant that interferes with management objectives for a given area of land at a give point in time”, and a weed is a non-native plant that disrupts or has the potential to disrupt or alter the natural ecosystem function, composition, and diversity of the site it occupies (BLM, 2009). Nevada Revised Statute (NRS 555.005) says noxious weeds are “any species of plant which is, or likely to be, detrimental or destructive and difficult to control or eradicate.”

Cheatgrass (*Bromus tectorum*), an invasive non-native plant species, was observed within the mixed conifer woodland vegetation community (Enviroscientists, Inc., 2012). Noxious weed species were not observed within the Project Area during baseline surveys conducted in June 2012 (Enviroscientists, Inc., 2012). Additionally, there are no documented noxious weeds within the Project Area according to the Ely District weed inventory; however, the Risk Assessment for Noxious and Invasive Weeds created by the BLM for the Project states that there are probably undocumented weeds found scattered along roads in the Project Area (BLM, 2013b). There are also no document noxious weeds within the Project Area as mapped by the Nevada Department of Agriculture (NDA, 2013).

3.3.8.2 Impact Analysis

Proposed Action

Surface disturbance associated with the Proposed Action would result in 50 acres of new surface disturbance. New surface disturbance would increase the potential for the establishment and spread of invasive, non-native plant species.

Increased vehicle travel to and from drill pads would increase the potential for spreading invasive non-native plant species in the Project Area. The Project Area is relatively weed-free with the exception of cheatgrass observed in the mixed conifer woodland vegetation community.

The Risk Assessment for Noxious and Invasive Weeds created by the BLM for the Project states that the likelihood of noxious and invasive weed species spreading to the Project Area is moderate. Although there are no documented weeds in the area, the use of heavy machinery coupled with ground-disturbing activities would introduce weeds. The BLM identifies the consequences of noxious and invasive weed establishment in the Project Area as high. This rating is based on the area currently being free of noxious weeds and because of the ecological condition of the area. If noxious weeds establish themselves in the area, they could become dominate (BLM, 2013b).

Based on an overall risk rating of “moderate,” the BLM has included required measures, all of which is consistent with the EPMs contained in Chapter 2. The rating of “moderate” indicates that the Proposed Action can proceed so long as the following measures are followed:

- Continue to use integrated weed management to treat weed infestations and use principles of integrated pest management to meet management objectives and to reestablish resistant and resilient native vegetation communities;
- Develop weed management plans that address weed vectors, minimize the movement of weeds within public lands, consider disturbance regimes, and address existing weed infestations;
- When manual weed control is conducted, remove the cut weeds and weed parts and dispose of them in a manner designed to kill seeds and weed parts;
- All straw or other organic products used for reclamation or stabilization activities, must be certified that all materials are free of plant species listed on the Nevada noxious weed list or specifically identified by the Ely District Office;
- Where appropriate, inspect source sites such as borrow pits, fill sources, or gravel pits used to supply inorganic materials used for construction, maintenance, or reclamation to ensure they are free of plant species listed on the Nevada noxious weed list or specifically

identified by the Ely District Office. Inspections would be conducted by a weed scientist or qualified biologist;

- Where appropriate, vehicles and heavy equipment used for the completion, maintenance, inspection, or monitoring of ground disturbing activities; for emergency fire suppression; or for authorized off-road driving would be free of soil and debris capable of transporting weed propagules. Vehicles and equipment would be cleaned with power or high pressure equipment prior to entering or leaving the work site or Project Area. Vehicles used for emergency fire suppression would be cleaned as a part of check-in and demobilization procedures. Cleaning efforts would concentrate on tracks, feet and tires, and on the undercarriage. Special emphasis would be applied to axels, frames, cross members, motor mounts, on and underneath steps, running boards, and front bumper/brush guard assemblies. Vehicle cabs would be swept out and refuse would be disposed of in waste receptacles. Cleaning sites would be recorded using global positioning systems or other mutually acceptable equipment and provided to the Ely District Office Weed Coordinator or designated contact person;
- To minimize the transport of soil-borne noxious weed seeds, roots, or rhizomes, infested soils or materials would not be moved and redistributed on weed-free or relatively weed-free areas. In areas where infestations are identified or noted and infested soils, rock, or overburden must be moved, these materials would be salvaged and stockpiled adjacent to the area from which they were stripped. Appropriate measures would be taken to minimize wind and water erosion of these stockpiles. During reclamation, the materials would be returned to the area from which they were stripped;
- Prior to Project approval a site-specific weed survey would occur and a weed risk assessment would be completed. Monitoring would be conducted for a period no shorter than the life of the permit or until bond release and monitoring reports would be provided to the Ely District Office. If the presence and/or spread of noxious weeds is noted, appropriate weed control procedures would be determined in consultation with Ely District Office personnel and would be in compliance with the appropriate BLM Handbook sections and applicable laws and regulations. All weed control efforts on ELM-administered lands would be in compliance with BLM Handbook H-9011, H-9011-1 Chemical Pest Control, H-9014 Use of Biological Control Agents of Pests on Public Lands, and H-9015 Integrated Pest Management. Submission of Pesticide Use Proposals and Pesticide Application Records would be required;
- Determine seed mixes on a site-specific basis dependant on the probability of successful establishment. Use native and adapted species that compete with annual invasive species or meet other objectives;
- For soil disturbing actions that would require reclamation, salvage and stockpile all available growth medium prior to surface disturbances. Seed stockpiles if they are to be left for more than one growing season. Recontour all disturbance areas to blend as nearly as possible with the natural topography prior to revegetation. Rip all compacted portions of the disturbance to an appropriate depth based on site characteristics. Establish an adequate seed bed to provide good seed-to-soil contact;

- Conduct mixing of herbicides and rinsing of herbicide containers and spray equipment only in areas that are a safe distance from environmentally sensitive areas and points of entry to bodies of water (storm drains, irrigation ditches, streams, lakes, or wells);
- Keep removal and disturbance of vegetation would be kept to a minimum through construction site management (e.g. using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites, etc.);
- Generally, conduct reclamation with native seeds that are representative of the indigenous species present in the adjacent habitat. Document rationale for potential seeding with selected nonnative species. Possible exceptions would include use of nonnative species for a temporary cover crop to out-compete weeds. In all cases, ensure seed mixes are approved by the BLM Authorized Officer prior to planting;
- Certify that all interim and final seed mixes, hay, straw, and hay/straw products are free of plant species listed on the Nevada noxious weed list;
- Distribute weed-free vegetation removed from the Project Area to provide protection, nutrient recycling, and seed source;
- Do not conduct noxious and invasive weed control within 0.5 miles of nesting and brood rearing areas for special status species during the nesting and brood rearing season;
- When maintaining unpaved roads on BLM-administered lands, avoid the unnecessary disturbance of adjacent native vegetation and spread of weeds. Grade road shoulders or barrow ditches only when necessary to provide for adequate drainage. Minimize the width of grading operations. The BLM Authorized Officer would meet with equipment operators to ensure that they understand this objective;
- All applications of approved pesticides would be conducted only by certified pesticide applicators or by personnel under the direct supervision of a certified applicator;
- Store all pesticides in areas where access can be controlled to prevent unauthorized/untrained people from gaining access to chemicals;
- No noxious weeds would be allowed on the site at the time of reclamation release. Any noxious weeds that become established would be controlled;
- Prior to entering public lands, the contractor, operator, or permit holder would provide information and training regarding noxious weed management and identification to all personnel who would be affiliated with the implementation of the Project. The importance of preventing the spread of weeds to uninfested areas and importance of controlling existing populations of weeds would be explained; and
- Whenever possible, hand spraying of herbicides is preferred over other methods at heavily used recreation sites (i.e. campgrounds, trailheads, etc.).

EPMs discussed in Section 2.2.9.6 state that noxious weeds would be controlled through implementation of the following BMPs: concurrent reclamation efforts; operator control; removal of invasive non-native, and noxious weeds on reclaimed areas; washing heavy equipment prior to entering the Project Area; and avoiding areas of known invasive non-native, and noxious weeds during periods when the weeds could be spread by vehicles. Additionally, disturbed areas would be reclaimed after implementation of the Proposed Action, which would limit the ability for invasive, non-native species establishment. Therefore, impacts from invasive, non-native species from the Proposed Action are expected to be negligible.

No Action Alternative

Under the No Action Alternative, the area would remain available for other multiple-use activities as approved by the BLM. Such activities include recreationalists, who many inadvertently introduce invasive, non-native species into the Project Area via vehicles, clothing, pets, and food. Impacts from invasive, non-native species from the No Action Alternative are expected to be negligible.

3.3.9 Heritage Special Designations and ACECs

The analysis area for impacts to heritage special designations includes the 1,193-acre Project Area. This area was chosen because it is located within the proposed Mount Irish ACEC.

3.3.9.1 Affected Environment

The Project Area is within the proposed Mount Irish Area ACEC, which consists of approximately 15,075 acres of the Mount Irish Mountain Range. ACECs are public lands where special management is required in order to protect the area's values. To be eligible for designation as an ACEC, an area must meet criteria for both relevance and importance. An ACEC possesses significant historic, cultural, or scenic values, fish or wildlife resources, natural processes or systems, or natural hazards. The Mount Irish area was designated as an ACEC based on cultural sites within the area, which include remnants of the Pahranaagat Mining District, Crescent Mill, and Logan City, and the potential for prehistoric artifacts associated with the Mount Irish Archaeological District (BLM, 2007). Mineral entry within the Mount Irish ACEC has not been withdrawn; therefore, locatable mineral development is not prohibited on lands within the ACEC.

