# CHAPTER 3
# AFFECTED ENVIRONMENT

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# Chapter 3 Affected Environment

## 3.1 Introduction

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources that have the potential to be affected by activities related to the Proposed Action and action alternatives discussed in Chapter 2. These resources include those that occur within, are adjacent to, or are associated with the Plan of Operations (Plan) boundary (i.e., Proposed Action and action alternative footprints, as well as those identified during the scoping process (Section 1.7). The analysis is divided into three sections under each resource. The first area is that which would contain the mine and associated facilities, south of Interstate 80 (I-80) and south of the Oasis exit (Exit 378). The second area is the linear corridor through which the power supply pipeline to power the project would be buried. The third area is that in which the municipal water supply facilities (i.e., wells, pumps, access roads) for Wendover, Utah and West Wendover, Nevada (Cities) would be located, and the proposed new water supply facilities would be constructed. The areas that are evaluated for potential cumulative effects are described in Chapter 5.

## 3.2 Water Resources

This section describes surface water (streams), springs, groundwater, and geochemistry of the areas that may be affected by the Proposed Action or an action alternative. Wetlands are described separately in Section 3.3.

The Proposed Action and all alternatives would occur within the Great Basin, in several closed basins that are typical of the region. More specifically, the areas that would be disturbed under the Proposed Action and all alternatives are located within the northern part of Hydrologic Unit Code (HUC) 16060008 and the southern part of HUC 16020307 (Figure 3.2-1). The HUC 16060008 is designated as the Spring-Steptoe Valleys sub-basin within the Central Nevada Desert Basin; the HUC 16020307 is designated as the Pilot-Thousand Springs, Nevada, Utah sub-basin within Great Salt Lake Basin.

### 3.2.1 Areas of Analysis

#### 3.2.1.1 Proposed Action

**Mining and Processing Facilities**

The Proposed Action area of analysis for surface water resources (streams and ponds) encompasses the area within the Plan boundary (Figure 2.2-1); the small drainage basins that are within or intersect the boundary; and their receiving streams (Sixmile and Hardy creeks). This area as defined includes portions of the Pequop Mountains and Goshute Valley.

For groundwater resources (groundwater and springs), the areas of analysis for the Proposed Action includes the uppermost alluvial/basin fill aquifer and carbonate bedrock aquifer;

associated areas of groundwater discharge (springs) within the Johnson Springs system located within the northern part of the Goshute Basin (hydrographic area 187), and groundwater flow associated with the range-front fault system (described in Section 3.3.3.1 under Structural Geology).

**Power Supply Pipeline**

The area of analysis for surface water resources also includes the southern part of the power supply pipeline corridor that overlaps the area within the Plan boundary (Figure 2.2-1); the proposed corridor as it continues northeast and then north to the existing Ruby Pipeline (Figure 2.2-8); and the drainage channels that the corridor intersects. This includes portions of Goshute and Tecoma valleys.

For the power supply pipeline, the area of analysis for groundwater extends into the Thousand Springs Valley/Montello-Crittenden Creek Area (hydrographic subarea 189D) and includes a buffer of 1,000 feet adjacent to the pipeline in this area.

**Cities' Water Supply**

For the Cities' water supply, the area of analysis for surface water resources is adjacent to the south boundary of the Plan boundary (encompassing Section 21, T35N, R66E), the contributing upgradient drainage areas, and the downgradient lands up to and including the Hardy Creek channel.

The area of analysis for the Cities water supply also includes groundwater units associated with the:

- Johnson Springs system, which includes Big Springs, located entirely within and adjacent to the Plan boundary;
- Shafter well field, located approximately 4.5 miles to the east of the Plan boundary;
- Area including the new proposed water supply wells for the Cities in Section 21, T35N, R66E that would be installed by Newmont Mining Corporation (Newmont) to replace the water currently used by the Cities from the Johnson Springs system (i.e., Big Springs); and
- Location of the new production and potable wells to be installed by Newmont for mining operations.

#### 3.2.1.2 North Facilities Alternative

The North Facilities Alternative area of analysis for surface water resources (streams and ponds) encompasses the area within the proposed North Facilities Alternative project boundary (Figure 2.3-1); the small drainage areas that are within or intersect the boundary; and their receiving streams (Sixmile and Hardy creeks). As defined, it includes portions of the Pequop Mountains and Goshute Valley. This area of analysis is the same as was previously described for the Proposed Action (Figure 2.2-1).

**Figure 3.2-1 Regional Surface Water Features**

The groundwater area of analysis for the North Facilities Alternative is the same as for the Proposed Action. The North Facilities Alternative also includes the proposed new municipal water supply wells to be installed by Newmont for the Cities to replace water currently used from Big Springs and the new mine production and potable wells, as described in the Proposed Action.

#### 3.2.1.3 No Action Alternative

The area of analysis for surface water resources, groundwater, and springs occurs within the approved exploration Plan boundary.

### 3.2.2 Data Sources and Methodology

#### 3.2.2.1 Proposed Action

**Mining and Processing Facilities**

**Surface Water**

Data sources used for the surface water analysis are the National Hydrography Dataset (NHD) (USGS, 2013b); other published state and federal information; and information obtained and compiled by Newmont's consultants, as listed below:

- Global Hydrologic Services Inc. (GHS). 2010. Hydrology Baseline Data Report for Northern Goshute Valley Elko County, NV. Prepared for Fronteer Development (USA) Inc. August 2010.
- Golder Associates. 2012. Hydrogeologic Characterization, Long Canyon Newmont USA Limited. Report 113-81813. March 8, 2012.
- JBR Environmental Consultants, Inc. (JBR). 2013b. Waters of the United States Jurisdictional Determination Long Canyon Project Elko County, Nevada. Draft. Prepared for Newmont Mining Corporation. January 2013.
- Nevada Division of Environmental Protection (NDEP). 2013. 2008-2010 Integrated Report. Accessed February 20, 2013 online at: http://ndep-emap.nv.gov/AssessedWaters/default.aspx
- Nevada Division of Water Resources (NDWR). 2012. Water Rights Home, Water Rights Database. Accessed February 20, 2012 online at: http://water.nv.gov/waterrights/
- Newmont Mining Corporation (Newmont). 2014a. Long Canyon Project DRAFT Fluid Management System Operating Plan, Water Pollution Control Permit was submitted to NDEP BMRR March 2014. Contains the Long Canyon Tentative Plan for Permanent Closure. Provided by Newmont Mining Corporation.
- SRK Consulting, Inc. (SRK). 2014b. Memo with subject “SRK Response to EPA Comments on the SRK Long Canyon Geochemistry Report. Prepared for Newmont Mining Company. June 11, 2014.
- United States Geological Survey (USGS). 2013b. National Hydrography Dataset. Accessed February 11 and 12, 2013 online at: http://nhd.usgs.gov/index.html

- United States Geological Survey (USGS). 2013c. National Water Information System: Web Interface. Accessed February 12 and 13, 2013 online at: http://waterdata.usgs.gov/nv/nwis

**Groundwater**

Existing hydrogeologic characteristics of the areas of analysis were determined from the following investigations:

- Golder Associates. 2012. Hydrogeologic Characterization, Long Canyon. Newmont USA Limited. Report 113-81813. March 8, 2012.
- Golder Associates. 2013a. 2012 Long-Term Aquifer Pumping Test Results and Projected Mine Water Supply Analysis, Long Canyon. March 11, 2013.
- Golder Associates. 2013b. *2013 Long Canyon Basin Groundwater Flow Model*. Report 133-81702. August 21, 2013.
- Golder Associates. 2013c. Long Canyon Groundwater Supply Model. Report 133-81702. September 25, 2013.
- Golder Associates. 2014. Long Canyon Groundwater Supply Model. Report 133-81702. Revision 3.
- Global Hydrologic Services, Inc. (GHS). 2010. Hydrologic Baseline Data Report for North Goshute Valley, Elko County, Nevada. August 2010.
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- Aqua Engineering, Inc. 2001. Drinking Water Source Protection Plan for the City of West Wendover.
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- SRK Consulting, Inc. 2013a. Geochemical Characterization and Predictive Modeling for the Long Canyon Project, Nevada. Prepared for Newmont Mining Corporation. November 2013.

The locations of the monitoring wells/piezometers installed in the Plan boundary, wells at the Big Springs Ranch, wells from the Nevada Division of Water Resources (NDWR) database, the Shafter well field wells, the Johnson Springs system, and the area proposed for the new water supply wells for the Cities are shown on Figure 3.2-2.

**Figure 3.2-2 Long Canyon Area Well Locations and Cross-Sections**

A summary of the aquifer test on the Big Springs Ranch irrigation well (BSR-1) is provided in the *Report on the Big Springs Ranch Well Aquifer Test* (Barnett et al., 2011b). Golder (2012) conducted a reassessment of the aquifer test analysis conducted by others in their *Hydrogeologic Characterization Report,* on behalf of Newmont. Another aquifer test was conducted at BSR-1 by Golder in 2012; the results of the test are provided in Golder (2013a). Consultants working for Newmont used the results from aquifer tests to characterize the groundwater properties of the bedrock and alluvial aquifers near the proposed mining operations. Standard techniques for evaluating these field investigations were applied and the descriptions and findings of these efforts were included in reports that were provided to the Bureau of Land Management (BLM). The results of the aquifer tests were documented as follows:

- Shafter production wells #1 through #5 (Aqua Engineering, Inc., 2001);
- Shafter well #6 production well (Neeley et al., 2009);
- Bedrock aquifer production well (LCPW-01) (Barnett et al., 2011a);
- Big Springs Ranch irrigation well (BSR-1) (Barnett et al., 2011b); and
- Second aquifer test at BSR-1 (Golder, 2013a).

Data collected during the field investigations were used by Golder (2012 and 2013a) in the development of a numerical groundwater flow model using the United States Geological Survey (USGS) software package MODFLOW (McDonald and Harbaugh, 1988). The model was used to provide quantitative predictions of the impacts to groundwater flow due to future mine supply and municipal water supply pumping, as described further in Chapter 4. Groundwater samples collected during the field investigation were used to characterize the water quality in both aquifers and to assess groundwater flow characteristics using isotope analysis (Mayo, 2013). The information in these reports was reviewed by the BLM and JBR Environmental Consultants, Inc. (JBR) groundwater specialists for use in this Environmental Impact Statement (EIS).

The principal hydraulic characteristics determined for aquifer units in the Plan boundary are hydraulic conductivity, transmissivity, and storage. The hydraulic conductivity (K) of material comprising an aquifer is a measure of the material's capacity to transmit water as defined by the volume of water that will move in a unit of time, under a unit hydraulic gradient, through a unit area. The transmissivity (T) is the rate at which water is transmitted through a unit width of the saturated thickness of the aquifer under a unit hydraulic gradient. For a given uniform material, hydraulic conductivity and transmissivity are related by the expression:

$$T = Kb$$

Where: $T$ is transmissivity (length$^2$/time),
$K$ is horizontal hydraulic conductivity (length/time), and
$b$ is thickness of the aquifer (length).

The storage coefficient (S) is defined as the volume of water that an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in hydraulic head. In a confined aquifer, the water released from storage when the head declines comes from expansion of the water and compression of the aquifer and is commonly referred to as storativity (Heath, 1983). In an unconfined aquifer, the storage term is referred to as specific yield and is a ratio (less than or equal to the effective porosity) between the volumetric fraction of the bulk aquifer volume to the total volume that a given aquifer will yield when all the water is allowed to drain out of it under the forces of gravity (Heath, 1983).

**Geochemistry**

SRK (2012 and 2013a) has completed on behalf of Newmont a geochemical characterization program to investigate the potential for development of acid rock drainage and metal leaching (ARDML) from the waste rock and heap leach facilities associated with the Long Canyon Project. As part of this study, SRK conducted predictive geochemical calculations to assess the source term chemistry associated with the proposed waste rock storage facility (WRSF) and mine pit, and evaluated the potential of these facilities to impact groundwater. Protocols applied in this study are in compliance with guidance documents from both BLM and the Nevada Division of Environmental Protection (NDEP). BLM Instruction Memorandum No. NV-2010-014 clarifies the rock and water resources data information that needs to be collected under Code of Federal Regulation (CFR) 43 CFR 3809.401(b)(2) and 3809.401(c)(1). NDEP requires geochemical testing under the Water Pollution Control Permit (WPCP) program and associated Nevada Administrative Code (NAC) 445A regulations (SRK, 2012 and 2013a).

Samples were taken from drill core recovered during drilling activities completed for the exploration program. One hundred and sixty-six sample intervals were selected from within the proposed pit boundaries to represent the waste rock material types that will be encountered during mining. The resulting sample dataset is spatially representative of the main waste rock material types identified for the Long Canyon deposit under the Plan (SRK, 2012 and 2013a). In addition, samples representative of spent ore material were collected from the metallurgical test program for testing (SRK, 2012 and 2013a).

The testing program included static testing (to evaluate the absolute potential of the Long Canyon materials to generate acid and leach deleterious constituents) and kinetic testing (to simulate long-term weathering behavior). Static methods included the following:

- Multi-element analysis using four-acid digest and ICP-MS analysis;
- Modified Sobek Acid Base Accounting (ABA);
- Net Acid Generation (NAG) test; and
- Meteoric Water Mobility Procedure (MWMP).

Kinetic testing was performed using the standard humidity cell test procedure according to American Society for Testing and Materials (ASTM) method D-5744-96. Combining the results of these tests estimated the potential for waste rock and spent heap ore to generate acid leachate and to mobilize metals or other constituents.

SRK (2013a) also conducted laboratory attenuation testing. The purpose of this testing was to predict site-specific attenuation of certain metals and metalloids (specifically mercury and arsenic) through unsaturated alluvium along the flow path toward groundwater. Samples that represent the alluvial stratigraphic profile collected within the footprint of the mine facilities were used for the testing. Two types of attenuation tests were used: batch tests and column tests. Only the results for the batch tests are available and discussed here. Column tests were undertaken "to confirm the capacity of alluvium in the Project Area to attenuate metals or metalloids" (SRK, 2013b) and are ongoing. If results of the column tests indicate a substantially lower capacity for constituent attenuation in the alluvium, the results would be taken into account in facility design and operation.

The batch attenuation test was used to assess the degree to which a chemical species will be removed from solution (permanently or temporarily) as the fluid migrated through alluvial material from the Plan boundary. The degree of partitioning between the liquid and solid phases under a certain set of conditions for species of interest is evaluated by determination of the attenuation coefficient or distribution coefficient ($K_d$), as follows:

$$K_d = \frac{\text{Mass of solute on the solid phase per unit mass of solid phase}}{\text{Mass of solute in solution per unit volume of the liquid phase}}$$

The batch test consisted of a series of batch sorption experiments where a solution of known concentration was spiked with specific concentrations for the two species of interest (SRK, 2013a). The spike concentrations bracketed the concentrations expected in the actual system. The solution and solid were allowed to react for seven days after which the solution was decanted and analyzed. After analysis of the liquid, the $K_d$ value was calculated as the difference between the concentrations in the initial solution and in the final solution after reaction.

The results show that arsenic and mercury, and to a lesser extent antimony and thallium, have a potential to be attenuated by the site alluvial soils, as shown on Figure 3.2-3. The attenuation of each of these constituents is generally greater than 50 percent as shown on Figure 3.2-4, further demonstrating the attenuation capacity of the site soils. The average $K_d$ values (arsenic is 23.4 liters per kilograms (L/kg), and mercury is 91.6 L/kg) were incorporated into the PH-REdox-EQuilibrium-Chemistry (PHREEQC, Parkhurst and Appelo, 1999) geochemical model to account for attenuation of constituents along the flow path to groundwater, as summarized in Section 4.2, and described in detail in SRK (2013a). Given the low amount of recharge assumed for the WRSF, SRK (2013a) estimates that it would take more than a thousand years for the attenuation capacity of the alluvium to be consumed.