3.3.9.2 Impact Analysis

Proposed Action

Aurion has committed to specifically avoid the resources the proposed ACEC is meant to protect. Should Aurion encounter any unexpected cultural remnants, personnel would immediately notify the BLM. Impacts to the ACEC from the Proposed Action are expected to be negligible.

No Action Alternative

Under the No Action Alternative, impacts to heritage special designation resources are unlikely; however, potential impacts to resources within the proposed ACEC could occur from vandalism or looting.

3.3.10 Wildlife

The analysis area for impacts to wildlife includes the 1,193-acre Project Area. This area was chosen because it represents the area where impacts to wildlife would be limited. This area was chosen because it represents an area with continuity in habitat where baseline surveys for wildlife species have been conducted. No fish are located within the Project Area; therefore, fish are not further analyzed in this EA.

3.3.10.1 Affected Environment

Biological baseline studies were conducted in June 2012 for the Project Area (Enviroscientists, Inc., 2012). The wildlife species in the Project Area are typical of the arid/semiarid environment in the Great Basin. In total, 14 bird, 11 mammal, and four reptile species were directly observed or detected by sign (tracks, burrows, scat, feathers, bones, or vocalizations). No amphibians were identified and no fish or aquatic habitat is present in the Project Area. Information from the biological studies report is summarized below.

On March 12, 2012, the NDOW provided information regarding known or potential occurrence of wildlife resources near the Project Area based on best available data from the NDOW's wildlife sight records, commercial reptile collections, scientific collections, raptor nest sites and ranges, greater sage-grouse leks and habitat, and big-game distributions databases. The results of that inquiry were summarized in a letter and series of maps (NDOW, 2012a). The NDOW response letter focuses on the Project Area including a three-mile radius for general wildlife. The letter also includes all known bald eagle and golden eagle nest data within 10 miles of the Project Area. Information from the NDOW letter is summarized below.

On March 13, 2012, the Nevada Natural Heritage Program (NNHP) provided information regarding endangered, threatened, candidate, and/or at risk animal taxa recorded within the Project Area and its three-mile radius based on the program's database and maps. The results of that inquiry were summarized in a letter (NNHP, 2012) and are incorporated into the summary below.

On March 28, 2012, USFWS provided information regarding federally listed, threatened, endangered, and candidate species and designated critical habitats that may occur in the Project Area (USFWS, 2012). The USFWS determined that no federally listed species are likely to

occur in the Project Area. Additionally, the area does not occur within federally designated critical habitat for any federally listed species. The nearest known habitat for federally listed species occurs south of the Project Area for several endemic species in Pahrangat Valley (NNHP, 2013a).

The NDOW's response letter regarding known or potential occurrence of wildlife resources near the Project Area indicates that pronghorn antelope (*Antilocapra americana*) distribution is present in Tikaboo Valley in the southwestern portion of the Project Area and three-mile radius and Coal Valley in the northern portion of the three-mile radius. Bighorn sheep (*Ovis canadensis*) distribution exists in the Mount Irish Mountain Range in the southern portion of the Project Area and three-mile radius. According to the 2008 Ely RMP, desert bighorn sheep (*Ovis canadensis nelsoni*) currently occupy the Logan Pass Area.

Mule deer (*Odocoileus hemionus*) distribution exists in the Mount Irish and Timpahute mountain ranges throughout the entire Project Area and the majority of the three-mile radius (NDOW, 2012a). Mule deer were observed in the Project Area during baseline surveys (Enviroscientists, Inc., 2012). Consultation with NDOW indicates that mule deer distribution in the Project Area is considered to be limited based on water availability and mature habitat.

Additional mammal species observed during baseline surveys include deer mouse (*Peromyscus maniculatus*), least chipmunk (*Tamias minimus*), Uinta chipmunk (*Neotamias umbrinus*), golden-mantled ground squirrel (*Spermophilus lateralis*), pocket gopher (*Thomomys* spp.), mountain cottontail (*Sylvilagus nuttallii*), black-tailed jackrabbit (*Lepus californicus*), woodrat (*Neotoma* spp.), and coyote (*Canis latrans*).

Four reptile species were observed during baseline surveys and include the desert horned lizard (*Phrynosoma platyrhinos*), gopher snake (*Pituophis catenifer*), sagebrush lizard (*Sceloporus graciosus*), and western fence lizard (*Sceloporus occidentalis*).

Aquatic habitat, waterfowl species, shorebirds, or colony nesting bird species were not observed in the Project Area (Enviroscientists, Inc., 2012). All bird species identified during baseline surveys are considered to be migratory birds; therefore, they are discussed in detail in Section 3.3.3.

Special Status Species

The BLM's policy for management of special status species is provided in the BLM Manual Section 6840 (BLM, 2008c). Special status species include the following:

- Federally Threatened or Endangered Species: Any species that the 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; and
- State of Nevada Listed Species: Any species that the State of Nevada has listed as a threatened or endangered species under the NAC Chapter 503.

As stated in the BLM Information Bulletin No. NV-2003-097, Nevada BLM sensitive species are taxa that are not already included as BLM special status species under (1) federally listed, proposed, or candidate species, or (2) State of Nevada listed species. BLM policy is to provide these species with the same level of protection as is provided for candidate species in BLM Manual 6840.06 C, that is to “ensure that actions authorized, funded, or carried out do not contribute to the need for the species to become listed”. The sensitive species designation is normally used for species that occur on Bureau administered lands for which BLM has the capability to significantly affect the conservation status of the species through management.

The NDOW indicated that northern goshawk, western burrowing owl, ferruginous hawk, Swainson’s hawk, peregrine falcon, and short-eared owl are NDOW species of special concern and are target species for conservation as outline in the Nevada Wildlife Action Plan (NDOW, 2013a). Golden eagles have been directly observed in the vicinity of the Project Area (NDOW, 2012a). The NDOW identified one golden eagle nest within ten miles of the Project Area (Enviroscientists, Inc., 2012). Northern goshawk, golden eagle, western burrowing owl, ferruginous hawk, Swainson’s hawk, and peregrine falcon are BLM Ely District special status species. Additionally, the pinyon jay was one of the 14 bird species identified during the 2012 biological baseline surveys and is also a designated BLM Ely District special status species.

The NNHP indicated that habitat for the long-legged myotis (*Myotis volans*) may occur in the Project Area (NNHP, 2012). The NNHP also indicated that habitat may be available for the Phainopepla (*Phainopepla nitens*), a NNHP at-risk species (NNHP, 2012).

Greater sage-grouse is currently a BLM-sensitive species and a State of Nevada-protected game bird managed in accordance with the *Greater Sage-Grouse Conservation Plan for Nevada and Eastern California* (NDOW, 2004). The greater sage-grouse is currently a candidate for listing under status review by the USFWS.

Greater sage-grouse historical habitat distribution data has been kept by NDOW. In March 2012, NDOW updated their greater sage-grouse habitat mapping to include five habitat categories. On March 15, 2012, the BLM issued a White Paper on greater sage-grouse habitat on BLM and USFS-managed land (BLM, 2012a). The paper states that the BLM and USFS will focus on two categories of greater sage-grouse habitat including Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH). Areas of PPH or PGH indicate where land-use changes could result in a negative impact to greater sage-grouse population health. The BLM used the NDOW Habitat Categories to determine PPH and PGH habitat types.

PPH comprises areas identified by the BLM as having the highest conservation value for maintaining sustainable sage-grouse populations. These areas include breeding, late brood-rearing, and winter concentration areas. PGH comprises areas of occupied seasonal or year-round habitat outside of priority habitat (BLM, 2012a). According to habitat data provided by NDOW, the Project Area is not located within any mapped greater sage-grouse habitat. The Southpaw Area is located approximately 3.5 miles south of areas that have yet to be categorized and the Logan Pass Area is located approximately seven miles south of areas that have yet to be categorized.

There are no known greater sage-grouse distributions or lek sites in the vicinity of the Project Area (NDOW, 2012a).

3.3.10.2 Impact Analysis

Proposed Action

The Proposed Action would result in the temporary loss of 50 acres. These 50 acres would be reclaimed following the exploration activities. Impacts as a result of the Proposed Action would be similar for all wildlife species encountered in the Project Area. Impacts to wildlife associated with the Proposed Action include temporary habitat loss, temporary auditory or visual irritation of individuals in or near the Project Area, or drowning in sumps. Disturbance associated with the Proposed Action would be short-term and temporary.

Species affected by temporary habitat loss and auditory or visual irritation would likely leave the immediate area and temporarily redistribute to the surrounding areas. After exploration activities have ceased and the area has been reclaimed, these species would be able to return to the area.

Surface disturbance would result in the direct removal of habitat used by wildlife species in the area for forage and cover. Habitat in the surrounding area is similar to that within the Project Area, and those species displaced into the adjacent areas would be able to return following reclamation. Habitat fragmentation would be limited due to the areas disturbed being reclaimed after exploration activities.

A minor increase in traffic would occur that could increase the occurrence of wildlife-vehicle collisions; however, the likelihood of this would be minimized by the speed limit restrictions in the Project Area. Additionally, Aurion would report any wildlife mortalities within the Project Area to the NDOW and BLM wildlife staff.

Sumps would be fenced with safety netting to restrict large mammals; however, smaller rodents and reptiles may still be able to access them. The depth and slopes of sumps would allow for easy access/egress. Sumps are expected to dry quickly; however, in the event that they do not, remaining drilling fluids have the potential to pose a hazard to wildlife. Aurion would work with the BLM to reduce this wildlife hazard by either removing the fluid or backfilling the sump.

No impacts are expected from the Project to species or habitat located in Pahrangat Valley. Pahrangat Valley is located approximately 15 miles southeast of the Project Area.

No Action Alternative

Under the No Action Alternative, dispersed public use in the Project Area would continue. Dispersed recreation may cause displacement of wildlife and wildlife-vehicle collisions by automobiles. The No Action Alternative would have negligible impacts to fish and wildlife.

3.3.11 Soils/Watershed

The analysis area for impacts to soil resources includes the 1,193-acre Project Area. This area was chosen because it represents the area of which impacts to soil resources would be limited to. It was also chosen because the Project Area has little connectivity to outside areas. The nearest known surface water in relation to the Southpaw Area is Springer Spring, which is located over 0.50 miles to the east. The nearest known surface water in relation to the Logan Pass Area is Crescent Spring, which is located over 0.80 miles to the south (USGS, 2013a). There are seven intermittent drainages within the Logan Pass Area and two within the Southpaw Area. Because the water within these drainages occurs at irregular intervals and lasts a short time, primary issues related to soils are limited to impacts in the Project Area and reclamation potential for disturbed areas.

3.3.11.1 Affected Environment

Soils in the Project Area as mapped by the National Resources Conservation Service (NRCS) consist of Logring-Rock outcrop, Logring-Eaglepass-Rock outcrop, and Lien-Devildog associations. Soil units and their location within the Project Area are listed in Table 6. Descriptions of these soil units are provided below and were obtained from the NRCS Web Soil Survey (NRCS, 2013).

Table 6 Soil Units within the Project Area

Soil Unit	Logan Pass Area (acres)	Southpaw Area (acres)	Project Area (acres)	Percent of Project Area
1090 – Logring-Rock outcrop association	747	12	759	63.62
1091 – Logring-Eaglepass-Rock outcrop association	55	273	328	27.49
1220 – Lien-Devildog association	106	-	106	8.89
Total	908	285	1,193	100%

The Logring-Rock outcrop association comprises approximately 63.62 percent of the Project Area. This association occurs at elevations ranging from 6,500 to 8,000 feet AMSL within the eight- to 10-inch precipitation zone. These soils occur on mountains with slopes ranging from 15 to 50 percent. The soil association consists of very gravelly loam, very cobbly loam, and unweathered bedrock derived from colluvium residuum. Soils are well drained and available water capacity is very low (about 1.1 inches).

The Logring-Eaglepass-Rock outcrop association comprises approximately 27.49 percent of the Project Area. This association occurs at elevations ranging from 5,900 to 8,000 feet AMSL within the seven- to 11-inch precipitation zone. These soils occur on mountains with slopes ranging from 15 to 75 percent. The soil association consists of very gravelly loam, very cobbly loam, extremely stony loam, and unweathered bedrock derived from colluvium residuum. Soils are well drained and available water capacity is very low to moderate (about 0.3 to 1.1 inches).

The Lien-Devildog association comprises approximately 8.89 percent of the Project Area. This association occurs at elevations ranging from 5,400 to 6,550 feet AMSL within the eight- to 10-inch precipitation zone. These soils occur on fan remnants and inset fans with slopes ranging from two to 15 percent. The soil association consists of very gravelly sandy loam, very gravelly fine sandy loam cemented material, cemented gravelly loamy fine sand, very gravelly ashy coarse sandy loam, gravelly ashy coarse sandy loam, stratified extremely gravelly coarse sand to very gravelly coarse sandy loam, and gravelly sandy clay loam derived from alluvium from tuff and minor amounts of volcanic ash. Soils are well to excessively drained and available water capacity is very low to low (about 0.5 to 5.1 inches).

Each soil series is evaluated for water and wind erosion hazards. Wind and water erosion hazards become critical issues when protective vegetation is removed during and following surface disturbance activities. Typically, soils found on steeper slopes have a higher water erosion hazard than soils found on gentler slopes. Also, finer grained soils have a greater risk of wind and water erosion than soils with more gravel and/or stones.

Soil hazard factors for fugitive dust, fire damage susceptibility, and soil suitability factors for compaction, restoration, and degradation susceptibility were obtained from the NRCS Web Soil Survey for land management and are provided in Table 7.

Fugitive dust resistance rates the vulnerability of a soil to go into suspension during a windstorm. A rating of low means that soil features are very favorable for dust formation, and a rating of moderate means that soil features are favorable for dust formation.

Fire damage susceptibility ratings represent the relative risk of creating a water repellent layer, volatilization of essential soil nutrients, destruction of soil biological activity, and vulnerability to water and wind erosion prior to reestablishing adequate watershed cover on the burned site. A rating of high means that the soil has one or more features that are favorable to soil damage by fire.

Soil restoration potential rates each soil for its ability to recover from degradation, and can be used to help prioritize areas for restoration projects. Soil restoration potential is dependent upon adequate stores of organic matter, good soil structure, low sodium levels, adequate nutrient levels, adequate precipitation for recovery, and other soil properties. A rating of low means that the soil has one or more features that are unfavorable for recovery, and that poor performance can be expected. A rating of moderate means that the soil has features that are generally favorable for recovery.

Soil compaction resistance ratings can be used to determine the tendency of a soil to reduce water infiltration, which affects plant production and composition, increases surface water runoff, and increases erosion potential. A rating of low means that the soil has features that favor the formation of a compacted layer. A rating of moderate means that the soil has features that are favorable to resisting compaction.

Site degradation susceptibility rates each soil or its susceptibility for soil degradation to occur during disturbance. Resistance to degradation is measured by its ability to function without a change throughout a disturbance. These ratings represent the relative risk of water and wind erosion, salinization, nutrient depletion, and loss of adequate rooting depth. A rating of moderate

means that the soil has features that are very favorable for degradation. A rating of high means that the soil has features that are very favorable for degradation.

Table 7 Soil Hazard and Suitability Factors

Soil Unit	Fugitive Dust Resistance	Fire Damage Susceptibility	Soil Restoration Potential	Soil Compaction Resistance	Site Degradation Susceptibility
1090 – Logring-Rock outcrop association	Low	High	Low	Low	Moderate
1091 – Logring-Eaglepass-Rock outcrop association	Low	High	Moderate	Low	Moderate
1220 – Lien-Devildog association	Moderate	High	Low	Moderate	High

Source: NRCS, 2013

3.3.11.2 Impact Analysis

Proposed Action

The Proposed Action would result in up to 50 acres of surface disturbance. Table 2 outlines the total acreage of proposed surface disturbance for the phased Project, by type of disturbance and corrected for slope.

Fugitive dust is created by the erosion and breakdown of soil particles into very fine material that can be suspended in the air. These fine particles can be lifted into the air by wind and vehicle traffic. The soil properties that affect fugitive dust are the size of surface soil particles, rock fragment content, calcium carbonate equivalent, and aggregate stability. Vehicle road traffic can pulverize soil particles and weak rock fragments into very fine particles known as “bug dust”. The soils in the Project Area have low to moderate resistance to forming fugitive dust; therefore, fugitive dust is expected to be common. The use of water suppression would limit the amount and effects of fugitive dust.

Overall, impacts to soils would be negligible due to the sediment and erosion controls outlined in Sections 2.2.5 and 2.2.9.

No Action Alternative

Under the No Action Alternative, existing use on roads would continue resulting in negligible impacts to soil erosion and stability.

3.3.12 Visual Resources

The analysis area for impacts to visual resources consists of the 1,193-acre Project Area. This area was chosen because it represents the area where impacts to visual resources would likely occur.

3.3.12.1 Affected Environment

Public land within the Project Area is subject to BLM jurisdiction, which has guidelines and criteria to assess visual resources and potential impacts. The BLM is required to designate Visual Resource Management (VRM) classes for all areas of BLM land based on three key elements: scenic quality, sensitivity level, and distance zones. These management classes identify various permissible levels of landscape alteration while protecting the overall visual quality of the regions (BLM, 1986a and 1986b). VRM classes are divided into four levels (Classes I through IV), with Class I designated as most protective of the visual resources. Objectives of these classes vary from very limited modification of the landscape to activities that allow for major landscape modification. Short-term (3 to 5 years) exceptions are allowed if the VRM objectives are met in the long-term (10 to 20 years).

Approximately 1,170 acres of the Project Area is located within an area classified as a VRM Class II. The remaining portions of the Project Area are located on private land; therefore, they do not have a VRM classification assigned. The objective for Class II is as follows:

To retain the existing character of the landscape. The level of change to be characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any change must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. New projects can be approved if they blend in with the existing surroundings and don't attract attention (BLM, 1986a).

Landscape character gives a geographic area its visual image, and consists of a combination of physical attributes that make each landscape unique or identifiable. Landscape character embodies distinct landscape attributes that exist throughout an area. As defined by BLM, landscape character is the “overall impression created by its unique combination of visual features such as land, vegetation, water, and structures as seen in terms of form, line, color, and texture” (BLM, 1986b). The Project Area is located in the Great Basin region of the Basin and Range Physiographic Province. The topography in Basin and Range landscape of southern Nevada is typically characterized by broad, open basins bounded by isolated north-south-trending mountain ranges covered by pinyon-juniper and/or sagebrush vegetation. The Project Area is located in the hills of the Mount Irish Mountain Range.