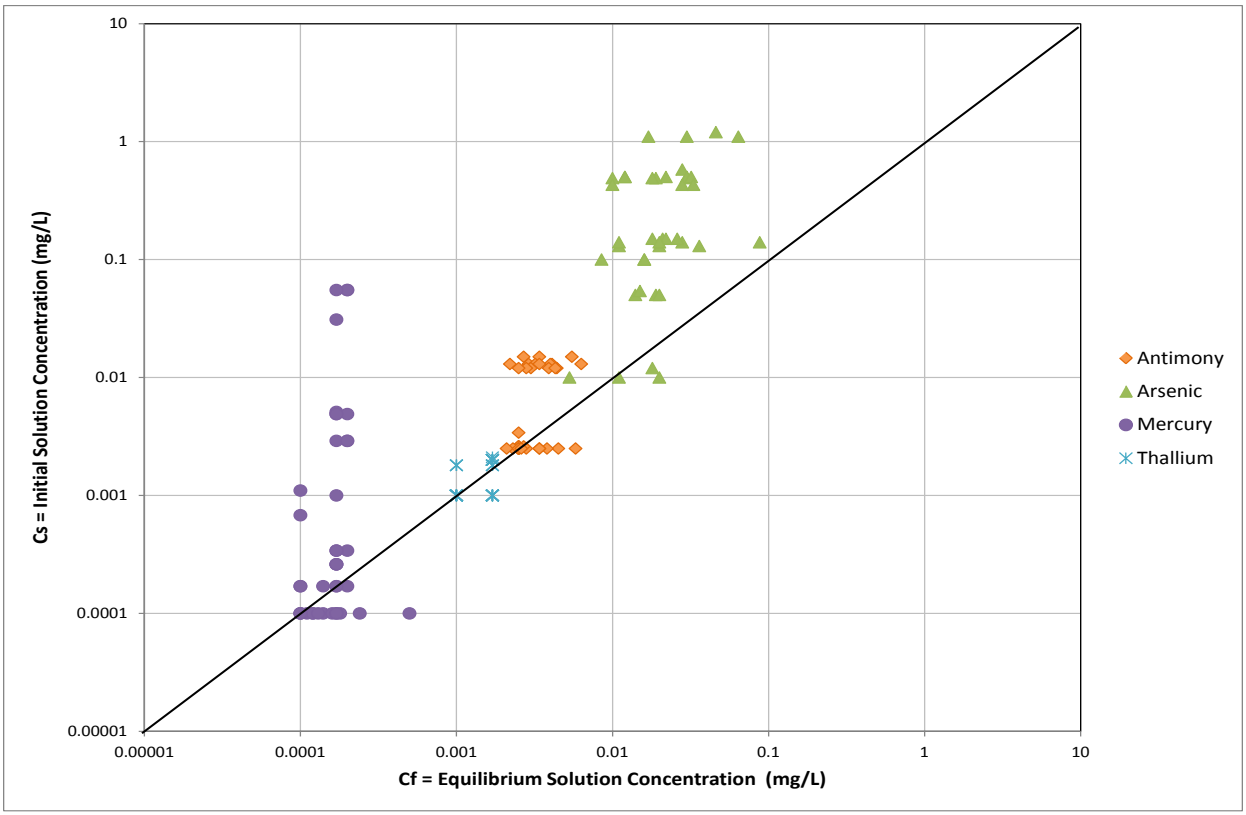


**Figure 3.2-3 Geochemical Batch Test, Initial Solution Concentration versus Final Solution Concentration**

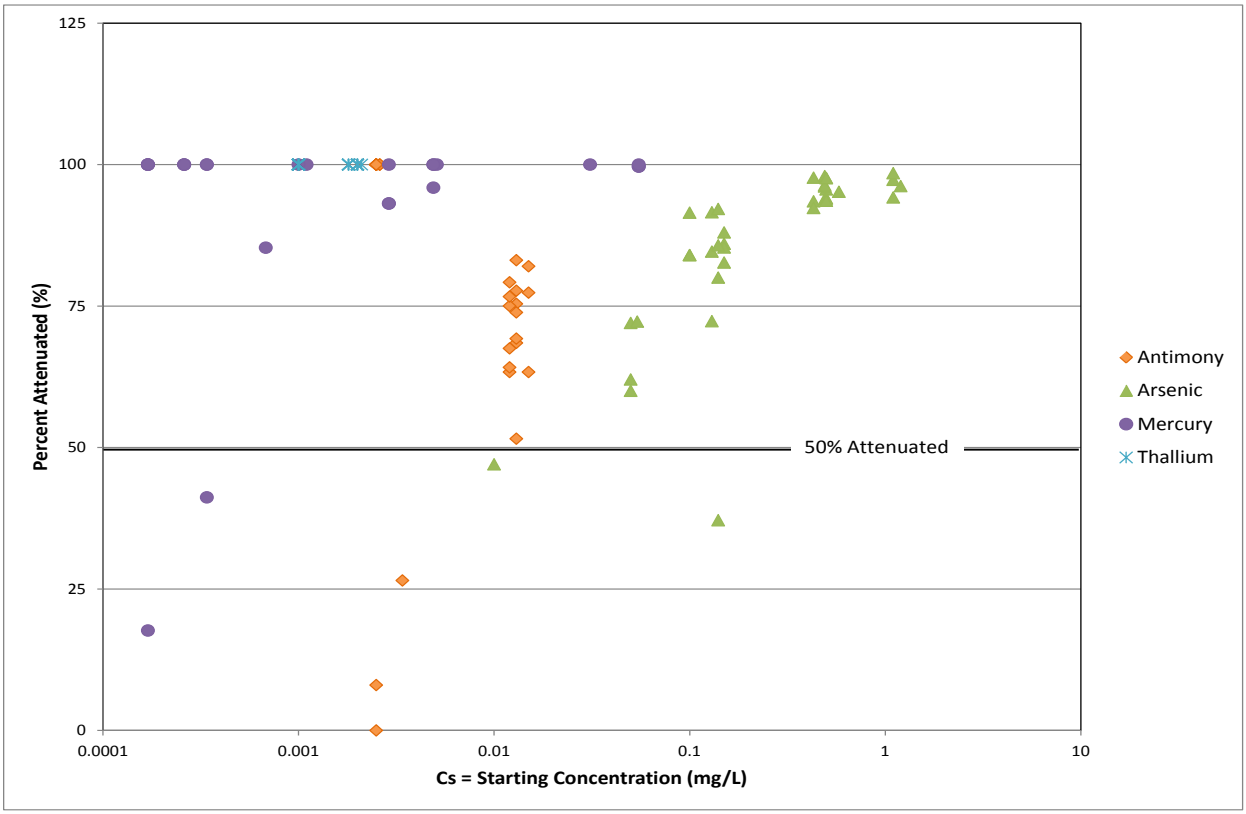


**Figure 3.2-4 Geochemical Batch Test, Percent Attenuated**

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities.

#### 3.2.2.2 North Facilities Alternative

Data sources used for the surface water analysis (not including wetlands and springs) are the NHD (USGS, 2013b); other published state and federal information; and information obtained and compiled by consultants to Newmont (see list under Section 3.2.2.1). Methods used were the same as for the Proposed Action.

The data sources for groundwater and springs for the North Facilities Alternative are the same as for the Proposed Action.

#### 3.2.2.3 No Action Alternative

Data sources used for the surface water analysis (not including wetlands and springs) are the NHD (USGS, 2013b); other published state and federal information; and information obtained and compiled by consultants to Newmont. Methods used were the same as for the Proposed Action.

The data sources for groundwater and springs for the No Action Alternative are the same as for the Proposed Action.

### 3.2.3 Existing Conditions

#### 3.2.3.1 Proposed Action

**Mining and Processing Facilities**

**Precipitation**

Precipitation monitoring at the proposed mining and processing facilities area began in 2010; and is insufficient to describe precipitation trends and patterns for the drainage basins and hydrologic analysis. A more site-specific discussion of Plan boundary climate is found in the air resources section (Section 3.6). Golder (2012) used regional data (which correlated well with the site data) in order to estimate longer-term precipitation characteristics at the facilities area. Their analysis considered records obtained from the Elko (9.60 inches annually), Wells (9.85 inches), Oasis (8.74 inches), and Pequop (12.30 inches) stations. Generally, most precipitation in the region occurs in winter and spring, and the least in July, August, and September. Spatially, it typically varies with elevation, as reflected in the data from the aforementioned sites. Newmont began measuring precipitation at the proposed mining and processing facilities area in 2011. This more local, but short-term, unpublished data set indicates an annual precipitation of about 8.8 inches (Newmont, 2013a).

Golder (2012) also assessed other climate characteristics at the proposed mining and processing facilities area, including temperature and evaporation. Typical of the Great Basin, temperatures fluctuate widely and, like precipitation, often vary with elevation. Based on the Oasis weather station data, the mining and processing facilities area experiences July averages of 88 degrees Fahrenheit (°F) and 44°F for daily high and low temperatures, respectively. January averages of 37°F and 11°F. Annual free water surface evaporation was estimated to be approximately 39 inches (Golder, 2012).

**Surface Water**

Existing surface water conditions in the analysis area for the proposed mining and processing facilities are influenced by precipitation patterns and by groundwater. Streams within the analysis area are discussed below. There are no lakes or playas relevant to the Proposed Action.

Most of the streams in the analysis area are unnamed, small, and ephemeral; their channel cross sections tend to lose definition as they cross alluvial fans along the margins of the Goshute Valley basin fill. The three named channels in the analysis area (Hardy Creek, Long Canyon, and Sixmile Creek) are discussed separately below.

Hardy Creek is the primary stream channel draining the northern part of Goshute Valley (Figure 3.2-5). The stream heads at the outflow of the Johnson Springs system, which includes Big Springs and numerous other smaller springs that issue within the analysis area along the eastern front of the Pequop Range (springs are discussed separately below). A small dam spans the stream channel approximately one mile downstream of where the spring outflows coalesce. The dam appears to support an irrigation diversion from the channel's west bank. Several unnamed channels also drain the east slopes of the Pequop Mountains within the Plan boundary, conveying flows intermittently or ephemerally toward, but not all the way to, Hardy Creek.

The USGS (2013b) considers Hardy Creek to be a perennial stream from its origin at the spring outflow for a distance approximately three miles downstream. GHS (2010) indicates that there are gaining reaches in this stream segment, but that downgradient stream flows gradually infiltrate into the basin fill and are consumed through evapotranspiration. Some reaches of Hardy Creek are mapped as anastomosing (i.e., multiple channels with vegetated banks and islands, relatively stable laterally). The creek ends upstream of an unnamed, dry terminal basin located approximately three miles downstream of the southern boundary of the proposed project, presumably because gradient and stream flows decrease to the point at which a channel can no longer be maintained. There are no known stream flow records for Hardy Creek. However, monitoring at the spring complex that supports Hardy Creek may on occasion reflect both spring discharge and storm runoff, as was noted for a measured flow of almost 1.2 cubic feet per second (cfs) in June 2009 (GHS, 2010). Details on spring flow at this location are provided in the Johnson Springs System section below.

**Figure 3.2-5 Local Surface Water & Springs Features**

The Long Canyon drainage basin (Figure 3.2-5) is located on the east side of the Pequop Range almost entirely within the Plan boundary. Water that falls into the Long Canyon drainage basin forms the upper reaches of the Long Canyon channel, which have been dammed below Long Canyon Spring (presumably to form a stock watering pond). The pond has not been observed to contain water year-round, nor to have a sustained outflow (USGS, 2013b). The Long Canyon channel is mapped as intermittent or ephemeral (USGS, 2013b). Long Canyon channel is tributary to Hardy Creek. However, there is no surface connection between the two (USGS, 2013b). Instead, Long Canyon's channel dissipates as it exits the canyon and crosses the alluvial fan (USGS, 2013b). There are no known stream flow records for the Long Canyon channel.

A small portion of the northwest side of the proposed Plan boundary, as well as the northern and northeastern portions, is within the Sixmile Creek drainage area. Sixmile Creek flows north out of the Pequop Mountains and then east and then south along the range front (Figure 3.2-5). It continues south through Goshute Valley heading into the Plan boundary and towards Hardy Creek. It stops short of Hardy Creek though it would technically be tributary to it (USGS, 2013b). Sixmile Creek is mapped as intermittent or ephemeral throughout its length. There are no known stream flow records for Sixmile Creek.

Golder (2012) delineated what they call four "major mountain block watersheds" near the Long Canyon project. Two of these represent the topographically defined watersheds of Long Canyon and Sixmile Creek, terminating at or near where their respective channels lose definition. The other two represent complexes of small, unnamed drainages: the East Mountain Front mountain block watershed includes several drainages that originate west of the proposed mining and processing facilities area; and the North Mountain Front mountain block watershed includes several drainages that trend north-northeast between the East Mountain Front and the Sixmile Creek areas. Golder's (2012) purpose for defining these watersheds was to develop runoff estimates using precipitation and watershed characteristics; the runoff estimates were then used to develop a groundwater budget for northern Goshute Valley (groundwater is discussed below). From a surface water perspective, their analysis showed that there has been no runoff from these four mountain block watersheds in many years (Golder, 2012). Their data also show that the Long Canyon and Sixmile Creek watersheds produce about 0.004 acre-feet per acre of runoff in an average year, while the East Mountain Front and North Mountain Front watersheds average annual runoff rates are higher, but still low (0.010 and 0.008 acre-feet per acre, respectively). According to a waters of the United States (WOUS) study completed for the Plan boundary, there are no jurisdictional drainages within the area studied (JBR, 2013b). Newmont received a concurrence of the finding of no jurisdictional waters from the ACOE on November 12, 2014 (USACOE, 2014). It is not known whether WOUS are associated with other streams (e.g., Sixmile Creek) and other reaches of studied channels that extend outside of the Plan boundary but are within the analysis area for the mining and processing facilities area.

Johnson Springs System

The Johnson Springs system is the only perennial spring and surface water source near the Plan boundary (Golder, 2012). The Johnson Springs system is located in the north-central

portion of the Plan boundary and represents groundwater discharge along the eastern flank of the Pequop Mountains. The springs result in localized perennial surface water flows located in Sections 22, 27, 28, 33, and 34, T36N, R66E (Figure 3.2-5).

The Johnson Springs system extends approximately 1.3 miles north-northeast of Big Springs where groundwater discharges to form many smaller springs along the alignment of the north-south trending range front faults (Figure 3.2-5). The elevations of the discharge points for the smaller springs are all lower than the Big Springs discharge point, ranging between 5,651.07 feet above mean sea level (AMSL) at Central Spring and 5,674.95 feet AMSL at the Extreme Northern Spring (Golder, 2012). It is possible that there are discharge points at lower elevations, especially in the form of gaining reaches in the headwaters of Hardy Creek (GHS, 2010).

Fifteen measurements of the cumulative discharge from the Johnson Springs system, excluding Big Springs, were made between March 2009 and September 2011, at a point where the flow of the smaller springs becomes naturally channelized in NW¼ SE¼, Section 27, T36N, R66E (Figure 3.2-5) forming the headwaters of Hardy Creek. Measured flows at this point range between 264 gallons per minute (gpm) and 529 gpm, with an average flow of approximately 395 gpm (Golder, 2012), but flow from Big Springs may influence the measured flow of the combined smaller springs. The flow rates of the numerous smaller springs of Johnson Springs system have not been individually measured. The largest measured spring discharges were typically in June. The measuring point was at least one-half mile downstream of the spring orifices, thus considerable water may be lost upstream due to evapotranspiration, infiltration, and other factors.

A hydraulic head differential of 10 to 20 feet between deep wells in the carbonate aquifer west of the range front fault and the shallow wells in the basin fill alluvial aquifer east of the aquifer suggests that the range front fault is an impediment to groundwater flow between the carbonate and valley fill aquifers (Golder, 2012 and 2014). However, the stable isotopic data and the calculated mean residence times for tritium and $^{14}C$ results suggest that the carbonate aquifer is a major source of groundwater recharge for the basin fill alluvial groundwater system and for the discharges in the Johnson Springs system including Big Springs (see Environmental Isotopes section below). One possible explanation for this apparent contradiction would involve the flow of groundwater into the mountain front alluvial sediments from vertically moving groundwater along the range front fault zone. Groundwater encountering the range front faults could include a mixture of shallow modern groundwater recharge and deeper carbonate aquifer water, which could then be the groundwater source of the Johnson Springs system as well as underflow into the basin fill aquifer. Where such a mountain front fault does not exist or does not have continuous segments, direct hydraulic communication between the carbonate aquifer and the basin fill aquifer is also possible.

*Big Springs*

Big Springs is the largest spring and principal discharge point for the Johnson Springs system. Big Springs discharges from the SW¼ of the SE¼ of Section 28, T36N, R66E, at an elevation of

5,681.25 feet AMSL, this elevation represents the top of the water at the weir constructed at Big Springs (Golder, 2012). Approximately one cfs of the flow at Big Springs is immediately diverted for use by the Cities for municipal purposes. Big Springs is also permitted for use by Big Springs Ranch; however, it is not known to what extent or how often water from Big Springs is actually diverted by the ranch. Aerial photography from 1969 to 2013 indicate that only a small portion of available water is occasionally diverted to irrigate crops (primarily hay) within the permitted place of use. Most available water appears to support riparian vegetation in channels and meadows that existed before ranching began in the valley. There is no evidence that water from Big Springs reaches Hardy Creek other than when the ranch releases excess water to it, which has not happened in recent years (Anderson, 2014; Golder, 2012; GHS, 2010). Two hydrology reports suggest that Hardy Creek has gaining reaches (i.e., groundwater inflow) below where water from the combined Johnson Springs system north of Big Springs form the headwaters of Hardy Creek (GHS, 2010; Golder, 2012), but no studies have been performed to verify this or determine if any of this water is from Big Springs. Hardy Creek flows up to three miles downstream (to the east and then south) before the water is consumed by vegetation, lost to evaporation, or infiltrates into the underlying basin fill sediments (Golder, 2012).

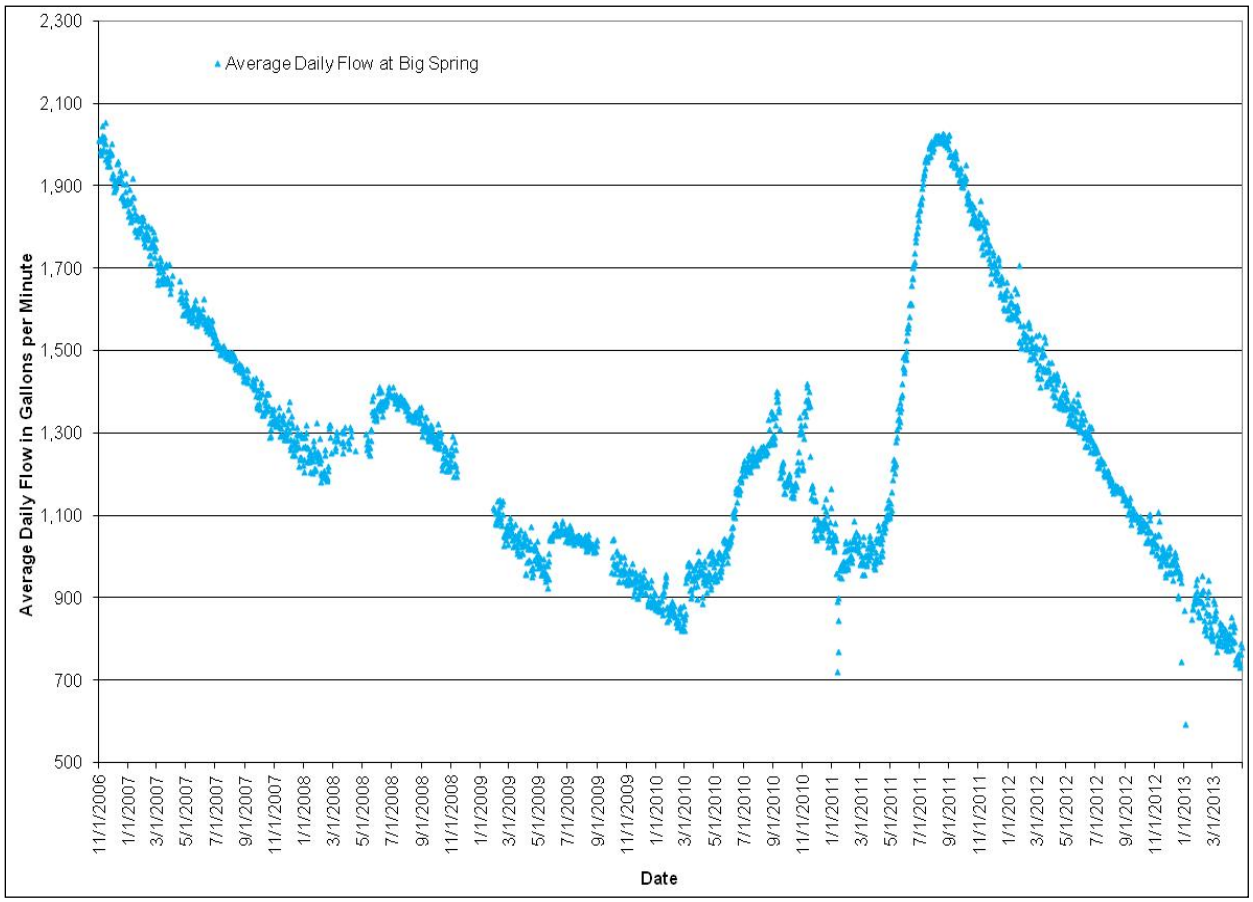


**Figure 3.2-6 Average Daily Flow Rate, Big Springs**

Based on continuous flow meter data collected by the Cities between November 2006 and April 2013, the flow of Big Springs varies naturally due to changes in the distribution and quantity of precipitation and/or snowmelt in the recharge areas upgradient from the spring (Golder, 2012). As shown on Figure 3.2-6, flow of Big Springs has varied from a high of 2,053 gpm (daily average flow on November 14, 2006) to less than 900 gpm (daily average flow on December 31, 2012). Flow generally decreased from November 2006 through March 2010 with temporary increases interrupting this trend in July 2008 and 2009. The next peak flow (over 2,000 gpm) occurred in August 2011 and the flows trended downward since October 2011. The daily average flow for the period between November 1, 2006 and December 31, 2012, was approximately 1,300 gpm. On an annual basis, the daily average flow rates ranged between approximately 1,010 gpm in 2009 to 1,530 gpm in 2007 (Appendix 3A, Big Springs Flow Data spreadsheet). More recent flow readings from 2013 are 445 gpm in October; 420 gpm in November; and 400 gpm in December, all of which reflect the drought conditions experienced in 2013.