Landscape in the Project Area is characterized as panoramic, whereas there is little or no “sense of boundary” restriction, and where the foreground and middle ground objects do not substantially impede viewing of background objects. The natural forms of the mountains are pyramidal, whereas the foothills tend to be more rolling and smooth. Vegetation in the area, which consists mainly singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus*

osteosperma), provides relatively uniform coverage on of the area. Throughout the year, colors in the landscape are primarily pinyon-green and brown hues dotted with grey and tan where the ground is visible because the vegetation does not cover the soil surface.

The most dominant features of human origin within the surrounding area include two-track roads that provide access into the Mount Irish mountain range. Vegetation has been cleared in these areas and exposes linear, serpentine shaped, tan hued lines throughout the landscape.

3.3.12.2 Impact Analysis

Proposed Action

In order to determine whether the Proposed Action meets the objectives of VRM Class II, the Proposed Action was evaluated for modifications in visual qualities, namely landform, vegetation, and structure. No permanent water resources are present within the Project Area; therefore, it was not included in this analysis. The principal measure for assessing the degree of visual change is measured through a contrast rating. Based upon the criteria of form, line, color, and texture, this analysis uses the contrast rating as a guide for evaluating changes to the landscape associated with the Proposed Action. Contrast ratings are noted as being none, weak, moderate, and/or strong depending on the degree of change. Proposed Actions having the potential to impact visual resources include road, drill site, and sump construction.

The Proposed Action would result in up to 50 acres of surface disturbance that would require the removal of vegetation at varying levels of degree. Any removal of vegetation would expose bare soil of lighter color and smoother texture than the surrounding areas. This would superimpose visible lines and openings. Existing disturbance currently shows some exposed soils, visible lines, and openings. Visual contrast of color and texture associated with vegetation removal is considered weak since these disturbances would be negligible and would replicate current landscape features. Additionally, the majority of the Project Area consists of pinyon-juniper woodland and varied topography, which has the potential to screen views of the Proposed Action from casual observers. Casual observers of the area would include recreationalists and visitors to the proposed ACEC.

Activities related to the Proposed Action 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. All drill sites, sumps, and constructed roads would be recontoured to approximate the original topography during reclamation. With successful reclamation and revegetation, long-term visual impacts would be minimized. EPMS would aid in protecting the visual quality of the area. The effects of the Project on visual resources would be consistent with Class II objectives. Impacts to visual resources from the Proposed Action are expected to be negligible.

No Action Alternative

No effects to visual resources would be expected as a result of the No Action Alternative.

3.3.13 Land Uses

The analysis area for land use includes the 1,193-acre Project Area. This area was chosen because it represents the area where impacts to land uses would likely occur.

3.3.13.1 Affected Environment

Land Use Plans and Policies

The BLM Ely District RMP DR was approved on August 20, 2008. The RMP provides programmatic and implementable direction for management of BLM administered public lands within the Ely RMP planning area. The RMP provides specific applicable management decisions for each resource that is addressed.

The RMP supports the following federal policies:

- Mining and Minerals Policy Act of 1970;
- Section 102 of the Federal Land Policy and Management Act of 1976; and
- BLM's Mineral and National Energy Policy

The Lincoln County Master Plan (Lincoln County, 2007) was developed to describe the land use patterns and designations of Lincoln County. Approximately 98 percent of Lincoln County's land is administered by public agencies (BLM, United States Department of Defense, USFS, and USFWS). Lincoln County has 14 general land use designations in the plan including agriculture, open space, parks/recreation, public, rural residential, low density residential, medium density residential, high density residential, public facilities, commercial, industrial, mobile home parks, mixed use, and planned unit development. Land designated as Public is for used for grazing, mining, recreation, historic, and cultural values.

In coordination with the Nevada State Land Use Planning Agency, the Lincoln County Public Land Users Advisory Committee (PLUAC) developed the Lincoln County Public Lands Policy Plan (Lincoln County, 2010). This plan was developed through a collaborative effort in order to establish and update the county's vision and policy voice concerning federal land management.

Specific policies relating to development of mineral resources are included in the plan. Policies address items such as the need for careful development of mineral resources while recognizing the need to conserve other environmental resources; supporting of state and federal policy that encourages both large and small-scale operations; the need for mineral operations to be consistent with BMPs for the protection of environmental quality; that mine site reclamation

standards be consistent with the best possible post-mine use for the specific area; and reclamation of mine sites should be coordinated with the county and the PLUAC.

Access

The Southpaw Area can be accessed by traveling approximately 35 miles west on US 93 from Caliente, Nevada to the intersection with SR-318. Turn right on SR-318 and travel for approximately 10.9 miles to the intersection of SR-318 and Mail Summit Road. Turn left and travel west and northwest on Mail Summit Road for approximately 8.5 miles, to the intersection of Mail Summit Road and Silver Canyon Road. Turn left and travel west and southwest on Silver Canyon for approximately 5.7 miles to the intersection between Silver Canyon Road and an unnamed road to the right (west). Turn right on this unnamed road, and travel for approximately 1.9 miles to enter the northern portion of the Southpaw Area. Note that there is a fork in the road at approximately 0.6 mile and the driver should bear left at this fork.

The Logan Pass Area can be accessed by traveling approximately 35 miles west on US 93 from Caliente, Nevada to the intersection with SR-318. Turn right on SR-318 and travel for approximately 0.75 mile before taking the left fork onto SR-375. Travel west on SR-375 for approximately 21 miles, then turn right onto Silver Tank Road. Travel north to northeast approximately 12 miles along this road to enter the western portion of the Logan Pass Area.

Land Use

The Project Area is located in Lincoln County, Nevada. The Southpaw Area is located entirely on public land administered by the BLM Caliente Field Office. The Southpaw Area includes all or portions of Sections 19, 20, 29 and 30, T3S, R59E, MDBM, and encompasses approximately 285 acres. The Logan Pass Area includes part or all of Sections 1, 2, 11, and 12, T4S, R58E; and Sections 6 and 7, T4S, R59E, MDBM. The Logan Pass Area covers approximately 908 acres. The 908 acres that comprise the Logan Pass Area includes approximately 20.6 acres of private land, owned by James Tate. The remaining 887.4 acres are located on public land administered by the BLM Caliente Field Office. Together, the total Southpaw and Logan Pass areas boundary includes approximately 1,193 acres.

Land use authorizations and land tenure information was obtained from BLM's Land and Mineral Legacy Rehost 2000 System (LR2000) for mineral leasing, rights-of-ways (ROWS), and land and mineral title documents, withdrawals and classifications after 1984 (BLM, 2013c). The primary land uses within and adjacent to the Project Area include communication sites; oil and gas leases; mineral exploration; livestock grazing; wildlife habitat; and dispersed outdoor recreation.

The Project Area is located within the proposed Mount Irish ACEC, which is discussed in Section 3.3.9. The nearest residential dwellings are located in Hiko, Nevada. The 2010 census documented 119 individuals living in the community (U.S. Census Bureau, 2010).

Realty

Access onto public lands for other than casual use requires a ROW grant. Casual use may entail travel over existing roads for purposes of sampling, surveying, and activities that do not cause any appreciable disturbance or damage to the public land, resources, or improvements. BLM issues a ROW grant for access on public land for mineral material lease or mining operations under Title V of FLMPA 43 U.S.C 1762 et seq as provided in 43 CFR 2800. LR2000 was searched for ROWs within the Project Area. Table 8 provides a detailed listing of ROWs in the Project Area.

Table 8 Existing Rights-of-Way within the Project Area

Serial Number	Type of Land Use	ROW Holder	Location	ROW Width (total acres)
NVN011779	Communication Site	Lincoln County Telephone System	Section 30, T3S, R59E	0.229 acres
NVN027728	Federal Communication Site	BLM	Section 30, T3S, R59E	0.50 acres
NVN090884	Road	Lincoln County Road Department	Section 11, T4S, R58E	8.00 acres

Source: BLM, 2013c

3.3.13.2 Impact Analysis

Proposed Action

There would be an incremental change in land use due to land associated with the Proposed Action being temporarily unavailable during exploration activities. Recreationists and livestock grazing may observe temporary land restrictions to areas actively being drilled. Also, localized Project activities could temporarily block access on roads to and through the Project Area. Project-related activities would occur over the life of the Project and would be dispersed throughout the Project Area. Exploration activities in the Project Area would restrict visitor use in that specific area; however, improved access to the general area by construction of the exploration roads would be a beneficial impact to hunters, other recreationists, and grazing operators. Additional impacts of road improvements include the potential increase of off-highway vehicle (OHV) activity in the area.

There would be an incremental increase in traffic on US 93, SR-318, and SR-375 during mobilization and demobilization equipment described in Section 2.2.2. A minor increase in daily traffic is not expected to affect traffic conditions on US 93, SR-318, or SR-375. The increased traffic may be considered as a nuisance to local users but it would not affect traffic conditions. Maintenance of access roads would be a benefit to other users such as grazing lease operators

and recreationalists. Public access would be allowed within the Project Area. Additionally, the Proposed Action would not affect any of the existing ROW grants.

Post-reclamation land use of most of the Project Area would be returned to mineral activities, wildlife habitat, livestock grazing, and recreation. These uses would be consistent with local and BLM land use plans and guidelines. Therefore, impacts to land use, access, and realty from the Proposed Action are expected to be negligible.

No Action Alternative

No effects to land use would be expected as a result of the No Action Alternative.

3.3.14 Recreation

The analysis area for impacts to recreation is NDOW Hunt Unit 133, a 115,683-acre area of Nye and Lincoln counties. Hunt Unit 133 was chosen because it encompasses the Project Area and all of the nearby environs, and is actively managed as a whole for hunting.

3.3.14.1 Affected Environment

The Project Area is located within the Caliente Extensive Recreation Management Area, which consists of approximately 3.5 million acres. Recreational use within this area typically consists of hunting, fishing, camping, sightseeing, and wildlife viewing. Management actions are primarily restricted to providing basic information and access to the public, and visitors are expected to rely on their own skill, knowledge, and equipment when conducting recreational activities in the area. The exact number of recreation visits that occur within the Project Area over a given period of time is unknown because of the dispersed nature of the uses that are provided within the area; however, recreational use of the public lands in the BLM Ely District has been consistently increasing (BLM, 2007).

There are no developed recreation resources within the Project Area or its general vicinity. The nearest developed recreation site within Lincoln County is Ash Springs located approximately 16 miles to the southeast. The Ash Springs Recreational Area is managed by the BLM Ely District Office. The site consists of a series of spring-fed mineral pools that provide habitat for endangered fish. The area is used for hiking, picnicking, scenic driving, and wildlife viewing (BLM, 2007).

In 1970, the BLM designated 640 acres to the Mount Irish Rock Art and Archeological District, which is located approximately two miles southeast of the Project Area on land managed by the BLM Ely District Office. The site contains petroglyphs, chipped stone, ground-stone, pottery, and rock shelters. Features at the site consist of two interpretive signs and two registers where visitors can sign in (BLM, 2006). This area has been proposed to be designated as an ACEC in

order to protect and preserve relevant and important cultural values under the Ely RMP (BLM, 2007).

The Mount Irish wilderness area is located approximately 0.5 miles to the south of the Project Area. This area consists of approximately 28,334 acres of public land managed by the BLM Ely District Office. Recreation opportunities within this area include hiking, backpacking, horseback riding, photography, nature study, and hunting. Motorized vehicles are not permitted in the wilderness area (BLM, 2004).

The state of Nevada has been divided into 29 management areas (i.e., hunting areas) for antelope, deer, mountain lion, elk, bighorn sheep, mountain goat, and fur-bearing animals by NDOW. Each hunting area has been further divided into several hunt units by NDOW. The Project Area is located within the boundaries of Hunting Area 13, which is comprised of NDOW Hunt Units 131, 132, 133, and 134. The Project Area occurs entirely within the boundaries of Hunt Unit 133. This unit is open for mule deer, pronghorn antelope, and bighorn sheep hunting (NDOW, 2013b).

NDOW's Key Pittman Wildlife Management Area (WMA) is located approximately 10 miles to the east of the Project Area in Pahrangat Valley. The WMA consists of 1,337 acres that is split into a north area that includes Nesbitt Lake and a south area that contains Frenchy Lake. The area was primarily reserved to preserve wetland habitats for waterfowls and other wildlife species. Recreational uses of the area include wildlife viewing, fishing, hunting, boating, trapping, picnicking, and photography. Camping is not permitted at the WMA. Nesbitt Lake covers approximately 200 surface acres and contains a sport fishery that sustains black bullhead catfish, largemouth bass, white crappie, and bluegill (NDOW, 2012b).

3.3.14.2 Impact Analysis

Proposed Action

The Proposed Action, which includes up to 50 acres of surface disturbance, could have a temporary impact to recreational opportunities in the Project Area. Project-related activities would occur over a 10-year period and would be dispersed throughout the Project Area. These activities could temporarily restrict access to some areas. Restricted access would be short-term.

The Proposed Action would improve access to the general area through maintenance of existing roads and by construction of new roads. This would be a benefit to a variety of recreationalists. Road improvements could increase OHV activity in the area. A temporary change in wildlife movement could occur during active exploration (i.e., exploration drilling and associated traffic). Habitat for big game in the Project Area is similar to habitat available surrounding the Project Area. Species of big game located in the Project Area are similar to species found throughout

the region. Wildlife hunters would likely hunt in nearby areas during periods of active operations if opportunities are temporarily limited in the Project Area.

The Proposed Action would result in negligible impacts to recreation during the Project. Hunting and OHV experiences would be altered during active exploration; however, as the Project moves to different phases and areas, recreational opportunities could improve as access improves. In the long-term, activities such as hunting and OHV riding, as well as other similar activities, would remain at current use levels or possibly increase as access to the area remains the same or improves. These impacts are expected to last until reclamation and revegetation are complete. Therefore, the impacts to recreation from the Proposed Action are expected to be negligible and this resource is not further evaluated in this EA.

No Action Alternative

No effects to land use would be expected as a result of the No Action Alternative.

3.3.15 Public Safety

The area of analysis for public safety includes the Project Area and its access routes. This area was chosen because it incorporates the areas in which there the public would be in relation to activities described in the Proposed Action.

3.3.15.1 Affected Environment

The Project Area is located in a remote and rural area of southern Nevada. There are no residential centers with schools, hospitals, parks, or other meeting places within the Project Area. Users of the area include hikers, hunters, and recreationalists visiting the proposed ACEC. The Project work force would include up to two crews of three drillers each, and three geologists.

3.3.15.2 Impact Analysis

Proposed Action

There are potential impacts to public safety as a result of drill pad and road construction. All equipment would be maintained and unattended sumps fenced. Access to areas being actively explored would be restricted from public access, and staff working on-site would be properly trained for their tasks per MSHA regulations. Aurion would take steps to prevent fires by ensuring that each field vehicle carries hand tools and a fire extinguisher, and water trucks at the Project Area 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. With the enforcement of EPMs outlined in Section 2.2.9.4, there would be no expected impacts to public safety.

No Action Alternative

No effects to public safety would be expected as a result of the No Action Alternative.

3.3.16 Fire Management

The area of analysis for fire management includes the Project Area and its access routes. This area was chosen because it incorporates the areas in which there could be human-caused fire.

3.3.16.1 Affected Environment

The BLM Ely District currently manages planned and unplanned ignitions according to the 2004 Ely Fire Management Plan, which incorporates the *Ely District Managed Natural and Prescribed Fire Plan* (BLM, 2000). The Project Area is in fire management units that allow (to the extent practical for resource benefit) the managed use of wildland fire to improve ecological system function, and to allow fire to function as a natural part of the ecological system.

Approximately 80 percent of fires in Lincoln County are caused by lightning. Approximately 19 percent are human caused, and the remaining one percent is unknown. Human caused ignition sources include burning material thrown out of vehicle windows (such as cigarettes), ignition during automobile accidents, debris lodged under a vehicle, OHV vehicles, arcing power lines, agricultural fires, ditch burning, burn barrels, target shooting, unattended campfires, and fireworks (Resource Concepts, Inc, 2005).

Fires are reported in Lincoln County through 911 calls to the Lincoln County Sheriff's Office, which dispatches volunteer fire department personnel. All wildland fires in Lincoln County are dispatched for BLM and Nevada Division of Forestry firefighters through the Ely Interagency Communication Center. The Lincoln County Sheriff's Office has access to the state mutual aid frequencies, and the radio system is compatible with neighboring agencies (Resource Concepts, Inc, 2005).

The Pahrnagat Valley Volunteer Fire Departments in Alamo and Hiko respond to fires in the western portion of Lincoln County. The BLM Ely District Office has mutual aid agreements with all Lincoln County volunteer fire departments to respond to fires. BLM fire response resources are located at the Caliente and Pony Springs Fire Stations. The Nevada Division of Forestry also fights wildfires in the area (Resource Concepts, Inc, 2005).

The fire ecology of a pinyon-juniper woodland differs from most other vegetation communities found in the area. Pinyon-juniper woodland is characterized by a discontinuous distribution on the landscape that consists of a heterogeneous internal fuel structure. This community creates a mosaic pattern of shrubs and trees that has canopy openings created by small and frequent fires. Both singleleaf pinyon and Utah juniper have thin bark with branches extending from the crown

to the base of the plant. This unique structure often carries ground fires into the crowns of the plant to create a crown fire. Crown fires are the most unsafe and difficult to fight. Typically, fires in this community are too difficult or dangerous to deploy firefighters (Resource Concepts, Inc, 2005).

3.3.16.2 Impact Analysis

Proposed Action

Under the Proposed Action, there would be a risk of human ignition from the following:

- Improper storage or handling of highly flammable materials;
- Ignition of vegetation from the undercarriage of vehicles; and
- Personnel activities such as smoking.

Aurion would take steps to prevent fires by ensuring that each field vehicle carries hand tools and a fire extinguisher. Water trucks at the Project Area 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. Aurion would comply with all applicable state and federal fire laws and regulations and all reasonable measures would be taken to prevent and suppress fires in the Project Area. In the unforeseen event of a fire, Aurion would call 911 and the Pahrnagat Valley Fire District at (775) 725-3774. Impacts to fire management from the Proposed Action are expected to be negligible.

No Action Alternative

Under the No Action Alternative, there would be the potential for risk for users of the area (recreationalists, hunters, etc) to cause ignition due to the following:

- Improper storage or handling of highly flammable materials (including campfires);
- Ignition of vegetation from the undercarriage of vehicles; and
- Activities such as smoking.