*Long Canyon Spring*

Long Canyon Spring, an ephemeral water feature, is associated with glacial deposits. The spring is located within the upper portion of the Long Canyon watershed in the western portion of the Plan boundary, in the SW¼ of the NE¼ of Section 30, T36N, R66E and is perched well above the bedrock groundwater at an elevation of approximately 7,200 feet AMSL (Golder, 2012). The outflow of the spring consists of a metal pipe that discharges into a series of metal troughs for use by livestock or wildlife.

Ephemeral surface flows from the Long Canyon Spring are generally only observed after heavy precipitation events or during/after periods of snowmelt. The Long Canyon Spring has been observed flowing from May 2011 through June 2012, possibly associated with the heavy snowpack in the winter of 2010/2011 and the subsequent recharge associated with the snowmelt. Flow at the Long Canyon Spring measured at approximately 0.4 gpm on October 25, 2011 (Golder, 2012). In 2013, flows at Long Canyon Spring occurred between January and May (Stefka, 2013).

***Groundwater***

Two major hydrogeologic units have been identified within the Plan boundary (Golder, 2012). From youngest to oldest, they are:

- Basin Fill/Alluvial Aquifer – comprised of Cenozoic basin fill within the Goshute Valley. The basin fill consists of Quaternary and Tertiary alluvial deposits along the valley margins and Quaternary pluvial lake deposits within the interior portions of the valley.

- Carbonate Bedrock Aquifer – comprised of Cambrian through Devonian limestone and dolomite, and Pennsylvanian and Permian carbonate rock located within the Pequop Mountains and Toano Range. Within the Plan boundary, the carbonate bedrock aquifer is comprised primarily of the Cambrian Notch Peak Formation and the Ordovician Pogonip Group.

In addition to the two major hydrogeologic units, a range front fault (basin-mountain bounding fault system) separates a portion of the upper basin fill aquifer from the carbonate bedrock aquifer near the Johnson Springs system and the proposed mine pit (Golder, 2012).

Previous hydrogeologic investigations have included the installation of 15 basin fill aquifer wells, 15 carbonate bedrock aquifer wells, and eight dual-completion wells. The relationship between the hydrogeologic units and structural geology in the Plan boundary are shown in the hydrogeologic cross sections A-A' through C-C' (Figures 3.2-7, 3.2-8, and 3.2-9). The locations of the cross sections are shown on Figure 3.2-2. The following sections provide a summary of the hydrogeologic characteristics of the two aquifer units and the basin-bounding fault system found within the Plan boundary.

Basin Fill Aquifer

The basin fill aquifer is an unconfined/semi-confined groundwater system found within the basin fill deposits in the Goshute Valley. The extent of the basin fill is shown on Figure 3.2-10, with thicknesses ranging from less than 100 meters at the margins of the valley and the eastern portion of the Plan boundary to a maximum thickness of approximately 2,000 meters (6,560 feet) in the center of the valley (Wright, 2012). The rapid thickening of the basin fill along the east side of the Pequop Mountains and Plan boundary is produced by the primary basin bounding range-front faults in this area (Golder, 2012). Groundwater flow within the basin fill deposits is believed to be continuous with groundwater that flows through remnant alluvial fan deposits that emanate to the east from the Pequop Range. The presence of low permeability clay and silt units beneath the wetlands areas are believed to form a perching layer immediately below the wetlands and may inhibit flow between the surface water body and the underlying basin fill aquifer (Golder, 2012).

Based on basin-wide measurements in August 2011, groundwater flow within the basin fill aquifer is away from the mountain fronts along the east and west margins of the Goshute Valley, where precipitation is greatest, toward the center of the basin and downstream channels in the lower part of the valley to the south, as shown on Figure 3.2-11 (Golder, 2012). Based on groundwater level measurements within the Plan boundary during October 2012, groundwater within the basin fill aquifer flows east/southeast, as shown on Figure 3.2-12. A steep groundwater gradient in the vicinity of the range-front faults and Johnson Springs system and a decrease of the gradient to the east with increasing distance from the faults and springs are evidence that groundwater flow is influenced by the range-front faults. A drop of the groundwater elevations of several tens of feet from west to east across the faults indicates the presence of a low hydraulic conductivity zone associated with the range-front faults (Golder, 2012).

The groundwater elevation contours shown on Figure 3.2-6 indicate that overall groundwater gradients within the basin fill aquifer appear to be relatively gentle (average of about 0.007 feet per linear foot [ft/ft]) in the central part of the valley, with steepening gradients present near the mountain fronts on both sides of the valley associated with zones of mountain-front recharge

(Golder, 2012). Groundwater gradients in the vicinity of the Plan boundary generally range between approximately 0.004 ft/ft within the north and west portions of the Plan boundary to approximately 0.15 ft/ft on the east side of the Plan boundary near the mountain range fronts. Groundwater gradients within the Shafter well field are observed to be influenced by pumping, particularly in the vicinity of Shafter well #6 (Golder, 2012).

Basin Fill Hydraulic Properties

Hydraulic property estimates for the basin fill aquifer were obtained from aquifer pumping tests conducted on the individual Shafter production wells (Aqua Engineering, Inc., 2001; Neeley et al., 2009) and BSR-1 (Barnett et al., 2011b; Golder, 2013a) (Figure 3.2-2). Additionally, single-well slug tests were conducted on the wells within the Long Canyon groundwater monitoring network (Golder, 2012).

A summary of the aquifer hydraulic property estimates for the basin fill aquifer are provided in Appendix 3A, Aquifer Property Estimates spreadsheet. Transmissivity estimates for the basin fill aquifer range between approximately 2.3 x 104 and 1.8 x 106 square feet per day ($ft^2$/day) in the Plan boundary (in the vicinity of BSR-1), and between approximately 1.4 x 103 and 1.9 x 103 $ft^2$/day in the vicinity of the Shafter well field (Golder, 2013a). A representative transmissivity value for the aquifer was identified as 5.2 x 104 $ft^2$/day (Golder, 2013a). Estimates of aquifer storativity within the basin fill aquifer range between 2.8 x 10-4 and 1.6 x 10-1, with the higher end estimates determined during the 2012 aquifer test. The lower transmissivities in the vicinity of the Shafter well field are associated with the finer-grained sedimentary strata comprised primarily of alluvial fan deposits, lake beds, eolian deposits, and some interbedded air-fall tuffs that are common along the western edge of the Toano Range. Based on these transmissivity estimates and an assumed aquifer thickness of 800 feet, calculated hydraulic conductivities range between approximately 29 and 1,200 feet per day (ft/day) (Golder, 2013a), with a representative value of 65 ft/day. This assumed aquifer thickness is conservative, considering that the geophysical model developed by Newmont shows the basin fill thickness ranging between approximately 300 meters (980 feet) in the vicinity of BSR-1 to approximately 1,200 meters (3,900 feet) in the vicinity of Shafter well #6 (Figure 3.2-5). Estimated vertical anisotropies within the basin fill range between 0.24 and 0.56. Hydraulic conductivity estimates from slug tests conducted in basin fill wells range between 0.04 and 188 ft/day, which are overall lower than the estimates determined from the pumping tests, and may be associated with lower permeability materials existing near the center of the Goshute Valley (Golder, 2013a). A supplemental analysis (Golder, 2013a) also indicated that a possible hydraulic boundary associated with the range-front faults is present at a distance of approximately 2,500 feet west of observation wells LCMW-18 and LCMW-20 (Figure 3.2-2).

**Figure 3.2-7 Hydrogeologic Cross-Section A-A'**

**Figure 3.2-8 Hydrogeologic Cross-Section B-B'**

**Figure 3.2-9 Hydrogeologic Cross-Section C-C’**

**Figure 3.2-10 Basin Fill Thickness, Northern Goshute Valley**

**Figure 3.2-11 Basin Fill Aquifer, Basin-Wide Potentiometric Surface Map, October 2012**

**Figure 3.2-12 Basin Fill Aquifer, Project Area Potentiometric Surface Map, October 2012**

Basin Fill Groundwater Level Trends

Groundwater level trends in the 15 basin fill aquifer wells between May 2009 and November 2012, showed groundwater elevations were highest at wells located to the west of the range-front faults (about 5,681 feet AMSL) and lowest (about 5,569 feet AMSL) near the center of the Goshute Valley and approximately 8,100 feet to the west of the Shafter well field (well #6) (Figure 3.2-13). With the exception of well TW-01, the hydrographs show very minor water level fluctuations in the basin fill wells throughout the monitoring period (generally less than 2 feet) (Golder, 2012). TW-01 is located approximately 60 feet from Shafter well #6 and the groundwater level fluctuations observed in this well reflect pumping variability in the Shafter well field wells.

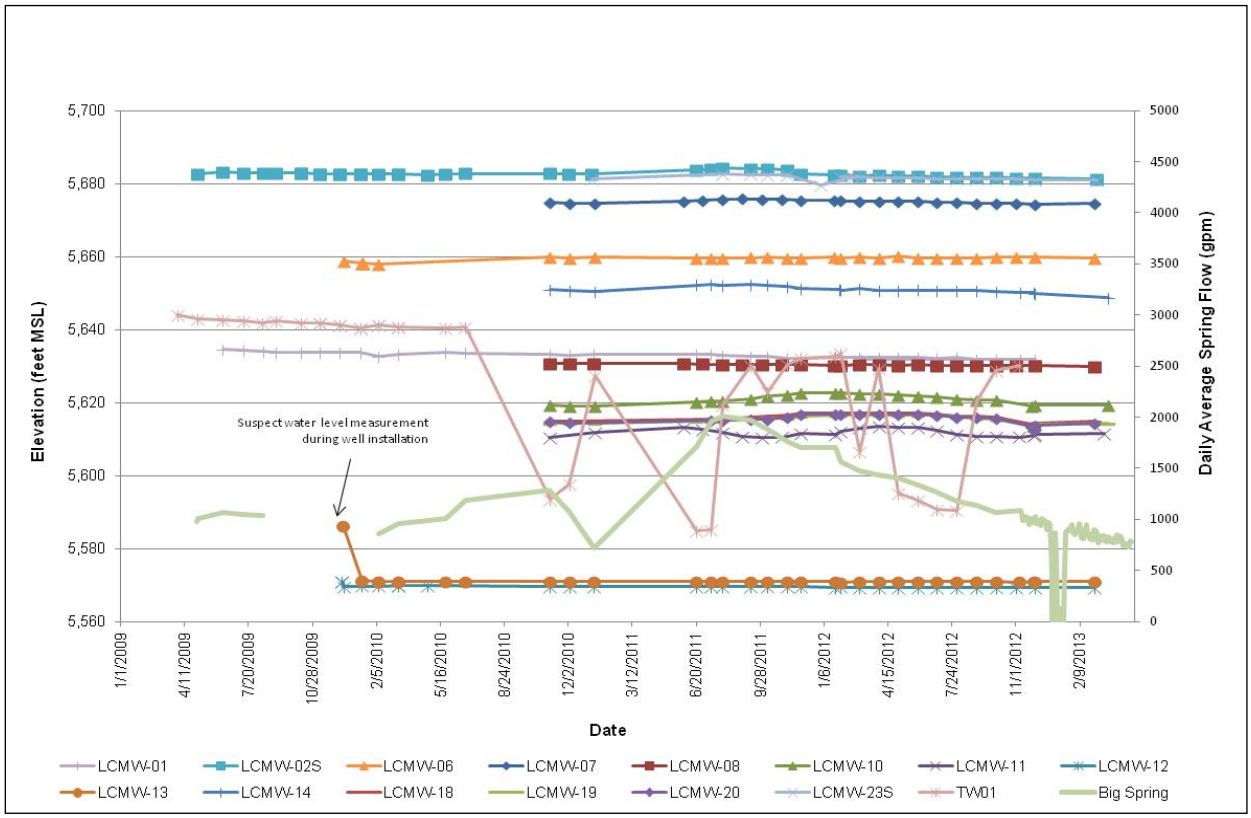


**Figure 3.2-13 Basin Fill/Alluvial Aquifer Wells and Big Springs Hydrograph, 2009-2013**

Basin fill aquifer wells located in close proximity to the Plan boundary were monitored between 2009 and 2012. Trends in the groundwater levels within several of the basin fill wells located in the southern portion of the Plan boundary and within the shear zone west of the range-front faults (LCMW-10, LCMW-18, LCMW-19, and LCMW-20) generally rose through December 2011, and then decreased throughout 2013 (Figure 3.2-14). These basin fill wells have similar, but more subtle, trends than those observed during the same time in the carbonate bedrock aquifer wells. The rise in the groundwater levels in these wells over this period suggests that there is some degree of hydraulic communication across the range-front faults and shear zone in this portion of the Plan boundary (Golder, 2013a, 2013b, and 2014). The groundwater level fluctuations observed in LCMW-11 are believed to be associated with surface flows in Hardy

Creek, located less than 500 feet to the east of the well location. The lack of groundwater level fluctuations in wells LCMW-01 and LCMW-08, located east of the range-front faults, suggests that the range-front faults are hydraulic barriers to groundwater flow over a portion of the Plan boundary (Golder, 2012).

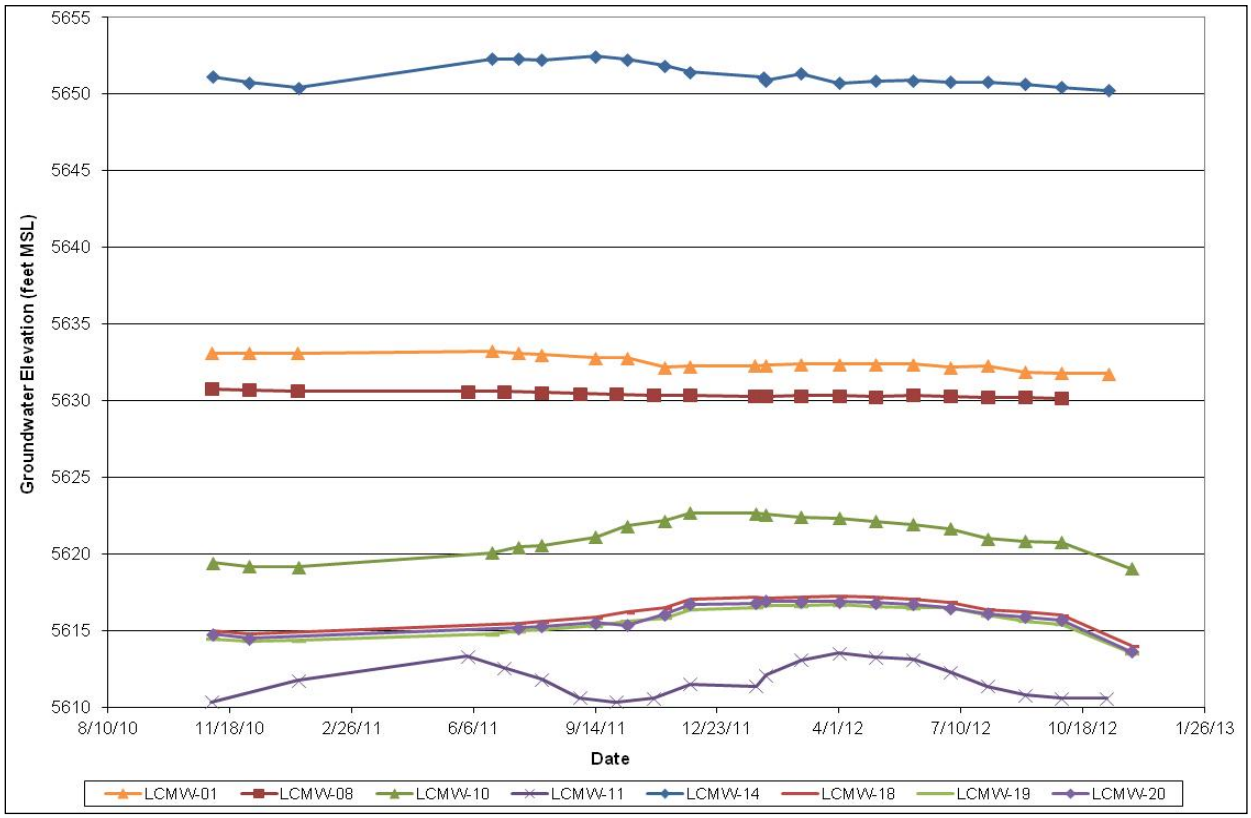


**Figure 3.2-14 Basin Fill Aquifer Hydrograph, Project Area and Vicinity, 2009-2013**

In addition, as indicated by the steepness in gradient across the range-front faults and the abrupt change in groundwater levels in this area as compared to discharge elevations at Central Spring and Big Springs, the range-front faults are acting as a zone of reduced permeability in portions of the Plan boundary (Golder, 2012).