Impacts to fire management from the No Action Alternative are expected to be negligible.

3.3.17 Mineral Resources

The analysis area for impacts to mineral resources includes the Project Area. This area was chosen because it represents the area where impacts to mineral resources would be limited to.

3.3.17.1 Affected Environment

The Project Area is located within the Pahrnagat mining district. This area was established in 1865. Historic mining was conducted for manganese, silver, lead, and copper. The district has

also been referred to historically and in literature as Hiko, Irish Mountain, Pahranaagat Lake, Crescent, and Boomerang (Tingley, 1998).

Rocks exposed on Mount Irish include the lower Paleozoic Pogonip Group, the Eureka Quartzite, and the Laketown and Ely Springs Dolomites. These rocks are thought to be part of a major pre-volcanic thrust plate that has overridden the complexly faulted upper Paleozoic rocks exposed on the east side of the mountain. The overridden rocks range from the Guilmette Formation to the Scotty Wash Quartzite. A major zone of north-south trending faults in the area occurs at the thrust and obscures a large overturned fold thought to exist beneath the thrust. The majority of silver and manganese deposits occur in the overthrust Ordovician rocks. The majority of silver deposits are found in the Pogonip Group of rocks below the Eureka Quartzite. The manganese deposits occur in the Ely Springs Dolomite above the Eureka Quartzite. The Eureka Quartzite forms rugged outcrops in the area, specifically on the faces of the upper Sanderson and Silver Canyons. The basal part of the Eureka Quartzite consist of thick, angular breccia mixed with silica and manganese- and iron-oxides (Tingley, 1991; Tschanz and Pampeyan, 1970).

Historic mining in the area followed shear zones of silicified limestone. Jasperoid replacement horizons occur in the limestone along the main silicified structures as well as along other cross-cutting structures. Ore consisted of lenticular zones of iron- and manganese-oxide stained quartz and calcite. The South Paw manganese mine followed gently dipping, pyrolusite-rich replacement lenses in brecciated Ely Springs Dolomite. The orebodies formed along bedding plane faults near the contact between dolomite and the underlying Eureka Quartzite (Tingley, 1991).

3.3.17.2 Impact Analysis

Proposed Action

The Proposed Action would not involve the removal of large amounts of rock other than from drill holes for geochemical testing and geologic study. The Proposed Action would increase the understanding and knowledge of geology and mineralization within the Project Area. Although the Project would result in removal of rock, the amount of rock proposed to be removed is minimal compared to the amount present in the Project Area. Therefore, the impacts to geology and minerals from the Proposed Action are expected to be negligible and this resource is not further evaluated in this EA.

No Action Alternative

No effects to mineral resources would be expected as a result of the No Action Alternative.

3.3.18 Vegetative Resources

The analysis area for impacts to vegetative resources includes the 1,193-acre Project Area. This area was chosen because it represents the area of which impacts to vegetative resources would be limited to.

3.3.18.1 Affected Environment

The Project Area is located in the southern portion of the Central Basin and Range ecoregion of the Intermountain physiographic region. This region is characterized by mountain ranges trending north and south with extensive valleys located between the mountain ranges. This region covers approximately 30,250 square miles in central Nevada.

Biological baseline studies were conducted in June 2012 for the Project Area (Enviroscientists, Inc., 2012). The area is dominated by two vegetation communities including pinyon-juniper woodland and mixed conifer woodland. The distribution of these communities is directly related to the subtle differences in landscape position, aspect, soil texture, and soil moisture. Table 9 presents the total acres of each vegetation community type within the Project Area.

Table 9 Vegetation Communities within the Project Area

Vegetation Community	Project Area (acres)	Percent of Project Area
Pinyon-Juniper Woodland	1,008	84.49%
Mixed Conifer Woodland	185	15.51%
Total	1,193	100.00%

The pinyon-juniper woodland community is found throughout the Logan Pass Area and the northern portion of the Southpaw area. Dominant species consist of singleleaf pinyon and Utah juniper. Shrubs observed in the Project Area include Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*), Utah serviceberry (*Amelanchier utahensis*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), Stansbury cliffrose (*Purshia stansburiana*), and mormon tea (*Ephedra viridis*).

Forbs were interspersed with the shrubs and included Beckwith's milkvetch (*Astragalus beckwithii* var. *purpureus*), Torrey's milkvetch (*Astragalus calycosus* var. *calycosus*), egg milkvetch (*Astragalus oophorus* var. *oophorus*), woollypod milkvetch (*Astragalus purshii*), desert candle (*Caulanthus inflatus*), tapertip hawksbeard (*Crepis acuminata*), rayless shaggy fleabane (*Erigeron aphanactis*), sulphur flower buckwheat (*Eriogonum umbellatum*), scarlet gilia (*Ipomopsis aggregata*), lava aster (*Ionactis alpina*), granite prickly phlox (*Leptodactylon pungens*), tufted evening primrose (*Oenothera caespitosa*), firecracker penstemon (*Penstemon eatonii*), Palmer's penstemon (*Penstemon palmeri* var. *palmeri*), spiny phlox (*Phlox hoodii*), Chambers' twinpod (*Physaria chambersii*), lobeleaf groundsel (*Packera multilobata*), desert

globemallow (*Sphaeralcea ambigua*), and stemless mock goldenweed (*Stenotus acaulis*). Grasses observed within this community include Sandberg bluegrass (*Poa secunda*), Indian ricegrass (*Achnatherum hymenoides*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and squirreltail (*Elymus elymoides*). Succulents observed in this community include plains pricklypear (*Opuntia polyacantha*) and Spanish bayonet (*Yucca harrimaniae*).

The mixed conifer woodland is found in the southern half of the Southpaw Area. Dominant species consist of singleleaf pinyon pine, ponderosa pine (*Pinus ponderosa*), white fir (*Abies concolor*), curl-leaf mountain mahogany, Utah serviceberry, and Wyoming big sagebrush. Forbs were interspersed with the shrubs and included whitemargin sandmat (*Chamaesyce albomarginata*), roughseed cryptantha (*Cryptantha flavoculata*), elkweed (*Frasera speciosa*), scarlet gilia, ballhead gilia (*Ipomopsis congesta*), firecracker penstemon, royal penstemon (*Penstemon speciosus*), mat rockspirea (*Petrophytum caespitosum*), spiny phlox, and Chamber's twinpod. Grasses observed in this community include needle and thread (*Hesperostipa comata*), Sandberg bluegrass, and cheatgrass.

On March 13, 2012, NNHP provided information in a letter regarding endangered, threatened, candidate, and/or at-risk plant and animal taxa recorded within the Project Area and its three-mile radius based on the program's database and maps (NNHP, 2012). During BLM scoping, it was determined that there is also potential for the spinystar (*Escobaria vivipara*), a state-protected cacti. At-risk plant taxa recorded by NNHP and BLM sensitive species are included in Table 10.

Table 10 At-Risk Plant Species within and/or Adjacent to the Project Area

Common Name	Scientific Name	Status
Clokey pincushion	<i>Coryphantha vivipara</i> var. <i>rosea</i>	NNHP: Vulnerable
Watson goldenbush	<i>Ericameria watsonii</i>	NNHP: Vulnerable
Shockley rockcress	<i>Boechera shockleyi</i>	NNHP: Vulnerable
Sheep fleabane	<i>Erigeron ovinus</i>	NNHP: Imperiled BLM: Sensitive Species
Spinystar	<i>Escobaria vivipara</i>	NNHP: None BLM: None

Sources: NNHP, 2012; BLM, 2012b

NNHP vulnerable species are those that are “at moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.” NNHP imperiled species are those that are “at high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, and other factors” (NNHP, 2013b).

None of the at-risk or sensitive species were observed or identified during the 2012 baseline surveys. Forty-five plant species were identified in the Project Area. Riparian and wetlands communities were not observed within the Project Area (Enviroscientists, Inc., 2012).

3.3.18.2 Impact Analysis

Proposed Action

The Project would result in disturbance or removal of up to 50 acres of vegetation over the life of the Project. Direct removal of vegetation would occur within the pinyon-juniper woodland and mixed conifer woodland communities.

The Proposed Action would affect approximately four percent of the vegetation in the Project Area over the life of the Project. Surface disturbance would be dispersed and would be linear and patchy in form. No unique vegetation communities would be removed as a result of the Project. Reclamation would begin upon completion of exploration activities using a BLM-recommended seed mix as outlined in the 2013 Plan and native species would move back into the disturbed areas adding to species diversity. Therefore, the impacts to vegetation from the Proposed Action are expected to be negligible.

Effects to BLM special status species habitat would be minimized through reclamation and the Proposed Action would not result in a permanent or long-term net loss of potential habitat. If potential habitat were disturbed by the Project, effects on local and regional populations would be negligible, temporary, and not expected to contribute to any detectable loss of viability for the for individuals, local populations, or regional populations of these species. Therefore, impacts to BLM special status species from the Proposed Action are expected to be negligible.

No Action Alternative

Under the No Action Alternative, dispersed recreation would remain in the area. There would be the potential for dispersed recreation users and OHV users to trample sensitive species. Additionally, recreationalists camping in the area may use surrounding vegetation, including pinyon and juniper for campfire. These impacts vegetation resources would be negligible.

4.0 CUMULATIVE IMPACTS

4.1 INTRODUCTION

As required under NEPA and the regulations implementing NEPA, this section analyzes potential cumulative impacts from past, present, and reasonably foreseeable future actions combined with the Proposed Action within the area analyzed for impacts in Chapter 3 specific to the resources for which cumulative impacts may be anticipated. A cumulative impact is defined as “the impact which results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7).