Carbonate Bedrock Aquifer

The carbonate bedrock aquifer is a fractured bedrock hydrogeologic unit that exists beneath the Pequop Range in the Plan boundary. Groundwater in this aquifer flows east to southeast through fractured bedrock until it intersects the alluvial basin fill near the range-front faults. Groundwater within the carbonate bedrock aquifer is primarily transmitted via fractures and not through the rock's matrix. This means that the rock is very permeable where it is fractured, but is essentially impermeable where it is not fractured (Golder, 2012). Previous aquifer tests at the site have identified a highly permeable north-south trending fracture zone locally paralleling the range-front faults that is directly connected to a broad, interconnected fracture permeability system (Barnett et al., 2011a and 2011b). This broad, interconnected fracture permeability system also supplies water to Big Springs. Hydrogeologic cross-sections from A-A' through C-

C' (locations shown on Figure 3.2-2) show the extent of the carbonate bedrock units and major faults identified within the Plan boundary (Figures 3.2-7, 3.2-8, and 3.2-9). The carbonate bedrock unit in the Plan boundary is estimated to be over 5,500 feet thick, but its total thickness is unknown (Golder, 2012).

The potentiometric surface in the carbonate bedrock aquifer is nearly flat within the western portion of the Long Canyon monitoring network and steepens eastward toward Big Springs and the range-front faults (Figure 3.2-15). The groundwater elevation of the carbonate bedrock aquifer beneath the Plan boundary is up to 5.1 feet higher (at LCMW-03) than the elevation of Big Springs (3.5 feet higher in October 2012), with a gradient (in the bedrock) generally towards the east or southeast at an average of about 0.0001 ft/ft in the western portion of the Long Canyon monitoring network. The groundwater gradients appear to steepen slightly toward Big Springs and the range-front faults to an average of approximately 0.0003 ft/ft (Figure 3.2-11). Carbonate bedrock aquifer groundwater elevation data to the east of the range-front faults is not available, as no monitoring wells have been installed into the bedrock aquifer in this area, but the similarities in the groundwater elevations between the carbonate aquifer and the basin fill aquifer in this area indicate that groundwater between the aquifer units is likely interconnected.

Carbonate Bedrock Hydraulic Properties

Hydraulic properties for the carbonate bedrock aquifer were estimated from data collected during aquifer tests at the Long Canyon bedrock production well (LCPW-1) (Barnett et al., 2011a and 2011b) and additional single-well slug tests conducted on 10 wells within the Long Canyon groundwater monitoring network (Golder, 2013a). A summary of the aquifer hydraulic property estimates for the carbonate bedrock aquifer are provided in Appendix 3A, Aquifer Property Estimates spreadsheet. Based on the aquifer test data, the hydraulic conductivity within the bedrock unit is highly variable and is likely directly related to the density of fractures present at each of the bedrock wells. The bedrock aquifer test data suggests that pumping of the bedrock production well (LCPW-01) intercepts a highly permeable north-south structure or fracture zone locally paralleling the range-front faults that is directly connected to a broad, interconnected fracture permeability system (Golder, 2012). This broad, interconnected fracture permeability system also supplies water to Big Springs/Johnson Springs system. Conversely, on a local scale at LCPW-01, there appears to be limited interconnection of fracturing outside of the main north-south fracture zone (Golder, 2013a).

According to a supplemental evaluation of the aquifer test data, transmissivity estimates for the carbonate bedrock aquifer in the Plan boundary range between approximately $1.7 \times 10^5$ and $5.9 \times 10^5$ $ft^2$/day, and aquifer storativity estimates range between $2.8 \times 10^{-3}$ and $2.2 \times 10^{-2}$ (Golder, 2013a). Calculated hydraulic conductivities, based on the transmissivity estimates and an assumed aquifer thickness of 1,121 feet, range between 150 and 300 ft/day. This assumed aquifer thickness is based on the lithologic logs and well completions at LCPW-1 and LCMW-23D. The slug test results provided estimates of aquifer hydraulic conductivities ranging between approximately 0.74 and 54 ft/day. The lowest hydraulic conductivity estimates appear to be associated with monitoring wells completed partially or fully within the Cambrian Notch

Peak formation consisting predominantly of massive dolomite, limestone and mudstone (Golder, 2013a).

Analysis of the slug test data from well LCMW-09D was conducted to calculate separate estimates of the hydraulic parameters of the bedrock fractures and the bedrock matrix. Based on the Barker and Black (1983) solution, estimates for the fracture transmissivity range between approximately 51 and 75 $ft^2$/day and the fracture storativity ranges between $8.8 \times 10^{-5}$ and $2.2 \times 10^{-4}$ (Golder, 2013a). For the bedrock matrix at this location, estimates for hydraulic conductivity range between approximately $2.0 \times 10^{-9}$ and $5.1 \times 10^{-8}$ ft/day and for specific storage range between $1.2 \times 10^{-4}$ and $5.3 \times 10^{-4}$ $feet^{-1}$ (Golder, 2013a). Aquifer test data suggest that hydraulic communication between the upper basin fill aquifer and the carbonate bedrock aquifer exists at some locations within the Plan boundary. For example, one (LCMW-2S) of the two basin fill observation wells (LCMW-2S and LCMW-23S) monitored during the aquifer pump test at bedrock well LCPW-01 showed a response to pumping (Golder, 2013a).

Carbonate Bedrock Groundwater Level Trends

Groundwater level trends in the 15 bedrock aquifer wells between May 2009 and November 2012 are shown on the hydrographs on Figure 3.2-16. As shown on the hydrographs, prior to June 2011, minor groundwater level fluctuations were observed in the bedrock wells (generally less than 0.5 feet), except for decreases associated with the bedrock well aquifer test in January 2011. Between June and August 2011, groundwater levels within all the bedrock wells rose with maximum groundwater levels typically observed during late July or early August 2011. Since that time, groundwater levels in all the bedrock rock wells have gradually decreased through November 2012 to pre-2011 levels. The water level rise in the carbonate bedrock aquifer wells between June and August 2011 is believed to be associated with the heavy snowpack in the winter of 2010/2011 and subsequent recharge associated with the snowmelt. The groundwater levels trends within the bedrock wells also directly correlate to the flows observed at Big Springs during this same period, reflecting the hydraulic interconnectivity between the bedrock aquifer and Big Springs.

**Figure 3.2-15 Potentiometric Surface in the Carbonate Bedrock Aquifer, October 2012**

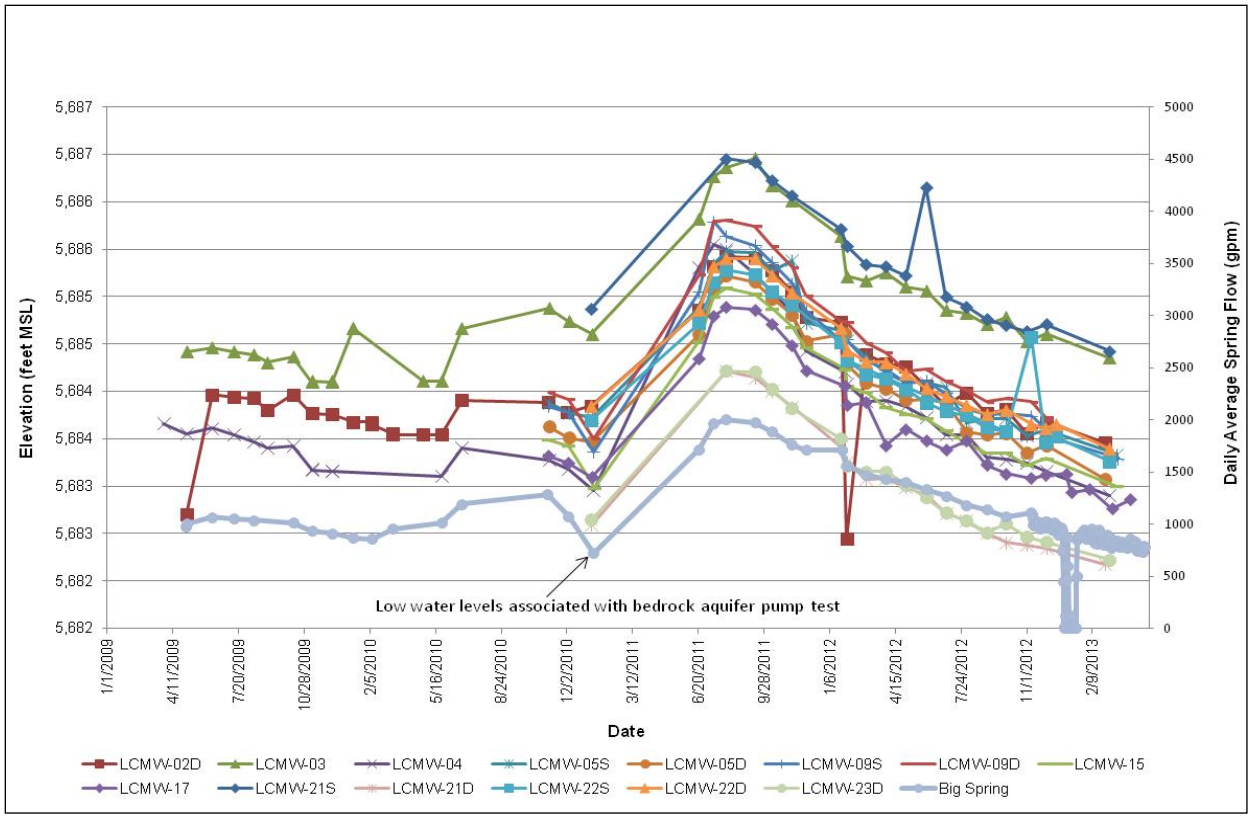


**Figure 3.2-16 Carbonate Bedrock Wells and Big Springs Hydrographs, 2009-2013**

Groundwater level trends in the dual-completion bedrock wells presented in Figure 3.2-16, Well Data spreadsheet, show that there is no consistent vertical gradient or flow component between the shallow and deep well completions.

Range Front Fault System/Hydrogeologic Interconnection

The structural geology of the range front fault system is described in Section 3.3.3. The hydrogeological characteristics of this area suggest that the damage zone associated with the range front fault system is the primary collector and discharge zone of much of the carbonate bedrock aquifer groundwater near the Plan boundary. Consequently, the presence of the Johnson Springs system, including Big Springs, is associated with the transmission of groundwater along and vertically upward through the range front fault system (Figure 3.2-2).

The large total discharge rate of the Johnson Springs system, including Big Springs, combined with elevated groundwater discharge temperatures and isotope analysis results (Mayo, 2013) indicate that the springs are a discharge area of a large catchment basin with relatively deeply circulating groundwater within the carbonate bedrock hydrogeologic unit. Also, seasonal and annual fluctuations in the discharge rate at Big Springs and the other Johnson Springs system springs, combined with similar groundwater level fluctuations in the carbonate bedrock aquifer wells suggest hydrodynamic communication or interconnection. This interconnection between the springs and the bedrock aquifer was also demonstrated by the rapid and substantial

decrease in the Big Springs discharge rate associated with pumping of the bedrock aquifer during aquifer testing at LCPW-01 (Barnett et al., 2011a and 2011b).

Based on the isotope study results, the Johnson Springs system appears to also be the discharge location of more shallow circulating alluvial groundwater; however, the full extent of hydrodynamic communication between the carbonate aquifer and the alluvial/basin fill aquifer across the range front fault system and between the alluvial aquifer and the springs is uncertain. The relatively stable water levels in the alluvial/basin fill wells in comparison to the corresponding fluctuations in the bedrock wells and Big Springs suggest that the water discharging at the Johnson Springs system is primarily from the carbonate bedrock aquifer.

*Recharge and Discharge*

Recharge to the aquifers in the Goshute Basin is primarily from infiltration of precipitation in the form of rain or winter snow pack. Precipitation is greatest at higher elevation areas of the Pequop Mountains, decreasing with decreasing elevations in the drainage. A smaller portion of recharge also occurs along the mountain front from surface water runoff (Golder, 2012). The precipitation infiltrates as it flows down-slope and crosses porous materials on the upper areas of alluvial fans, alluvium underlying drainage channels, and then into the basin fill at lower elevations. A smaller amount of recharge may occur through secondary porosity in bedrock higher in the drainage, which primarily recharges the bedrock aquifer. Discharge at the Johnson Springs system, including Big Springs, is more directly associated with groundwater flow from the carbonate bedrock aquifer across the range front fault system, but secondary recharge to the springs may also occur in the area upgradient of the range-front fault system.

A hydrologic budget was prepared for the Goshute Basin, which estimates both groundwater inflows to and outflows from the basin (Golder, 2012). The following summarizes components of the Goshute Basin water balance:

- Annual groundwater recharge (R) from precipitation for the northern Goshute Valley is estimated at approximately 17,953 acre-feet using the “bootstrap brute-force recharge model” (Epstein et al., 2010). Recharge is assumed to account for all of the inflow to the northern Goshute Valley.

- Mean annual evapotranspiration (ET) from the northern Goshute Valley is estimated to be approximately 20,791 acre-feet.

- Estimated total average annual runoff from the major mountain block watersheds is 63.2 acre-feet; however, runoff from each of the four watersheds is expected to be less than 10 acre-feet per year (AFY) most years with rainfall amounts generally too small to produce runoff from the mountain block watersheds.

- No surface water flows in or out of northern Goshute Valley; therefore, surface water was not included in the hydrologic budget. Hardy Creek does have a flowing reach although the water within this reach infiltrates into the basin fill and back into the groundwater system.

- Estimates of annual anthropogenic groundwater use (PW) are based on the currently permitted and certified rights for the entire Goshute Valley (http://water.nv.gov/data/underground/) as listed in the NDWR hydrographic summary report, including: 2,889.60 AFY for irrigation; 579.17 AFY for mining and milling; 5,935 AFY for municipal; 1,719.66 AFY for quasi-municipal; and 425.27 AFY for stock water. Within the northern Goshute Basin, average annual groundwater pumping withdrawals associated with the Shafter well field was approximately 1,058 acre-feet. Additional groundwater pumping is assumed negligible.

- A high likelihood of hydraulic connection exists between hydrographic basins along the northern, southern, and western boundaries of the Goshute Basin (Sweetkind et al., 2011). Portions of the southeastern boundary of Basin 187 also show a high likelihood of hydraulic connection between hydrographic basins.

- Hydraulic communication occurs between aquifers in some places.

- To date, net groundwater flow (GW) within the northern Goshute Valley has not been specifically quantified, but can be estimated as the residual component in the steady-state hydrologic budget equation.

Using the steady-state hydrologic budget equation:

$$R - ET = GW + PW$$

Where: R=recharge,
ET=evapotranspiration,
GW=net groundwater flow, and
PW=groundwater pumping withdrawal.

Net groundwater flow within the northern Goshute Valley, estimated as the residual of the steady-state hydrologic budget equation, is approximately 3,896 AFY (as inflow). As a reference, previous estimates of interbasin flow within the entire Goshute Valley range between a net groundwater inflow of 2,000 AFY (Harrill et al., 1988) and a net groundwater inflow of 1,474 AFY (Nichols, 2000).

**Geochemistry**

One hundred and sixty-six samples from exploration drilling cores were used for the waste rock characterization, and were chosen to represent all of the major geological materials in the proposed pit area. In addition, samples representative of spent ore material were collected from the metallurgical test program for testing (SRK, 2012 and 2013a). The results of the geochemical characterization of waste rock samples are provided below followed by the results for the spent ore.

Waste Rock Geochemical Testing

Twenty-three samples from exploration drilling cores were examined for mineralogy using x-ray diffraction, scanning microscope, and optical microscopy. Oxides, carbonates, and phosphates were found in abundance, with only trace amounts of sulfides. The samples were oxidized throughout the depth of the core samples and pyrite has typically been pervasively and pseudomorphically replaced by hematite. Gold is fine-grained and principally associated with arsenic mineralization in the form of arseniosiderite [$Ca_2Fe^{3+}{}_3(AsO_4)_3O_3 \bullet 3(H_2O)$], but also found in calcite ($CaCO_3$) (SRK, 2013a).

A multi-element analysis was performed to identify metals and metalloids present in the geologic materials that could be available for leaching at levels substantially above crustal abundance. The elements found in the samples at concentrations over at least six times crustal abundance were antimony, arsenic, calcium, mercury, selenium, and thallium. High calcium levels would be expected in materials dominated by limestone and dolomite.

ABA uses a combination of the neutralization potential ratio (NPR), which is the ratio of neutralization potential (NP) to acid generating potential (AGP), and the net neutralization potential (the difference between NP and AGP) to determine the likelihood that the material will generate acidity in the environment. Nevada BLM guidance (BLM, 2008f) states that samples with neutralizing potential less than three times the AGP and/or a difference between neutralizing and AGP less than 20 have an uncertain potential for acid generation and require further evaluation (e.g., by kinetic test methods). The ABA data for Long Canyon shows the carbonate-rich sedimentary host rocks of the deposit contain substantial neutralization capacity and very limited sulfide minerals. Thus, all waste rock samples were classified as non-acid generating according to the BLM criteria (Table 3.2-1).

**Table 3.2-1 Modified Acid/Base Accounting Static ARD Potential Test Results, Long Canyon Waste Rock Composites**

| Lithology | # | Paste pH (s.u.) | Sulfide Sulfur (wt%) | AGP[1] (kg $CaCO_3$ eq/t) | | NP (kg $CaCO_3$ eq/t) | | NNP (kg $CaCO_3$ eq/t) | | NPR | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Alluvium | 1 | 8.59 | 0.01 | 0.30 | - | 577 | - | 577 | - | 1,846 | - |
| Ki | 14 | 8.45 | 0.13 | 4.35 | 7.6 | 260 | 149 | 256 | 145 | 484 | 421 |
| LC0 and LC1 | 19 | 8.57 | 0.01 | 0.30 | 0 | 740 | 83 | 739 | 83 | 2,159 | 638 |
| LC2 | 39 | 8.56 | 0.03 | 0.30 | 0 | 675 | 116 | 673 | 115 | 1,788 | 875 |
| LC3 | 22 | 8.51 | 0.01 | 0.30 | 0 | 768 | 115 | 768 | 115 | 2,397 | 598 |
| LC4 and LC5 | 41 | 8.90 | 0.01 | 0.30 | 0 | 958 | 120 | 958 | 120 | 3,112 | 379 |
| LC6 and LC7 | 30 | 8.52 | 0.01 | 0.30 | 0 | 836 | 168 | 836 | 168 | 2,711 | 550 |
| **All** | **166** | **8.62** | **0.03** | **0.64** | **0.64** | **758** | **223** | **757** | **224** | **2,295** | **954** |

Source: SRK, 2013a

[1]AGP based on Pyritic $S^{=}$ content (%$S^{=}$ x 31.25). AGP, ANP and NNP in units of tons CaCO equivalents per 1,000 tons of solids.

NAG results for all samples were characterized by a NAG pH greater than four standard units (s.u.) and a NAG value of zero, indicating the samples will not generate acid in the long-term (Table 3.2-2). These results support the ABA prediction and confirm that no acid generation would be predicted in any of the materials from the Long Canyon deposit.

**Table 3.2-2 Average NAG Results for Waste Rock Samples**

| Lithology | # | NAG pH (s.u.) | | Net Acid Generation (kg $H_2SO_4$ eq/t) | |
|---|---|---|---|---|---|
| | | Mean | S.D. | Mean | S.D. |
| Alluvium | 1 | 7.72 | - | 0 | - |
| Ki | 14 | 8.08 | 0.49 | 0 | - |
| LC0 and LC1 | 19 | 7.83 | 0.53 | 0 | - |
| LC2 | 39 | 8.07 | 0.96 | 0 | - |
| LC3 | 22 | 7.70 | 0.17 | 0 | - |
| LC4 and LC5 | 41 | 7.61 | 0.24 | 0 | - |
| LC6 and LC7 | 30 | 7.58 | 0.15 | 0 | - |
| **All** | **166** | **7.79** | **0.57** | **0** | **-** |

Source: SRK, 2013a

MWMP leach tests were run on 42 samples representing all of the major geologic material types. The resulting concentrations were compared to NDEP Profile I reference values to determine if leachate has the potential to exceed Nevada limits. Only arsenic and mercury exceeded the reference values, which was expected given the alkaline (high pH value) of the leachate (Table 3.2-3). Results of attenuation modeling are in Section 4.2.2, as well as modeled potential impacts to groundwater.

Kinetic tests (humidity cell tests or HCTs) were run on eight waste rock samples to confirm the long-term leaching behavior of the Long Canyon materials. Kinetic testing was conducted even though ABA results demonstrated that all of the Long Canyon samples were acid neutralizing and further testing was not required. The tests were run for 53 weeks. The HCT results are consistent with the static test results and predict there is no potential for acid generation with very limited metal leaching. At neutral to alkaline pH, several parameters were mobilized through the leaching process, notably arsenic, antimony, mercury and thallium; however, mercury and thallium were quickly removed by progressive rinsing during the HCT indicating they are likely controlled by the available metal mass. Although antimony and arsenic release rates did not decrease as rapidly as mercury and thallium, the constant release of these constituents from the HCTs throughout the duration of the test indicates mass driven release (Appendix 3A).

**Table 3.2-3 Average MWMP Results for Waste Rock Samples**

| Parameter | Units | NDEP Profile I Reference Value | Average | Minimum | Maximum |
|---|---|---|---|---|---|
| Alkalinity | mg/L as CaCO3 | - | 30.4 | 6.80 | 89.6 |
| Aluminum* | mg/L | 0.2 | 0.07 | <0.045 | 0.18 |
| Antimony* | mg/L | 0.006 | 0.003 | <0.0025 | 0.01 |

| Parameter | Units | NDEP Profile I Reference Value | Average | Minimum | Maximum |
|---|---|---|---|---|---|
| Arsenic* | mg/L | 0.01 | 0.12 | <0.003 | 3.19 |
| Barium* | mg/L | 2 | 0.03 | <0.01 | 0.30 |
| Beryllium* | mg/L | 0.004 | <0.001** | <0.001 | <0.002 |
| Cadmium* | mg/L | 0.005 | <0.001** | <0.001 | <0.002 |
| Calcium | mg/L | - | 9.46 | 2.90 | 44.8 |
| Chloride | mg/L | 400 | 5.36 | <1 | 42.2 |
| Chromium* | mg/L | 0.1 | <0.005** | <0.005 | <0.006 |
| Copper* | mg/L | 1 | <0.03** | <0.01 | <0.05 |
| Cyanide, WAD | mg/L | 0.2 | <0.01 | <0.01 | <0.01 |
| Fluoride* | mg/L | 4 | 0.44 | <0.1 | 2.80 |
| Iron* | mg/L | 0.6 | 0.03 | <0.01 | 0.06 |
| Lead* | mg/L | 0.015 | <0.004** | <0.0025 | <0.01 |
| Magnesium | mg/L | 150 | 2.01 | <0.3 | 8.60 |
| Manganese* | mg/L | 0.1 | 0.005 | <0.004 | 0.008 |
| Mercury* | mg/L | 0.002 | 0.008 | <0.0001 | 0.19 |
| Molybdenum* | mg/L | - | <0.01** | <0.008 | <0.03 |
| Nickel | mg/L | 0.1 | <0.01 | <0.01 | <0.01 |
| Nitrate/ Nitrite | mg/L as N | 10 | 0.51 | <0.5 | 0.70 |
| Nitrogen, total | mg/L as N | 10 | <1 | <1 | <1 |
| pH | s.u. | 6.5 - 8.5 | 7.95 | 6.85 | 8.99 |
| Phosphorus* | mg/L | - | 0.32 | <0.05 | 0.5 |
| Potassium | mg/L | - | 1.70 | <0.5 | 21.0 |
| Selenium* | mg/L | 0.05 | <0.02** | <0.005 | <0.04 |
| Silver | mg/L | 0.1 | <0.005 | <0.005 | <0.005 |
| Sodium* | mg/L | - | 6.18 | <0.5 | 24.9 |
| Sulfate* | mg/L | 500 | 7.79 | <1 | 48.0 |
| Thallium | mg/L | 0.002 | <0.001 | <0.001 | <0.001 |
| Total Dissolved Solids | mg/L | 1000 | 57.6 | 14.0 | 239 |
| Vanadium* | mg/L | - | 0.008 | <0.005 | 0.018 |
| Zinc | mg/L | 5 | 0.03 | <0.01 | 0.06 |

Source: SRK, 2012, 2013a, and 2014b
All values reported in mg/L unless noted otherwise
< denotes less than the laboratory detection limit
*indicates that analytical detection limit changed between 2008 and 2013 analyses
**value represents an average of the upper and lower detection limits
- denotes not analyzed
Shaded values exceed the respective NDEP reference values

Spent Ore Geochemical Testing

The SRK (2012 and 2013a) characterization program included spent ore from metallurgical testing columns representative of heap leach materials after closure. Low-, medium-, and high-grade ore material was used. Both pregnant solution and final rinse solution from the metallurgical test program were also tested for comparison.

Pregnant solution chemistry was alkaline with antimony, arsenic, copper, iron, mercury, and thallium concentrations elevated above the NDEP Profile I reference values. In the final rinse

solution chemistry, only aluminum, arsenic, and antimony concentrations were higher than the NDEP reference values (Table 3.2-4). These results suggest that rinsing columns with de-ionized water effectively reduced the initial constituent concentrations in the spent ore. Note that the metallurgical samples were treated with lime prior to testing, which increases the alkalinity.

**Table 3.2-4 Average Pregnant Solution and Final Rinse Solution Chemistry**

| Parameter | NDEP Value | Pregnant Solution | | | Final Rinse Solution | | |
|---|---|---|---|---|---|---|---|
| | | Low Grade | Medium Grade | High Grade | Low Grade | Medium Grade | High Grade |
| | | n = 9 | n = 14 | n = 10 | n = 9 | n = 14 | n = 10 |
| Alkalinity, Total | -- | 2700 | 2600 | 2700 | 100 | 110 | 110 |
| Aluminum | 0.2 | 0.057 | 0.065 | 0.065 | 0.045 | 0.27 | 0.2 |
| Antimony | 0.006 | 0.16 | 0.21 | 0.067 | 0.005 | 0.0069 | 0.0099 |
| Arsenic | 0.01 | 8.7 | 22 | 17 | 0.037 | 0.49 | 0.12 |
| Barium | 2 | 0.017 | 0.01 | 0.023 | 0.063 | 0.014 | 0.021 |
| Beryllium | 0.004 | 0.001 | 0.001 | 0.0014 | 0.001 | 0.001 | 0.001 |
| Cadmium | 0.005 | 0.0025 | 0.0015 | 0.0021 | 0.001 | 0.001 | 0.001 |
| Calcium | -- | 9.9 | 3.3 | 2.1 | 20 | 17 | 18 |
| Chloride | 400 | 67 | 41 | 36 | 14 | 14 | 15 |
| Chromium | 0.1 | 0.011 | 0.0097 | 0.0085 | 0.005 | 0.005 | 0.005 |
| Cobalt | -- | 0.034 | 0.044 | 0.036 | 0.01 | 0.01 | 0.01 |
| Copper | 1.3 | 4.2 | 2.7 | 2.6 | 0.05 | 0.05 | 0.05 |
| Cyanide, WAD | 0.2 | 290 | 190 | 210 | 0.042 | 0.038 | 0.029 |
| Fluoride | 4 | 1.2 | 1.4 | 1.3 | 0.27 | 0.18 | 0.12 |
| Iron | 0.6 | 1.2 | 0.92 | 0.6 | 0.027 | 0.15 | 0.31 |
| Lead | 0.015 | 0.017 | 0.0061 | 0.015 | 0.0058 | 0.0057 | 0.0055 |
| Magnesium | 150 | 0.8 | 0.5 | 0.78 | 9.1 | 5.1 | 4.6 |
| Manganese | 0.1 | 0.047 | 0.018 | 0.013 | 0.0053 | 0.0077 | 0.0058 |
| Mercury | 0.002 | 0.08 | 0.17 | 0.088 | 0.00023 | 0.00045 | 0.00099 |
| Molybdenum | -- | 0.053 | 0.034 | 0.026 | 0.01 | 0.01 | 0.01 |
| Nickel | 0.1 | 0.021 | 0.03 | 0.027 | 0.01 | 0.01 | 0.01 |
| Nitrate as N | 10 | 5 | 4.5 | 4.6 | 1 | 1 | 1 |
| Nitrite as N | -- | 0.29 | 2.8 | 2.1 | 0.054 | 0.05 | 0.049 |
| pH (s.u.) | 6.5-8.5 | 10 | 10 | 10 | 8 | 8.1 | 8.3 |
| Phosphorus | -- | 1.1 | 1.9 | 1.8 | 0.5 | 0.55 | 0.5 |
| Potassium | -- | 71 | 36 | 34 | 3.2 | 6 | 4.8 |
| Selenium | 0.05 | 0.0067 | 0.0053 | 0.01 | 0.005 | 0.005 | 0.005 |
| Silver | 0.1 | 0.0073 | 0.0054 | 0.0071 | 0.005 | 0.005 | 0.005 |
| Sodium | -- | 1400 | 1500 | 1500 | 29 | 41 | 43 |
| Sulfate | 500 | 83 | 62 | 65 | 28 | 24 | 24 |
| Thallium | 0.002 | 0.002 | 0.0015 | 0.0019 | 0.001 | 0.0012 | 0.0013 |
| Tin | -- | 0.1 | 0.1 | 0.14 | 0.1 | 0.1 | 0.1 |
| TDS | 1000 | 3200 | 3300 | 3500 | 180 | 190 | 200 |
| Zinc | 5 | 2.1 | 3.2 | 2.8 | 0.01 | 0.011 | 0.011 |

SRK, 2012, 2013a
All values reported in mg/L unless noted otherwise
Shaded values exceed the respective NDEP reference values.

Pre- and Post-Leach Geochemical Testing

Geochemical testing was performed on four ore-grade samples collected from the metallurgical testwork after the cyanide leach and final rinse. Multi-element results for the ore grade samples were similar to the waste rock samples with antimony, arsenic, calcium, mercury, and selenium concentrations elevated for all samples. Thallium also showed enrichment for all but one sample. Tin and silver were enriched for a few samples. The results also showed general reductions in the total concentrations of the spent ore material in comparison to the feed material because of cyanide leaching and fresh water rinsing for most of the parameters (SRK, 2012).

Heap Leach Geochemistry

MWMP tests were conducted on six samples of spent ore from the metallurgical test program (SRK, 2012 and 2014) to provide an indication of elemental mobility and constituent release from unrinsed heap leach material. These samples were not rinsed with fresh water prior to testing. A summary of the MWMP results for the unrinsed spent ore samples is provided in Table 3.2-5 along with a comparison to the average MWMP concentrations calculated for rinsed spent ore samples (SRK, 2012) and the NDEP reference values. A comparison of the MWMP results with the NDEP reference values shows that the spent ore samples rinsed with fresh water present a low potential for metal leaching with all constituents at or below reference values. The exception to this is arsenic, which is leached from the rinsed spent ore at concentrations above the NDEP reference values. The results from samples of spent ore that were not rinsed with fresh water prior to testing are similar with concentrations of arsenic elevated above NDEP reference values. However, the concentrations of arsenic were as much as an order of magnitude higher for the unrinsed samples in comparison to the rinsed samples. In addition, mercury and WAD cyanide are elevated above the NDEP reference values in some of the unrinsed samples.

**Table 3.2-5 MWMP Results for Rinsed and Unrinsed Spent Ore Samples**

| Parameter | Units | NDEP Value | Rinsed Samples | | | Unrinsed Samples | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Low Grade | Medium Grade | High Grade | OP1 #2 Column 2 | OP1 #3 Column 5 | OP1 #4 Column 8 | OP1 #5 Column 11 | OP1 #6 Column 14 | OP1 #7 Column 17 |
| | | | n = 10 | n = 11 | n = 4 | | | | | | |
| Alkalinity | mg/L | -- | 32 | 37 | 39 | 25.8 | 24.1 | 34.1 | 28.9 | 20.9 | 24.8 |
| $CO_3$, $CaCO_3$ | mg/L | -- | 2 | 2.5 | 2.9 | <10 | <10 | <10 | <10 | <10 | <10 |
| $HCO_3$ | mg/L | -- | 37 | 42 | 43 | 21.8 | 16.3 | 24.3 | 25 | 16.1 | 17.6 |
| Aluminum | mg/L | 0.2 | 0.065 | 0.19 | 0.071 | <0.08 | 0.091 | <0.08 | <0.08 | <0.08 | <0.08 |
| Antimony | mg/L | 0.006 | <0.0025 | 0.006 | 0.0051 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | 0.00352 |
| Arsenic | mg/L | 0.01 | 0.022 | 0.054 | 0.035 | 0.694 | 0.706 | 0.059 | 0.0063 | 0.018 | 0.0819 |
| Barium | mg/L | 2 | 0.02 | 0.033 | 0.014 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 |
| Beryllium | mg/L | 0.004 | <0.001 | <0.001 | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Bismuth | mg/L | -- | <0.1 | <0.1 | <0.1 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 |
| Boron | mg/L | -- | <0.1 | 0.1 | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Cadmium | mg/L | 0.005 | <0.001 | <0.001 | <0.001 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Calcium | mg/L | -- | 7.7 | 11 | 8.7 | 4.72 | 6.45 | 4.16 | 4.5 | 4.67 | 5.9 |
| Chloride | mg/L | 400 | 1.1 | 1.1 | 1.5 | <1 | <1 | 1 | <1 | <1 | <1 |
| Chromium | mg/L | 0.1 | <0.005 | 0.006 | <0.005 | <0.006 | <0.006 | <0.006 | <0.006 | <0.006 | <0.006 |
| Cobalt | mg/L | -- | <0.01 | <0.01 | <0.01 | <0.006 | <0.006 | <0.006 | <0.006 | <0.006 | <0.006 |
| Copper | mg/L | 1.3 | 0.058 | <0.05 | <0.05 | 0.11 | 0.139 | <0.01 | 0.01 | <0.01 | <0.01 |
| Cyanide, WAD | mg/L | 0.2 | 0.029 | 0.017 | 0.033 | 0.508 | 1.00 | 0.421 | 0.103 | 0.275 | 0.3 |
| Fluoride | mg/L | 4 | 0.14 | 0.11 | 0.19 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Gallium | mg/L | -- | <0.1 | <0.1 | <0.1 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Iron | mg/L | 0.6 | <0.01 | 0.086 | <0.01 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 |
| Lead | mg/L | 0.015 | <0.0025 | <0.0025 | <0.0025 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Lithium | mg/L | -- | <0.1 | <0.1 | <0.1 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | 150 | 1.9 | 1.5 | 2.2 | <0.3 | <0.3 | 4.52 | 1.98 | 0.6 | 0.42 |
| Manganese | mg/L | 0.1 | 0.0051 | 0.0051 | 0.029 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Mercury | mg/L | 0.002 | 0.00026 | 0.00019 | 0.00018 | 0.00027 | 0.00309 | 0.00594 | <0.0002 | 0.00557 | 0.00541 |
| Molybdenum | mg/L | -- | <0.01 | <0.01 | <0.01 | <0.008 | <0.008 | <0.008 | <0.008 | <0.008 | <0.008 |
| Nickel | mg/L | 0.1 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |

| Parameter | Units | NDEP Value | Rinsed Samples | | | Unrinsed Samples | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Low Grade | Medium Grade | High Grade | OP1 #2 Column 2 | OP1 #3 Column 5 | OP1 #4 Column 8 | OP1 #5 Column 11 | OP1 #6 Column 14 | OP1 #7 Column 17 |
| | | | n = 10 | n = 11 | n = 4 | | | | | | |
| Nitrate/Nitrite | mg/L as N | 10 | 0.12 | 0.091 | 1.33 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| pH | s.u. | 6.5-8.5 | 8.1 | 8.1 | 8.2 | 9.01 | 9.38 | 9.41 | 9 | 9.19 | 9.28 |
| Phosphorus | mg/L | -- | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Potassium | mg/L | -- | 1.4 | 1.7 | 2.3 | 0.91 | 1.15 | 0.91 | 0.8 | 0.68 | 0.92 |
| Scandium | mg/L | -- | <0.1 | <0.1 | <0.1 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Selenium | mg/L | 0.05 | <0.005 | <0.005 | <0.005 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 |
| Silver | mg/L | 0.1 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Sodium | mg/L | -- | 2.7 | 6.6 | 5 | 8.12 | 6.81 | 5.57 | 5.23 | <5 | 5.8 |
| Strontium | mg/L | -- | <0.1 | 0.13 | <0.1 | 0.0067 | 0.0126 | 0.0059 | <0.005 | <0.005 | 0.0056 |
| Sulfate | mg/L | 500 | 2.9 | 10 | 4.3 | 3.03 | 4.41 | 2.96 | <1.5 | <1.5 | 2.08 |
| Thallium | mg/L | 0.002 | <0.001 | <0.001 | 0.0011 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | mg/L | -- | <0.1 | <0.1 | <0.1 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Titanium | mg/L | -- | <0.1 | <0.1 | <0.1 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| TDS | mg/L | 1000 | 54 | 75 | 59 | 52 | 46 | 47 | 40 | 32 | 44 |
| Vanadium | mg/L | -- | <0.01 | 0.01 | <0.01 | 0.0066 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Zinc | mg/L | 5 | <0.01 | 0.012 | 0.011 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 |

SRK, 2012 and SRK, 2014
All values reported in mg/L unless noted otherwise
< denotes less than the laboratory detection limit
- denotes not analyzed
Shaded values exceed the respective NDEP reference values

Acid Base Accounting Results

The ABA results indicated that all of the spent ore samples contained high neutralizing capacity with no measureable total sulfur (Table 3.2-6). Therefore, the spent ore samples are predicted to be non-acid producing, the same as the waste rock.