Environmental consequences of the Proposed Action and alternatives are described in Chapter 3. No cumulative impacts to air quality, cultural resources, rangeland standards and guidelines, Native American Religious Concerns, hazardous or solid wastes, water quality, special status animal species, special status plant species, grazing uses/forage, recreation, visual resources, public safety, land uses, fire management, or mineral resources are anticipated; therefore, a cumulative analysis for these resources was not conducted.

Based on the analysis in Chapter 3, 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:

- Migratory Birds;
- Invasive, Non-native Species;
- Heritage Special Designations (ACECs);
- Wildlife;
- Soils/Watershed; and
- Vegetative Resources.

The geographic extent of cumulative impacts varies by the type of resource and impact. The timeframes, or temporal boundaries, for those impacts may also vary by resource. Three different spatial and temporal cumulative effects study areas (CESAs) have been developed and are listed with their respective acreage in Table 11. Table 11 also includes the figure number on which the geographic extent of the CESA is shown.

Table 11 Cumulative Effects Study Areas

Resource	Cumulative Effects Study Areas		
	Name	Acres	Description
Vegetation Resources	Vegetation, Invasive-Non-native Species, and Soils CESA	22,412	Immediate watershed drawn around the Project boundary using topographical features (Figure 6)
Invasive, Non-native Species			
Soils/Watershed			
Heritage Special Designations (ACEC)	ACEC CESA	15,075	Mount Irish Area ACEC (Figure 7)
Migratory Birds	Wildlife and Migratory Birds CESA	1,156,834	NDOW Hunt Unit 133 (Figure 8)
Wildlife			

4.2 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Information utilized in the cumulative impacts assessment was gathered from the BLM’s LR2000 and the Nevada Atlas and Gazetteer. The LR2000 database was queried for authorized multiple land use activities, pending ROW grants, mineral and non-mineral exploration and mining permits, and natural catastrophic events. Table 12 outlines the quantifiable actions considered in the cumulative impacts analysis.

The timeframe for past, present, and RFFAs begins with the earliest recorded data on the LR2000 report and extends into the future to correspond with the life of the proposed Project including reclamation. The past, present, and RFFAs discussed in the following sections have occurred or may occur in numerous geographic locations and therefore, could have impacts to resources within the various CESAs.

Past and present activities in the three CESAs include the following:

- Livestock grazing and range improvements;
- Agriculture;
- Urban development;
- Recreation (dispersed used, OHV, Christmas tree cutting);
- Road construction and maintenance;
- Utilities infrastructure including water and irrigation facilities, utility lines (power lines, fiber optic lines, and telephone lines), and railroads;
- Oil and gas exploration;

- Mineral development and exploration including Notice-level exploration (minerals activities on BLM administered land with less than five acres of surface disturbance) and Plans of Operations, metal and non-metal mining projects, and sand and gravel operations; and
- ROWs for projects including communication, federal aid highway, material sites, mineral exploration, oil and gas, power lines, roads, telephone, water/irrigation facility, wind and geothermal, and other undefined projects.

Mineral exploration in the Project Area began in the 1860s (primarily for silver) and has continued sporadically to the present. Typical historical exploration and mine workings in the area include prospect pits, trenches, adits, and shafts. Modern exploration commenced with Phelps-Dodge Corporation in the early 1980s. Records are scarce; however, it is known that Phelps-Dodge Corporation drilled approximately eight holes in the Logan Pass Area in search of economic base metals. In the early 1990s, BHP Minerals conducted a gold exploration program, also in the Logan Pass Area, which included 15 reverse circulation drill holes using a combination of overland and constructed access. Reclamation of their disturbances appears to have been completed within a year or two after drilling.

Acreage disturbance amounts associated with agriculture, urban development, recreation and public purpose, road construction and maintenance, utilities, oil and gas exploration, mineral development, and ROWs, were obtained from information from LR2000 and are presented in Table 12.

RFFAs are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends. According to LR2000, there are RFFAs within the Wildlife and Migratory Bird CESA including sand and gravel operations, power lines, and telephone and communication facilities (Table 12).

Table 12 Past, Present, and Reasonably Foreseeable Future Actions for the Logan Pass Project Cumulative Effects Study Areas

CESA	Types of Activity										
	Oil and Gas Exploration ¹	Federal Aid-Highway	Sand and Gravel Material Sites	Mineral Exploration and Mining Operations	Agriculture	Power Lines	Urban Development	Recreation and Public Purpose	ROW-Roads	Telephone and Communication Facilities	Water / Irrigation Facility
Past and Present Actions – Surface Disturbance Acres											
Wildlife and Migratory Birds	36	4,702	2,098	142	178	1,260	155	80	1,070	348	312
Vegetation, Invasive Weeds, and Soils	NA	NA	NA	77	NA	NA	NA	NA	188	4	1
ACEC	NA	NA	NA	77	NA	NA	NA	NA	126	4	1
Reasonably Foreseeable Future Actions – Surface Disturbance Acres											
Wildlife and Migratory Birds	0	NA	5	NA	NA	610	NA	NA	NA	10	NA
Vegetation, Invasive Weeds, and Soils	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACEC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

¹ Oil and gas disturbance acres are based on an estimated three acres of surface disturbance for each well site within the CESA.

4.3 CUMULATIVE IMPACT ANALYSIS BY RESOURCE

4.3.1 Vegetation

4.3.1.1 Proposed Action

Surface-disturbing activities result in a loss of vegetation and impacts to plant communities and habitat. Impacts from past and present actions within the 22,412-acre CESA include 270 acres of surface disturbance activities with alterations to the plant communities, including the introduction of invasive, non-native species. This is approximately 1.2 percent of the CESA. Reclamation of past and present minerals-related disturbance (at least portions of the 77 acres) has likely converted the vegetation to native grass and forb species found within the existing vegetation communities. Reclaimed and seeded areas have likely resulted in stable plant communities with densities that are similar to the pre-disturbance plant densities. There are no identified RFFAs within the CSEA for vegetation.

The Proposed Action would disturb an additional 50 acres of vegetation, which is approximately 0.2 percent of the CESA. This comprises an 18.5 percent addition to the past, present, and reasonably foreseeable surface disturbance identified above. This contribution would be localized and impacts would be minimized from implementation of EPMs and BMPs. Since reclamation would occur concurrently, not all 50 acres associated with Project-related disturbance would be disturbed simultaneously which would reduce impacts to vegetation in terms of total cumulative acres of disturbance at one time.

4.3.1.2 No Action Alternative

Total surface disturbance under the No Action Alternative would be limited to the 270 acres of disturbance caused by the past, present, and RFFAs described above. According to LR2000, 142 of the 270 acres are associated with mineral exploration and mining. The present actions and RFFAs associated with mineral operations are subject to reclamation requirements, which would reduce impacts to vegetation in the CESA.

4.3.2 Invasive, Non-native Species

4.3.2.1 Proposed Action

Surface-disturbing activities that remove native vegetation provides the opportunity for the introduction and spread of invasive, non-native species. Impacts from past and present actions within the 22,412-acre CESA include 270 acres of surface disturbance activities and vegetation removal. This is approximately 1.2 percent of the CESA. Impacts from these activities include the increased potential to introduce invasive, non-native species or spread existing populations of invasive, non-native species. The extent of these impacts varies with the type of activity. Reclamation of at least portions of past and present minerals-related disturbance (77 acres) has likely reduced impacts from invasive, non-native species. There are no identified RFFAs within the CSEA for invasive, non-native species.

The Proposed Action would disturb an additional 50 acres of vegetation, which is approximately 0.2 percent of the CESA. This comprises an 18.5 percent addition to the past, present, and reasonably foreseeable surface disturbance identified above. This contribution would be localized and impacts would be minimized from implementation of EPMs and BMPs. Reclamation would occur concurrently, which would re-establish native vegetation and reduce impacts from invasive, non-native species.

4.3.2.2 No Action Alternative

Total surface disturbance under the No Action Alternative would be limited to the 270 acres of disturbance caused by the past, present, and RFFAs described above. According to LR2000, 142 of the 270 acres are associated with mineral exploration and mining. The present actions and RFFAs associated with mineral operations are subject to reclamation requirements, which would reduce impacts from invasive, non-native species in the CESA.

4.3.3 Soils

4.3.3.1 Proposed Action

Surface-disturbing activities that remove vegetation and topsoil would adversely affect soil. Impacts would depend on the amount, placement, and type of surface disturbance, the type of soil, and its characteristics. Specific impacts to soils could include removal of vegetation, exposure of soil, mixing of soil horizons (layers), soil compaction, loss of productivity, and increased susceptibility to wind and water erosion. Impacts from past and present actions within the 22,412-acre CESA include 270 acres of surface disturbance activities with resulting changes in soil physical properties, soil movement in response to water and wind erosion, and compaction. This is approximately 1.2 percent of the CESA. Reclamation of past and present minerals-related disturbance (at least portions of the 77 acres) has reduced erosion potential from some of these disturbances. There are no identified RFFAs within the CSEA for soils.