**Table 3.2-6 ABA Results for Spent Ore Samples from Metallurgical Columns**

| Phase | Met Column | Grade | Paste pH (s.u.) | Total Sulfur (wt%) | Sulfate Sulfur (wt%) | Sulfide Sulfur (wt%) | NP (eq. kg CaCO3/t) | NNP (eq. kg CaCO3/t) | NPR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | #1 | Low | 9.12 | <0.01 | <0.01 | <0.01 | 876 | 876 | 2,920 |
| 1 | #2 | Low | 8.68 | <0.01 | <0.01 | <0.01 | 804 | 804 | 2,680 |
| 1 | #3 | Medium | 8.74 | <0.01 | <0.01 | <0.01 | 325 | 325 | 1,083 |
| 1 | #4 | High | 8.71 | <0.01 | <0.01 | <0.01 | 546 | 546 | 1,820 |
| 1 | #5 | Low | 8.64 | <0.01 | <0.01 | <0.01 | 867 | 867 | 2,890 |
| 1 | #6 | Low | 8.85 | <0.01 | <0.01 | <0.01 | 884 | 884 | 2,947 |
| 1 | #9 | Low | 8.67 | <0.01 | <0.01 | <0.01 | 563 | 563 | 1,877 |
| 1 | #10 | Low | 8.87 | <0.01 | <0.01 | <0.01 | 840 | 840 | 2,800 |
| 1 | #11 | Low | 8.71 | <0.01 | <0.01 | <0.01 | 541 | 541 | 1,803 |
| 1 | #14 | Low | 8.73 | <0.01 | <0.01 | <0.01 | 850 | 850 | 2,833 |
| 1 | #15 | Medium | 8.64 | <0.01 | <0.01 | <0.01 | 711 | 711 | 2,370 |
| 1 | #19 | Medium | 8.64 | <0.01 | <0.01 | <0.01 | 634 | 634 | 2,113 |
| 1 | #20 | High | 8.5 | <0.01 | <0.01 | <0.01 | 660 | 660 | 2,200 |
| 2 | #26 | Medium | 8.13 | <0.01 | <0.01 | <0.01 | 784 | 784 | 2,613 |
| 2 | #27 | High | 8.76 | <0.01 | <0.01 | <0.01 | 551 | 551 | 1,837 |
| 2 | #29 | Medium | 8.22 | <0.01 | <0.01 | <0.01 | 826 | 826 | 2,753 |
| 2 | #34 | Medium | 8.46 | <0.01 | <0.01 | <0.01 | 787 | 787 | 2,623 |
| 2 | #35 | High | 8.8 | <0.01 | <0.01 | <0.01 | 540 | 540 | 1,800 |
| 2 | #38 | Medium | 8.73 | <0.01 | <0.01 | <0.01 | 655 | 655 | 2,183 |
| 2 | #42 | Low | 8.94 | <0.01 | <0.01 | <0.01 | 990 | 990 | 3,300 |
| 2 | #44 | High | 8.83 | <0.01 | <0.01 | <0.01 | 597 | 597 | 1,990 |
| 2 | #47 | Medium | 8.78 | <0.01 | <0.01 | <0.01 | 724 | 724 | 2,413 |
| 2 | #48 | Low | 8.49 | <0.01 | <0.01 | <0.01 | 869 | 869 | 2,897 |
| 2 | #50 | Medium | 8.61 | <0.01 | <0.01 | <0.01 | 590 | 590 | 1,967 |
| 2 | #51 | High | 8.67 | <0.01 | <0.01 | <0.01 | 650 | 650 | 2,167 |

Source: SRK, 2012 and 2013a
< Denotes less than the laboratory method detection limit.

Four samples of spent ore material were selected for kinetic testing, including two samples showing the highest constituent release from the static test results and two samples showing a low to moderate release of constituents. The HCT results are consistent with the static test results on spent ore and confirm that the spent ore material is not acid generating but that there is potential to leach arsenic and antimony under neutral to alkaline pH conditions. Mercury and thallium were also sporadically elevated above NDEP reference values at the beginning of the test for some of the cells. These results are consistent with the HCT results from samples of waste rock as described above (Appendix 3A).

**Environmental Isotopes**

As part of the baseline investigation, Newmont collected water samples from seven wells, three springs, and a snow event for isotopic analysis. Three of the wells are completed in basin fill/alluvial aquifer, three in the carbonate bedrock aquifer, and one in glacial till near the headwaters of Long Canyon. Most samples were collected in March 2013, prior to the spring snowmelt when the discharge from Big Springs was minimal. Therefore, these samples predominantly represent base flow. The purpose of the isotopic sampling was to provide additional data than could be used to help characterize the groundwater flow systems and to help evaluate the groundwater flow relationships between the carbonate bedrock, basin fill alluvial, and range front fault groundwater systems, and the Johnson Springs system including Big Springs.

The laboratory analysis included stable isotopes of water ($\delta^2$H and $\delta^{18}$O), stable isotopes of carbon in dissolved bicarbonate ($\delta^{13}$C), and the radiogenic isotopes tritium ($^3$H) and carbon-14 ($^{14}$C). The water samples were analyzed by Isotech Laboratories Inc. (Champaign, Illinois). Mayo (2013) provides the following conclusions about the isotope data:

- The stable isotopic compositions ($\delta^2$H and $\delta^{18}$O) of the spring, groundwater, and snow samples are plotted on Figure 3.2-17. The clustered nature of the data plots suggest that waters in the springs, and the alluvial and the carbonate aquifer wells recharged under similar average meteoric conditions (i.e. precipitation temperature) or recharge elevation. There is not a significant statistical difference between the spring and groundwater samples or between the bedrock and basin fill alluvial samples. Also, there is no isotopic evidence of excessive evaporation or geothermal heating due to deep groundwater circulation.

- The groundwater $\delta^{13}$C values are consistent with arid zone recharge and the dissolution of carbonate minerals.

- The tritium values for Big Springs and two bedrock wells (LCMW-09 and LCMW-17) indicate a component of modern groundwater recharge.

- All groundwater samples contain a component of ancient water with calculated $^{14}$C mean residence times of about 2,000 to 17,000 years.

- The glacial till groundwater collected near the headwaters of Long Canyon has a calculated $^{14}$C mean residence time of about 17,000 years. This system is perched above the regional carbonate aquifer and the age of the water indicates no connection with modern recharge.

The results of the isotopic analyses indicate that the alluvial aquifer in the vicinity of the mountain front is recharged, in part by flow from the bedrock aquifer. The groundwater in the bedrock aquifer is a mixture of modern recharge and older water.

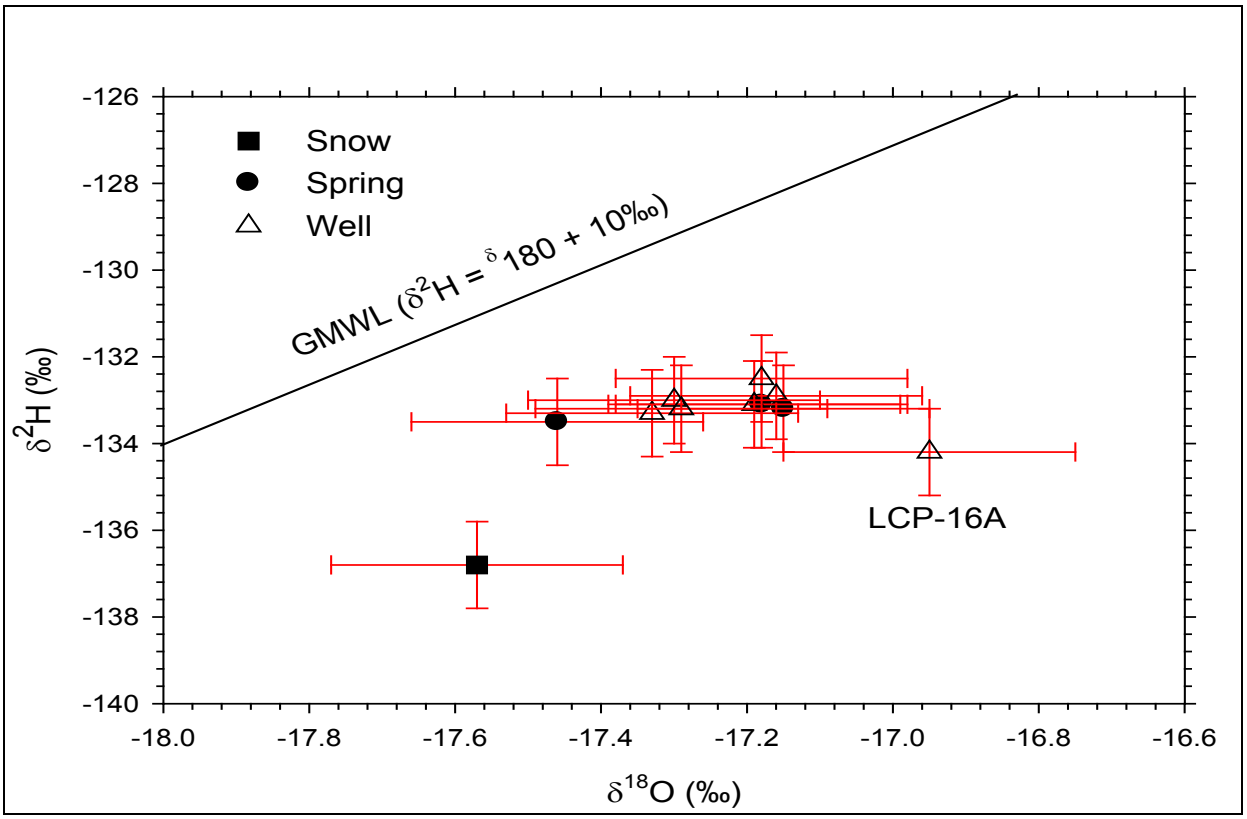


**Figure 3.2-17 Stable Isotope Data Plots**

Notes:

GMWL = Global Meteoric Water Line In the absence of a local, long-term stable isotopic precipitation record for the Long Canyon area, the stable isotopic compositions of surface water and groundwater were analyzed relative to the GMWL, which is empirically derived from worldwide coastal zone precipitation data.

The cross patterns at each data point represent the typical error bars associated with statistical analysis of the data.

## Water Quality

Surface Water Quality

There are no known water quality data for Long Canyon channel, the unnamed range front channels, or Sixmile Creek. Hardy Creek's chemical makeup is described by data designated as collected at site "Combined Springs". These data, some of which are reported in Appendix 3A under the name "Combined Smaller Springs", were collected between June 2009 and May 2013. These data do not appear to include Hardy Creek below Big Springs. The water quality data show that the surface water is generally a calcium-bicarbonate type with total dissolved solids (TDS) concentration ranging from 220 to 334 milligrams per liter (mg/L) (Figure 3.2-18). During occasional runoff events, Hardy Creek and the other aforementioned streams likely convey moderate to high sediment loads. A search of Nevada's most recent (2008-2010) Integrated Report (NDEP, 2012) does not indicate any of the area streams are considered to be impaired for their beneficial uses (i.e., they do not appear on the 303(d) list).

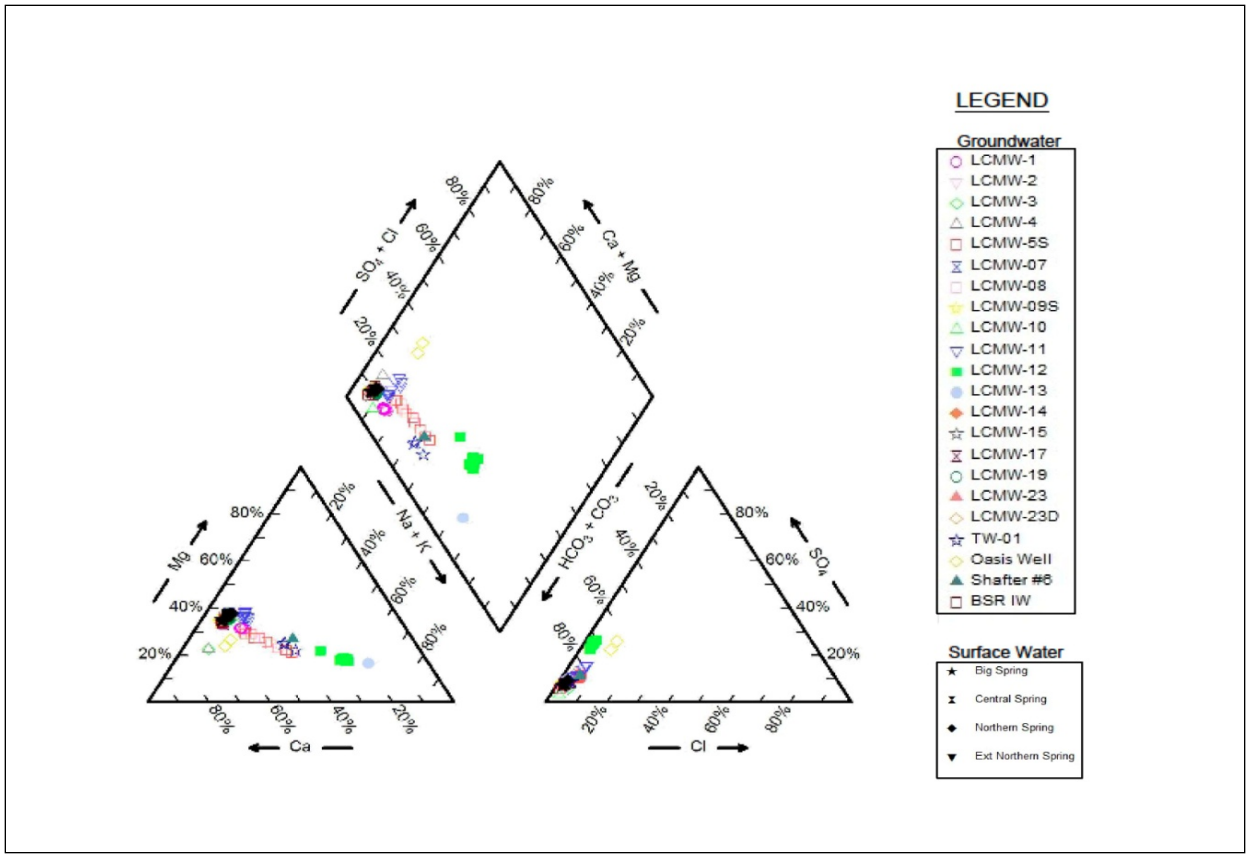


**Figure 3.2-18 Trilinear Plot of Groundwater and Spring Water Quality**

Groundwater Quality

Within the Plan boundary, chemical analysis results are available for selected monitoring wells completed in the alluvium and bedrock aquifers, the Oasis well, and BSR-1 completed in the basin fill aquifer and production test well LCPW-1 completed in the carbonate bedrock aquifer. Data collected between 2006 and 2012 for these locations are provided in Appendix 3A, Groundwater Quality Data spreadsheet.

NAC 445A establishes primary and secondary water quality standards based on the Environmental Protection Agency (EPA) maximum and secondary contaminant levels. Primary standards (Profile I Reference Values) are based on the potential use of groundwater for drinking water and are established to protect human health; secondary standards (Profile II Reference Values) are for aesthetic qualities. Because groundwater in the Plan boundary has the potential to be used for drinking water and by wildlife, the Nevada primary standards would apply to mine-related activities that affect groundwater. NDEP is charged with protecting waters of the state, including groundwater, from degradation (NAC 445A.350 – 445A.447). Nevada drinking water standards and Profile II reference values are provided in Appendix 3A, Groundwater Quality Data spreadsheet.