The Proposed Action would disturb an additional 50 acres of soils, which is approximately 0.2 percent of the CESA. This comprises an 18.5 percent addition to the past, present, and reasonably foreseeable surface disturbance identified above. This contribution would be localized and impacts would be minimized from implementation of EPMs and BMPs. Soil salvaged and used in reclamation would become viable and would be expected to return to pre-disturbance productivity once vegetation was established. Since reclamation would occur concurrently, not all 50 acres associated with Project-related disturbance would be disturbed simultaneously which would reduce impacts to soils in terms of total cumulative acres of disturbance at one time.

4.3.3.2 No Action Alternative

Total surface disturbance under the No Action Alternative would be limited to the 270 acres of disturbance caused by the past, present, and RFFAs described above. According to LR2000, 142 of the 270 acres are associated with mineral exploration and mining. The present actions and RFFAs associated with mineral operations are subject to reclamation requirements, which would reduce impacts to soils in the CESA.

4.3.4 ACECs

4.3.4.1 Proposed Action

Surface-disturbing activities could result in impacts to cultural resources within the ACEC. Impacts could occur to historic or prehistoric sites in the ACEC. Impacts from past and present actions within the 15,075-acre CESA include 208 acres of surface disturbance activities associated with minerals activities, ROWs, telephone and communication facilities, and a water/irrigation facility. It is unlikely that any of these activities have impacted cultural resources directly within the ACEC. Indirect impacts to cultural resources may have occurred with increased public access and resulted in vandalism. There are no identified RFFAs within the Mount Irish ACEC.

The Proposed Action would disturb an additional 50 acres; however, there are no impacts to cultural resources anticipated from the Proposed Action since Aurion has committed to avoidance of known cultural resources. Indirect impacts to cultural resources from visual setting would be minimized by concurrent reclamation. Not all 50 acres associated with Project-related disturbance would be disturbed simultaneously, which would reduce impacts to visual setting of cultural resources in the CSEA in terms of total cumulative acres of disturbance at one time.

4.3.4.2 No Action Alternative

Total surface disturbance under the No Action Alternative would be limited to the 208 acres of disturbance caused by the past, present, and RFFAs described above. Potential effects to cultural resources within the ACEC from these activities on BLM-administered land would have been considered under Section 106 of the NHPA as part of the permitting process for each project.

4.3.5 Wildlife

4.3.5.1 Proposed Action

Land-disturbing activities adversely affect wildlife indirectly by decreasing foraging and nesting habitat by removing vegetation, affecting prey base, decreasing quality of habitat by human presence, or directly by mortality from vehicular collisions. Excavations and drilling activities may directly impact burrowing species, such as rodents, resulting in individual mortality. Impacts from past and present actions within the 1,156,834-acre CESA include 10,381 acres of surface disturbance activities. This is approximately 0.9 percent of the CESA. Reclamation of

past and present minerals-related disturbance (at least portions of the 142 acres) has likely converted the vegetation to native grass and forb species found within the existing vegetation communities and in time, reclaimed and seeded areas would result in stable plant communities with densities that are similar to the pre-disturbance plant densities, which provide wildlife habitat.

There are approximately 625 acres of RFFAs identified within the CSEA for wildlife. The disturbance is associated with sand and gravel sites (5 acres), power lines (610 acres), and telephone and communication facilities (10 acres). Impacts to wildlife habitat from these actions would be similar to those described for past and present actions. Together, past, present, and reasonably foreseeable surface disturbance would total 11,006 acres (approximately 1 percent of the CESA).

The Proposed Action would disturb an additional 50 acres of habitat, which is less than 0.004 percent of the CESA. This comprises a 0.5 percent addition to the past, present, and reasonably foreseeable surface disturbance identified above. This contribution is negligible and would be localized and impacts would be minimized from implementation of EPMs and BMPs. Since reclamation would occur concurrently, not all 50 acres associated with Project-related disturbance would be disturbed simultaneously which would reduce impacts to wildlife habitat in terms of total cumulative acres of disturbance at one time.

4.3.5.2 No Action Alternative

Total surface disturbance under the No Action Alternative would include 11,006 acres of disturbance caused by the past, present, and RFFAs described above. According to LR2000, 142 of the 11,006 acres are associated with mineral exploration and mining. The present actions and RFFAs associated with mineral operations are subject to reclamation requirements, which would reduce impacts to wildlife habitat in the CESA.

4.3.6 Migratory Birds

4.3.6.1 Proposed Action

Land-disturbing activities adversely affect migratory birds indirectly by decreasing foraging and nesting habitat by removing vegetation, affecting prey base, decreasing quality of habitat by human presence, increasing habitat edges from fragmentation and reducing cover for some migratory bird species, making them more vulnerable to predators and cowbird parasitism, or directly by mortality from vehicular collisions. Impacts from past and present actions within the 1,156,834-acre CESA include 10,381 acres of surface disturbance activities. This is approximately 0.9 percent of the CESA. Reclamation of past and present minerals-related disturbance (at least portions of the 142 acres) has likely converted the vegetation to native grass and forb species found within the existing vegetation communities and in time, reclaimed and

seeded areas would result in stable plant communities with densities that are similar to the pre-disturbance plant densities, which provide migratory bird habitat.

There are approximately 625 acres of RFFAs identified within the CSEA for migratory birds. The disturbance is associated with sand and gravel sites (5 acres), power lines (610 acres), and telephone and communication facilities (10 acres). Impacts to migratory bird habitat from these actions would be similar to those described for past and present actions. Together, past, present, and reasonably foreseeable surface disturbance would total 11,006 acres (approximately 1 percent of the CESA).

The Proposed Action would disturb an additional 50 acres of migratory bird habitat, which is less than 0.004 percent of the CESA. This comprises a 0.5 percent addition to the past, present, and reasonably foreseeable surface disturbance identified above. This contribution is negligible and would be localized and impacts would be minimized from implementation of EPMs and BMPs. Since reclamation would occur concurrently, not all 50 acres associated with Project-related disturbance would be disturbed simultaneously, which would reduce impacts to migratory bird habitat in terms of total cumulative acres of disturbance at one time.

4.3.6.2 No Action Alternative

Total surface disturbance under the No Action Alternative is associated with approximately 11,006 acres of disturbance caused by the past, present, and RFFAs described above. According to LR2000, 142 of the 11,006 acres are associated with mineral exploration and mining. The present actions and RFFAs associated with mineral operations are subject to reclamation requirements, which would reduce impacts to migratory bird habitat in the CESA.

5.0 CONSULTATION AND COORDINATION

5.1 INTRODUCTION

The issue identification section of Chapter 1 provides the rationale for issues that were considered but not analyzed further and identifies those issues analyzed in detail in Chapter 3. The issues were identified through the public and agency involvement process described in Sections 5.2 and 5.3.

5.2 PERSONS, GROUPS, AND AGENCIES CONSULTED

Name	Purpose & Authority for Consultation or Coordination	Findings and Conclusions
Nevada SHPO	Consultation for undertakings as required by the National Historic Preservation Act (16 USC 1531)	The cultural survey report was sent to SHPO with a determination of no adverse effect. No response was received within 30 days from the submission of any of the reports. Consultation is therefore considered to be closed.
Duckwater Shoshone Tribe of the Duckwater Reservation, Nevada	AIRFA, NHPA, NEPA, Executive Order 13175, Executive Order 12898, BLM Manual 8120, BLM Handbook H-8120-1	On February 5, 2013, the BLM initiated consultation with the Tribe. The BLM received a response on February 21, 2013, requesting a site visit. A site visit was conducted. No additional concerns from the Tribe were identified. Consultation is on-going.
Skull Valley Band of Goshute Indians of Utah	AIRFA, NHPA, NEPA, Executive Order 13175, Executive Order 12898, BLM Manual 8120, BLM Handbook H-8120-1	On February 5, 2013, the BLM initiated consultation with the Tribes. No responses were received. Consultation is on-going.
Ely Shoshone Tribe of Nevada		
Confederated Tribes of the Goshute Reservation, Nevada-Utah		
Paiute Indian Tribe of Utah		
Indian Peaks Band		
Shivwits Band of Paiutes		
Cedar City Band of Paiutes		
Kaibab Band of Paiute Indians of the Kaibab Indian reservation, Arizona		
Moapa Band of Paiute Indians of the Moapa River Indian Reservation, Nevada		
Las Vegas Paiute Tribe of the Las Vegas Indian Colony		
Battle Mountain Band Council		
Te-Moak Tribe of the Western Shoshone Indians of Nevada		
Wells Band Council		
South Fork Band Council		
Elko Band Council		
Yomba Shoshone Tribe of the Yomba Reservation, Nevada		

5.3 SUMMARY OF PUBLIC PARTICIPATION

During preparation of the EA, internal BLM scoping was conducted. The draft EA will be posted on the BLM website for public review. A public comment period will be offered on the draft EA.

5.4 LIST OF PREPARERS

5.4.1 BLM

Name	Title	Responsible for the Following Section(s) of this Document
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Todd Trapp	Wildlife Biologist	Wildlife, Migratory Birds, Special Status Species
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Emily Simpson	Outdoor Recreation Planner	Wilderness and Lands with Wilderness Characteristics
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5.4.2 Non-BLM Preparers

Name	Title	Responsible for the Following Section(s) of this Document
Kristi Schaff	Project Manager	Technical review
Walter Martin	Assistant Project Manager	Chapter 2, conformance with Plan of Operations
Diana Eck	Resource Specialist	Chapters 3, 4,5
Michele Lefebvre	Resource Specialist	Chapters 3, 4,5
Dulcy Engelmeier	Administrative Assistant	Editorial review

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FIGURES