Comparison of the Nevada water quality standards with groundwater quality data indicates that water quality is universally good, with no validated results in excess of Nevada Profile II

Reference Values except for one analysis from LCMW-13 for manganese. Reported total dissolved solids concentrations range from 150 mg/L to 350 mg/L. Field pH measurements range from 7.2 to 8.2. Concentrations of trace metals are typically below detection limits or reported at trace concentrations. Water quality data for groundwater and springs are provided in Appendix 3A, Groundwater Quality Data and Combined Smaller Springs Water Quality spreadsheets, respectively.

Water chemistry for groundwater samples obtained from wells and the springs is similar in composition and concentrations, as shown on the trilinear diagram, Figure 3.2-18, which shows relative concentrations of major ions. The chemical composition of most waters is a calcium-bicarbonate type, with a few other water types resulting from variable proportions of magnesium, sodium and potassium for cations, and sulfate and chloride for anions. A summary of the water quality information is provided below:

- Bicarbonate is the dominant anion, as is expected given the proximity of the carbonate bedrock in the study area.
- Calcium is the dominant cation and magnesium is typically the secondary cation. The calcium and magnesium are likely derived from dissolution of abundant limestone and dolomite in the study area.
- Sulfate concentrations are consistently low, averaging 15 mg/L, even in the vicinity of the ore body. This is expected, given the fully oxidized nature of the ore. Higher sulfate concentrations exist only at two locations: LCMW-12 (55 mg/L) and at the Oasis well (69 mg/L to 70 mg/L).
- Chloride concentrations are also consistently low, averaging 4 mg/L. Notably higher chloride concentrations exist only at two locations: the Oasis Well (21 mg/L to 24 mg/L) and Shafter well #6 (11 mg/L to 12 mg/L; although complete analyses were not reported).
- Higher concentrations of potassium and sodium were reported for basin fill wells LCMW-12, LCMW-13, Oasis Well, TW-01 and Shafter well #6 located at the Shafter well field, and bedrock well LCMW-5S. With the exception of the Oasis well samples, these higher concentrations of cations generally correspond with lower calcium and magnesium concentration. Higher sodium and potassium may result from dissolution of feldspars in volcanic source rocks within the Toano Range or lower concentrations of calcium and magnesium may result from cation exchange reactions with basin fill sediments (Golder, 2012).

**Water Use and Water Rights**

NDWR regulates water rights in Nevada. They grant permits for use (appropriations) of water rights that allow specific flow rates and volumes of water from groundwater, springs, and streams to be used for specific beneficial uses. NDWR maintains a water rights database and those records were reviewed for water use and water rights information relevant to the Proposed Action, as described below.

Surface Water Use

Surface water uses (excluding springs) are limited due to the lack of reliable surface water sources. Historically and currently, irrigation appears to be the primary use seasonally. The only water rights to streams within this analysis area for the proposed mining and processing facilities component of the Proposed Action, according to the NDWR (2012) database, are four water rights currently held by Fronteer Development for a combined diversion rate of 35.212 cfs from a stream source named Johnson Creek for irrigation use. However, this drainage rarely, if ever, produces this amount of flow. Based upon the location, it appears to be actually referring to the Johnson Springs system and Hardy Creek, described as follows. Two of these rights (numbers 58144 and 58148 in Section 28, T36N, R66E) include Johnson Springs as part of the source and the other two (numbers 58142 and 58143 in Sections 34 and 35, T36N, R66E) only include the creek (called Johnson Creek in the record, but officially named Hardy Creek).

Groundwater Use

In 1984, the State Engineer, under order O-842, designated the preferred water use within the northern area of Goshute Valley Groundwater Basin (Basin 187) as municipal, quasi-municipal and domestic. NDWR Hydrographic Area Summary (http://water.nv.gov/data/underground/) lists five water uses for the Goshute Basin: irrigation; mining and milling; municipal; quasi-municipal; and stock water (NDWR, 1984). The primary water use within the vicinity of the Plan boundary is municipal water supply for the Cities.

NDWR approved conveyance of four underground (groundwater) water rights from M & N Ranch to Fronteer Development (USA) Inc. in 2010 (NDWR, 2010). Those rights are shown in Table 3.2-7. In addition to these water rights, Newmont would lease 1.8 cfs (approximately 1,303 AFY) from the Cities during mine operations (Section 2.2.10). By virtue of Newmont's ownership of the Big Springs Ranch, it owns 0.34 cfs (approximately 242 AFY) of underground water rights designated for stockwater use (in addition to stream and spring source water rights).

**Table 3.2-7 Newmont Groundwater Rights**

| Permit Number | Priority Date | Duty (AFA) | Diversion (cfs) | Manner of Use | Source |
|---|---|---|---|---|---|
| **Fronteer Development (USA) Inc.** | | | | | |
| 41545 | 06/19/1980 | 1,423.26 | 1.97 | QM | Underground |
| 61418 | 06/19/1980 | 1,447.90 | 2.00 | QM | Underground |
| 61419 | 06/19/1980 | 1,447.90 | 2.00 | QM | Underground |
| 68083 | 06/19/1980 | 24.64 | 0.034 | Stock | Underground |
| | **Total** | **4,343.7** | **6.004** | | |

Source: NDWR, 2010
AFA = acre-feet annually
cfs = cubic feet per second
QM = quasi-municipal

Water Rights

For the Goshute Basin (Hydrographic Basin 187), the NDWR water rights database contains 451 water rights filings 59 on springs, 27 on streams, and 365 on groundwater (NDWR, 2012). Appendix 3B lists these water rights and includes information on their location, source, owner of record, and diversion rate, among other data. NDWR also provides Hydrographic Area Summaries for individual basins. The summary for the northern portion of the Goshute Basin (NDWR, 2012) provides the following information about current water appropriations:

- Perennial yield (the amount of water that can be withdrawn from a basin without reducing water storage) for groundwater is 11,000 AFY. Currently permitted and certificated rights total 11,548.69 AFY after adjusting the total for supplemental rights (Golder, 2012).
- The three largest permitted beneficial use of groundwater are 1) 5,935 AFY for municipal use, 2) 2,889.60 AFY for irrigation, and 3) 1,719.66 AFY for quasi-municipal.
- Of the remaining appropriations in the basin, 425.27 AFY are for stock water and 579.17 AFY are for mining and milling.
- Appropriations exceed perennial yield by approximately 69 acre-feet annually (AFA).

A summary of the Shafter well field and Big Springs water use and water rights summary is provided in Appendix 3A, Shafter & Big Springs Water Use spreadsheet.

Appropriated water is not always used, particularly for water appropriated for irrigation. NDWR has published crop and irrigation inventories for the basin annually for years 2007 through 2012. The crop inventories show only two owners of record with permitted irrigation water rights in the Goshute Valley Basin for this time period:

- Wendover Project and Star Living Trust with 2,249.6 AFA; and
- Big Springs Land and Resource Co., LLC with 640 AFA.

The inventories show that there were no crops (i.e., no irrigation water used) for the years 2009-2012. For 2008, a total of 504 acre-feet was pumped (126 acre-feet for Big Springs Land and Resource Co.) and for 2007 a total of 3,024 acre-feet was pumped for irrigation (1,008 acre-feet for Big Springs Land and Resource Co.) (NDWR, 2014).

#### 3.2.3.2 Power Supply Pipeline

**Precipitation**

The southern portion of the power supply pipeline corridor overlaps with the mining and processing facilities area, and thus climate characteristics would be essentially the same as described above for that area. As the power supply pipeline corridor continues northeastward, it is generally within the lower elevation valley bottoms, where precipitation levels may be similar to those at Oasis, Elko, and Wells. A weather station at Montello (located along the corridor) reports a mean annual precipitation of 8.28 inches (WRCC, 2013).

Temperature along the corridor is likely similar to that reported above for the Oasis station (Golder, 2012); the lower elevation Montello station data indicates a July mean normal maximum of 92.8°F and minimum of 48.5°F, and a January average maximum and minimum of 36.6°F and 9.7°F, respectively (WRCC, 2013). Annual free water surface evaporation is likely somewhat higher along much of the power supply pipeline corridor than at the mining and processing facilities area due to the lower overall elevations encountered by the pipeline.

**Surface Water**

The southern portion of the power supply pipeline corridor overlaps the mining and processing facilities' area described above. Within this area, the pipeline corridor crosses Sixmile Creek. As the corridor continues northeastward through upper Goshute Valley (Figure 3.2-1), it also crosses numerous intermittent or ephemeral tributaries to Sixmile Creek (although there appears to be no mapped surface channel connections with the creek). Nanny and East Squaw creeks are the only two of these channels that are named.

Continuing toward Tecoma Valley, the power supply pipeline corridor follows (and crosses numerous times) Loray Wash, the primary stream draining that valley. It also crosses several tributaries to Loray Wash, some named (Immigrant, Montello, Hoppie, and Charley creeks) and some unnamed. Loray Wash joins Thousands Springs Creek several miles east of the corridor, near Dake Reservoir. Within the area of the power supply pipeline corridor, the Federal Emergency Management Agency (FEMA) has mapped a 100-year floodplain associated with Loray Wash (FEMA, 2013).

At the town of Montello, the power supply pipeline corridor diverges from Loray Wash and heads north toward and upstream along Thousand Springs Creek (Figure 3.2-1). It crosses several of the creek's tributaries and the creek itself before reaching the proposed point of origin at the existing Ruby Pipeline. Thousand Springs Creek is tributary to Grouse Creek, joining it several miles east of the Nevada-Utah border.

All of the small tributary channels are mapped as intermittent or ephemeral, as is Loray Wash. Thousand Springs Creek is perennial in its upper reaches, but is mapped as intermittent or ephemeral within and near the analysis area. The only known flow records for any of these streams is for Thousand Springs Creek. For several years in the late 1980s, the creek was monitored by the USGS (gaging station #10172914) near the Nevada-Utah border. Those records (USGS, 2013c) indicate that, while intermittent, stream flow can occur in any month of the year. In some years, one or more of the summer months can have no reported flow. The maximum monthly mean flow rate during the few years of record was approximately 27 cfs and occurred in April 1986. This USGS gaging site is located several miles downstream of the analysis area and only encompasses a short period of record. However, it may give a general indication of the timing and range of flows that can be expected in the vicinity of the proposed Thousand Springs Creek pipeline crossing.

There are no known lakes or playas relevant to this aspect of the Proposed Action.

**Groundwater**

Known groundwater conditions are limited to the southernmost area where the route intersects the Plan boundary and directly adjacent to the Plan boundary to the northeast. The uppermost aquifer along the southernmost section of the pipeline corridor is the basin fill aquifer and depth to groundwater in October 2012 across this area ranged from about 75 feet below ground surface (bgs) near the southernmost end of the pipeline corridor (monitoring well LCMW-7) to about 235 feet bgs just to the northeast of the Plan boundary (monitoring well LCMW-6). The remainder of the pipeline corridor extends into Thousand Springs/Montello Valley Basin (Hydrographic Area 189D). The NDWR database indicates that 127 wells exist in the Montello basin. The minimum depth of these wells is 28 feet bgs (NDWR, 2012).

**Water Quality**

**Surface Water Quality**

The only known stream water quality data potentially relevant to the power supply pipeline corridor comes from two samples collected in June 1985 from Thousand Springs Creek close to the proposed pipeline's connection with Ruby Pipeline. Collected from the site designated as USGS #1017291190, the stream samples were analyzed for dissolved constituents, but not for suspended solids or sediments. Both pH and TDS were unremarkable for the region (USGS, 2013c). During occasional or infrequent runoff events, the streams likely convey moderate to high sediment loads. A search of Nevada's most recent (2008-2010) Integrated Report (NDEP, 2012) does not indicate any of the area streams are considered to be impaired for their beneficial uses (i.e., they do not appear on the 303(d) list).

**Groundwater Quality**

In the areas within and directly adjacent to the Plan boundary, groundwater quality is the same as for the mining and processing facilities area. Groundwater quality data are not available for the remainder of the pipeline corridor located in the Thousand Springs/Montello Valley Basin.

**Water Use and Water Rights**

**Surface Water**

Water use and water rights to streams within this analysis area for the power supply pipeline corridor of the Proposed Action have not been fully researched, as they would not be potentially impacted by the project. However, there are likely water rights and irrigation diversions associated with at least some of the streams crossed by this pipeline alignment.

**Groundwater**

For the portion of the pipeline corridor that is located within the Goshute Basin, the water use and water rights are the same as for the Proposed Action. For the portion that is located in the Thousand Springs/Montello Valley Basin (Hydrographic Area 189D), the NDWR water rights database contains 207 water rights filings: 27 for springs, 16 for streams, and 164 for groundwater (NDWR, 2012). Appendix 3B lists these water rights and includes information on their location, source, owner of record, and diversion rate, among other data.

#### 3.2.3.3 Cities' Water Supply

**Precipitation**

The Cities' water supply area is located immediately adjacent to the southern portion of the mining and processing facilities area, thus climate characteristics would be essentially the same as described above for the mining and processing facilities area.

**Surface Water**

Stream channels within the analysis area for the Cities' water supply include a couple of small, unnamed, ephemeral drainages that collect runoff from the east slopes of the Pequop Mountains. Their channel cross sections lose definition as they cross remnant alluvial fans before reaching Hardy Creek, which was described above under mining and processing facilities (USGS, 2013b). These small drainages were not within the East Mountain Front mountain block watershed that was defined by Golder (2012), but they would likely have similar runoff characteristics.

No stream channels within the analysis area for the Cities' water supply had an "ordinary high water mark" (OHWM) in the JBR (2013b) survey. Nor were any wetlands found or WOUS (JBR, 2013b). Greater detail on the WOUS survey is in Section 3.3.

**Springs**

The Cities are the primary users of groundwater discharge via springs within the Goshute Basin. The Cities' water supply is obtained in part from Big Springs of the Johnson Springs system. Much of the flow at Big Springs is immediately diverted for use by the Cities for municipal water supply (1 cfs under NDWR Permit #28527). Additional groundwater use by the Cities is discussed in the following section.

**Groundwater**

The Cities' water supply is currently obtained from the Shafter well field and Big Springs of the Johnson Springs system. The Shafter well field is located south of I-80 along the eastern perimeter of the Goshute Valley (Figure 3.2-2). The well field consists of six production wells, which are completed to depths ranging between 345 and 960 feet bgs; and have pumping capacities ranging from approximately 110 gpm to 850 gpm. Water is also currently pumped at a constant rate of approximately 450 gpm from a collection facility at Big Springs (Golder, 2012) (Appendix 3A, Big Springs Flow Data spreadsheet).

In August 2009, an aquifer test was performed at the Shafter well #6 located on the east side of the Goshute Valley, approximately 10 miles southeast of the Plan boundary. The aquifer test consisted of pumping the Shafter well #6 supply well at a rate of approximately 535 gpm for 48 hours and monitoring drawdown and recovery at both the pumping well and an observation well, TW-01, located 61 feet from the supply well. Both the Shafer #6 supply well and TW-01 are screened in the Goshute Valley basin fill aquifer. The maximum drawdown measured at the pumping and observation wells were approximately 289 and 29 feet, respectively. The groundwater level in the Shafter well #6 supply well recovered to within 0.17 feet of the pre-

pumping levels after 23 hours. Transmissivity estimates range from 1.7 x $10^3$ to 7.5 x $10^3$ $ft^2$/day, and are one to two orders of magnitude less in the vicinity of the Shafter well #6 supply well than the estimated aquifer transmissivities near BSR-1, located on the opposite side of the Goshute Valley (Golder, 2012).

**Water Quality**

**Surface Water Quality**

Water quality data for the drainages within the analysis area for the Cities' water supply are lacking due to the ephemeral nature of these drainages. Therefore, no analysis of surface water quality can be supported.

**Groundwater Quality**

Chemical analysis results are available for the Shafter well field (specifically TW-01 and Shafter well #6) installed in the basin fill aquifer. The water quality data for these locations is included in Appendix 3A, Groundwater Quality Data spreadsheet. The data indicate that the water quality in this area is similar to the other basin fill aquifer wells in the western side of the Goshute Basin in that the chemical composition of the groundwater is a calcium-bicarbonate type. However, as shown on Figure 3.2-12, groundwater quality in the Cities' water supply wells contain more sodium and potassium and more calcium than the wells in the other part of the basin.

**Water Use and Water Rights**

**Surface Water**

The only water usage and water rights to streams within this analysis area for the proposed Cities' water supply component of the Proposed Action, are those previously described for the mining and processing facilities component of the Proposed Action.

**Groundwater**

Of the total municipal water rights listed under the Proposed Action, Water Use and Water Rights sections above, the Cities have been granted 5,059 AFY. The combined duty for all well water rights for the Cities does not exceed 4,335 AFY (NDWR, 2012). The current water rights held by the Cities and their water use are listed in Appendix 3A, Shafter & Big Springs Water Use spreadsheet. These include water rights associated with both the Shafter well field and Big Springs.

### 3.2.3.4 North Facilities Alternative

**Precipitation**

The Northern Facilities Alternative would be located in the same area as the Proposed Action mining and processing facilities area (although the specific proposed facilities location would vary), thus climate characteristics would be essentially the same as described above for the Proposed Action.

**Surface Water**

Existing surface water conditions in the analysis area for the North Facilities Alternative are influenced by precipitation patterns (discussed above) and by groundwater (discussed below). There are no known lakes relevant to this aspect of the Proposed Action.

Stream characteristics relevant to the North Facilities Alternative are the same as were discussed above for the Proposed Action mining and processing facilities area. This alternative has a slightly different location for the Cities' water supply wells, but stream characteristics would be similar to those described above for the Cities' water supply wells Proposed Action location.

**Groundwater**

The North Facilities Alternative responds in part to scoping comments from the Cities related to potential impacts to their water supply. With regard to groundwater, this alternative includes the following components and considerations:

- The water supply well(s) for the mine operations and facilities would be located in Section 13 one mile east of the processing facilities.
- No mineral processing facilities would be positioned over the bedrock aquifer from which Big Springs emanates; all facilities would be situated over the alluvial aquifer; and
- Ground surface at the North Facilities Alternative is approximately 30 to 50 feet higher above the water table of the basin fill aquifer than where mine facilities would be located under the Proposed Action.

The water supply wells for the mining facilities would be installed in the basin fill aquifer to minimize the direct impacts on Big Springs and other surface water bodies.

**Water Quality**

**Surface Water Quality**

Stream water quality is the same for the North Facilities Alternative as it is for the Proposed Action.

**Groundwater Quality**

The groundwater quality for the North Facilities Alternative would be the same as for the Proposed Action.

**Water Use and Water Rights**

**Surface Water**

Water rights to streams within this analysis area for the North Facilities Alternative are the same as was previously discussed for the mining and processing facilities area, as obtained from the NDWR (2012) database.

**Groundwater**
The groundwater use and water rights for the North Facilities Alternative would be the same as for the Proposed Action.

#### 3.2.3.5 No Action Alternative

**Precipitation**
The No Action Alternative would take place in the same location as the Proposed Action, thus its climate characteristics would be essentially the same as those described above.

**Surface Water**
Existing surface water conditions in the analysis area for the No Action Alternative are the same as were discussed above for the Proposed Action.

**Springs**
Existing conditions for springs for the No Action Alternative are the same as for the Proposed Action.

**Groundwater**
Existing conditions for groundwater for the No Action Alternative are the same as for the Proposed Action.

**Water Quality**
**Surface Water Quality**
Water quality information for streams relevant to the No Action Alternative is the same as was discussed above for the Proposed Action.

**Groundwater Quality**
Existing water quality conditions for groundwater for the No Action Alterative are the same as for the Proposed Action.

**Water Use and Water Rights**
**Surface Water**
Water use and water rights affected environment is the same as was previously described for the Proposed Action.

**Groundwater**
No additional water use or water rights would be required.

## 3.3 Wetland and Riparian Resources

This section identifies and describes wetland and riparian resources that may be affected by the Proposed Action, North Facilities Alternative, or No Action Alternative. Also discussed in this

section are waters that may be jurisdictional under Section 404 of the Clean Water Act (CWA) and areas considered to be “waters of the state” of Nevada.

### 3.3.1 Areas of Analysis

#### 3.3.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for wetland and riparian resources includes the entire Plan boundary.

**Power Supply Pipeline**

The area of analysis for wetland and riparian resources includes the southern part of the power supply pipeline corridor that overlaps the area within the Plan boundary (Figure 2.2-1) and the proposed corridor as it continues northeast and then north to the existing Ruby Pipeline (Figure 2.2-8).

**Cities’ Water Supply**

The area of analysis for wetland and riparian resources occurs within the Plan boundary and Section 21, T35N, R66E.

#### 3.3.1.2 North Facilities Alternative

The area of analysis for wetland and riparian resources is the same as for the Proposed Action.

#### 3.3.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the approved exploration boundary, as described in the Expanded Long Canyon Exploration Project (BLM, 2011d).

### 3.3.2 Data Sources and Methodology

**Regulatory Framework**

Construction within certain streams and wetlands would require regulatory oversight by the United States Army Corps of Engineers (ACOE). The CWA is the primary federal law that governs and authorizes surface water quality control activities and is intended "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Section 404 of the CWA gives the ACOE authority to regulate construction activities which are considered a "discharge of dredged or fill material" when the activity occurs in a WOUS. WOUS are defined below, and include certain types of streams and wetlands. Fill is defined as any material used to convert an aquatic area to dry land or to change the bottom elevation of a water body. The ACOE jurisdiction over non-tidal WOUS extends to the “ordinary high water mark (OHWM) provided the jurisdiction is not extended by the presence of wetlands” under Title 33 CFR Part 328.4 and Title 40 CFR Part 230.3 (s)(1) (see Glossary in Chapter 7 for definition).

WOUS are defined by 33 CFR 328.3 as:

- All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide;

- All interstate waters including interstate wetlands;

- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
  - Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
  - From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
  - Which are used or could be used for industrial purpose by industries in interstate commerce.

- All impoundments of waters otherwise defined as WOUS under the definition;

- Tributaries of waters identified in paragraphs (a)(1)-(4) of 33 CFR 328.3;

- The territorial seas; and

- Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1)-(6) of 33 CFR 328.3.

Interstate waters have been defined by the federal water pollution control statutes prior to the CWA as "all rivers, lakes, and other waters that flow across, or form a part of, State boundaries." Under guidance issued by the EPA and ACOE, interstate waters include lakes, ponds, and similar lentic water features crossing state boundaries. Interstate waters remain jurisdictional waters under the CWA, even if such waters are not traditional navigable waters (TNW).

Additional guidance from the EPA clarifies that interstate waters are protected under the CWA. If a water body does not have a surface connection to an interstate water or a TNW, but there is a significant physical, chemical, or biological connection between the two, both waterbodies should be protected under the CWA. Additionally, the EPA recognizes and provides guidance that wetlands adjacent to either TNW or interstate waters are protected under the CWA (EPA and USACOE, 2011).

Wetlands have the potential to be protected under the CWA as WOUS and special aquatic sites. In addition, Executive Order 11990, Protection of Wetlands (42 *Federal Register* 26961), directs all federal agencies to minimize the destruction, loss, or degradation of wetlands, and to enhance the natural and beneficial values of wetlands. Federal regulation and management of wetlands follows a "no net loss" policy. Under Section 404, the ACOE issues a number of Nationwide Permits for different types of activities that result in minimal individual and cumulative adverse effects on the aquatic environment.

Wetlands are defined by the ACOE and EPA in 40 CFR 230.3 and 33 CFR 328.3 as:

- Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Special aquatic sites are defined by the ACOE and EPA in 40 CFR 230.3 as geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. Springs fall under the category of special aquatic sites.

In order to qualify for a permit, the construction (fill activity) must be the least environmentally damaging practicable alternative, so long as the alternative does not have other significant adverse environmental consequences (40 CFR 230.10(a)). The activity also needs to include water quality protection measures because under Section 401 of the CWA, the state water quality agency (e.g. NDEP's Bureau of Water Quality Planning) must certify that the permitted activity meets state and federal water quality standards. The ACOE permit would not be valid until the Section 401 Certification is issued.

There are no specific laws protecting riparian areas; however, the land management plans of federal agencies provide protection for riparian areas including the BLM's no net loss of wetland/riparian habitat policy. Federal agency management goals are to maintain, restore, and improve riparian areas to protect water quality, improve water retention and groundwater recharge, provide wildlife habitat, support biodiversity, and other goals.

Riparian areas are transitional zones that occur along watercourses or water bodies between terrestrial and aquatic systems exhibiting characteristics of both systems. They perform vital ecological functions linking terrestrial and aquatic systems within watersheds. Important functions of riparian areas include protecting aquatic ecosystems by removing sediments, decreasing flooding, maintaining water conditions for aquatic life, providing habitat for numerous plant and animal species, and providing organic material (NRCS, 2013d).

Riparian areas differ from surrounding lands because of unique soil and plant characteristics that are strongly influenced by free or unbound water in the soil. Examples of riparian areas include floodplains, streambanks, lakeshores, and wetlands. Riparian areas may exist within any land use area, such as cropland, hay land, pastureland, rangeland, and forestland (NRCS, 2013d).

Riparian habitats are often combined with wetlands (as a result of their intimate relationship to the hydrological regime) and perennial drainages; however, riparian areas differ from wetlands

in that they are generally linear, more terrestrial (less hydric), and are often dependent on a natural disturbance regime relating to flooding and stream dynamics (Naiman et al., 2005). Portions of riparian areas, such as wetlands and other WOUS, may be subject to federal regulation under provisions of the Food Security Act, the CWA, the National Environmental Policy Act (NEPA), and state and local legislation (NRCS, 2013d).

The BLM and United States Forest Service (USFS) evaluate the functional condition of riparian areas using a qualitative method called assessment of proper functioning condition. "Proper functioning" means the hydrological, vegetation, and soil erosion/deposition components on a stream system are in working condition, are resilient to disturbance, and provide adequate vegetation, landform, or debris to protect water resources, habitat, and biodiversity. Proper functioning condition can be applied to both lotic (streams) and lentic (ponds, wetlands) systems. The evaluation procedures for delineating the condition of these areas are specific to each of these types of systems and are more clearly defined in the BLM technical documents. The assessment of proper functioning condition should be used in conjunction with more quantitative methods (Prichard et al., 1998).

The Wells Resource Management Plan (RMP) (BLM, 1983) states that the planning criteria for riparian and wetland areas are to:

- Retain existing wetland/riparian/stream habitat under BLM administration;
- Manage and/or enhance wetland and riparian areas to improve them to, or maintain them in, at least a good condition class; and
- Consider special management standards for areas containing threatened and endangered species and/or protected sensitive species and/or those with existing or potential fishing use.

Additionally, long-term management actions stated in the Wells RMP Record of Decision (BLM, 1985) include improving areas of deteriorated riparian/stream habitat, managing areas in good or better condition so that declines in habitat quality do not occur, and closely managing new road construction and monitoring activities within riparian zones to minimize or eliminate impacts (BLM, 1985).

Waters of the State are defined by the State of Nevada in Nevada Revised Statute (NRS) 445A.415 as:

> All waters situated wholly or partly within or bordering upon this State, including but not limited to: All streams, lakes, ponds, impounding reservoirs, marshes, water courses, waterways, wells, springs, irrigation systems and drainage systems; and all bodies or accumulations of water, surface and underground, natural or artificial.

Construction activities on public and private lands in Nevada are subject to regulation by NDEP in order to protect the quality of waters of the State. NDEP administers the National Pollutant

Discharge Elimination System (NPDES) program, which requires an NPDES permit for construction activities where wetlands have been delineated as jurisdictional WOUS. As discussed below, no jurisdictional WOUS were identified within the Plan boundary.

Additionally, the Elko County Public Lands Policy Plan (Elko County, 2008) has three policies relating to wetlands, riparian habitat, and WOUS, which are stated as follows:

- Policy 13-1: Wetlands, riparian habitat, and waters of the US should be protected from undue degradation. Undue degradation may result from over pumping of groundwater, destruction of vegetation for over-development or misplacement of recreational facilities, poorly planned land dispositions, unintentional misuse of riparian resources by public and private users, and other actions.

- Policy 13-2: Wetlands, riparian habitat, and waters should be managed in a responsible and balanced manner with other resources and uses.

- Policy 13-3: Support a coordinated effort to protect wellhead protection areas and municipal watersheds from undue degradation through proactive zoning and development controls, pursuant to the County's Wellhead Protection ordinance.

#### 3.3.2.1 Proposed Action

**Mining and Processing Facilities**

JBR reviewed the Shafter, Independence Valley NE, Independence Valley SE, Pequop Summit, and Hardy Creek 7.5 Minute USGS topographic quadrangle maps and aerial photographs of the Plan boundary for indications of ephemeral, intermittent, and perennial drainages as well as mapped wetlands and spring locations. The United States Fish and Wildlife Service (USFWS) National Wetlands Inventory, and the USGS National Hydrography Dataset were reviewed for presence of these features within the Plan boundary. Additionally, wetlands and WOUS field surveys were conducted in fall 2012 and spring 2013 (JBR, 2013b).

**Wetlands**

Potential wetland areas and springs were assessed for wetland characteristics in accordance with the criteria in USACOE (1987) and as modified by USACOE (2008). Sample sites were established at each potential and mapped spring. Vegetation was visually observed in a one-square-meter quadrat for determining species dominance. Soil pits were excavated to determine presence or absence of hydric soils. Pits were excavated to a depth of 20 inches, or until either hydric soil indicators could be identified or a restrictive layer, such as bedrock or compacted soils, was reached. Soils types in each pit were identified using *Field Indicators of Hydric Soils in the United States, Guide for Identifying and Delineating Hydric Soils, Version 7.0* (NRCS, 2010). Indicators of hydrology were observed either on the surface or within the soil pit. If it was determined that a site had indicators of hydrophytic vegetation, hydric soils, and wetland hydrology, paired sample sites were used to identify the wetland boundary.

**Riparian Areas**
The Plan boundary area was investigated for all drainage and drainage-like features. Special attention was given to USGS-recognized drainages and spring locations and where aerial photography suggested a channel feature or spring existed. Those drainages that exhibited riparian habitat were noted.

**Power Supply Pipeline**
JBR reviewed the Twelvemile Ranch, Montello, Pilot Peak NW, Loray, Cobre SE, and Cobre 7.5 Minute USGS topographic quadrangle maps and aerial photographs of the power supply pipeline corridor for indications of ephemeral, intermittent, and perennial drainages as well as mapped wetlands and spring locations. The USFWS National Wetlands Inventory and the USGS National Hydrography Dataset were reviewed for presence of these features within the power supply pipeline corridor (USGS, 2013b).

The power supply pipeline corridor was investigated for all wetlands, springs, drainages, and drainage-like features. Special attention was given to USGS-recognized drainages and spring locations and where aerial photography suggested a channel feature or spring existed. Those drainages that exhibited riparian habitat were noted (JBR, 2013b).

**Cities' Water Supply**
Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.3.2.2 North Facilities Alternative
Data sources and methodologies are the same for the North Facilities Alternative as for the Proposed Action.

#### 3.3.2.3 No Action Alternative
Data sources and methodologies are the same for the No Action Alternative as for the Proposed Action.

### 3.3.3 Existing Conditions
#### 3.3.3.1 Proposed Action
**Mining and Processing Facilities**
The Plan boundary is located within the Goshute Valley Watershed (Basin 187) of the Spring-Steptoe Valleys Watershed Basin (HUC No. 16060008), which is part of the Central Region Watershed (Hydrographic Region 10) in central Nevada.

The condition of the riparian and wetland areas in this basin is varied, and results from a combination of natural and anthropogenic factors such as land use, weather events, and climate change. Land uses that may affect riparian/wetlands include water diversion and livestock grazing. Water diversions alter the availability of water resources, which support riparian areas by diverting water for other uses. A complete discussion of water use in the basin is presented

in Section 4.2. The riparian areas within the project area are affected by these activities since a portion of water from Big Springs is diverted for municipal and irrigation use. Livestock grazing, which can alter surface water flow patterns and reduce vigor of riparian communities, can also affect riparian and wetland areas within the basin. As mentioned above, BLM has its own protocol for evaluating condition of riparian areas, and many riparian areas on public land within the basin have been assessed. Most assessed riparian areas in the basin show impacts from livestock grazing. Riparian and wetland areas within the project area are not assessed using BLM's protocol because they are on private land. Due to the intensive livestock use within the riparian areas on these private lands, there are likely negative impacts associated with this land use.

A WOUS survey was conducted within the Plan boundary in fall 2012 and spring 2013 (JBR, 2013b). The survey determined that waters within the Plan boundary are not considered to be WOUS. The ACOE concurred with determination in a letter dated November 12, 2014 (USACOE, 2014).

**Wetlands**

Long Canyon Spring and the Johnson Springs system are located within the Plan boundary and were assessed for wetland characteristics. Figure 3.3-1 displays the wetlands delineated within the Plan boundary. Table 3.3-1 presents a summary of the springs surveyed as well as their wetland status.

**Table 3.3-1 Summary of Springs and Associated Wetlands Surveyed**

| Spring Name | Acres Jurisdictional Wetlands | Acres Non-Jurisdictional Wetlands | Justification/Wetland Status |
|---|---|---|---|
| Johnson Springs System | 0.00 | 389.58 | Wetland habitat permanently supported. The Johnson Springs system does not connect to a jurisdictional drainage, it is not an interstate waterway, and there is no surface interstate commerce associated with its use. |
| Long Canyon Spring | 0.00 | 0.00 | Long Canyon Spring does not support any wetland habitat. |
| **Total** | **0.00** | **389.58** | |

**<u>Johnson Springs System</u>**

The Johnson Springs system is made up of several spring heads and discharges groundwater to the surface resulting in localized perennial surface flows of water. Big Springs is the principal discharge point for the Johnson Springs system. The flow of Big Springs varies naturally due to changes in the distribution and quantity of precipitation in the recharge areas upgradient from the spring (Figure 3.2-4). Much of the flow is immediately diverted for use by the Cities for municipal purposes (1 cfs under NDWR Permit #28527) or by Big Springs Ranch for irrigation. An earthen dam was constructed downstream of the Johnson Springs system creating a large wetland complex behind the dam. Hardy Creek begins where the combined flow of the northern springs and the central springs converge into a single channel. Hardy Creek was dry during the 2012 and 2013 surveys. Section 3.2.3 provides detail on the hydrology of the Johnson Springs system.

Although the Johnson Springs system supports an extensive wetland area, it is connected to Hardy Creek, a non-jurisdictional drainage. The Johnson Springs system is not an interstate waterway and there is no surface interstate commerce associated with its use. Therefore, the Johnson Springs system is considered to be an isolated, non-jurisdictional feature and would not be subject to regulation under Section 404 of the CWA (USACOE, 2014).

In addition to the Big Springs discharge point, there are many smaller springs that are a part of the Johnson Springs system. JBR identified 22 springs via aerial photography associated with the Johnson Springs system within the Plan boundary; however, not all springs were visited during site surveys. All springs visited appeared to have hydrophytic vegetation, hydric soils, and wetland hydrology, and were therefore considered to be a part of wetlands associated with the Johnson Springs system (JBR, 2013b). These smaller springs are scattered along a north-trending zone from Big Springs northwards approximately 1.3 miles. It is likely that there are discharge points at lower elevations, especially in the form of gaining reaches (areas where the channel bottom is lower than the level of the surrounding groundwater table) in the headwaters of Hardy Creek (GHS, 2010). The wetland complex associated with the Johnson Springs system is located entirely on private land owned and managed by Newmont.

During the 2013 wetland delineation, JBR identified 389.58 acres that meet wetlands criteria, as defined by the ACOE, within the Plan boundary (JBR, 2013b); however, due to a lack of surface connection to a federally jurisdictional drainage it would be considered an isolated feature that is not an interstate waterway. There is no surface interstate commerce associated with the wetlands; therefore, this acreage is proposed to be non-federal waters.

Wetlands associated with the Johnson Springs system have been classified as Freshwater Emergent Wetland. This has been further broken into two basic communities during baseline surveys conducted by Great Basin Ecology, Inc. (GBE) including Emergent Marsh and Alkali Wet Meadow. GBE also identified the presence of irrigated meadows and crested wheatgrass seedlings; however, these are managed communities that result from higher moisture levels as a result of irrigation that occurs within with Plan boundary (GBE, 2012).

GBE identified the Emergent Marsh community as Alkali Emergent Marsh and Freshwater Emergent Marsh. Alkali Emergent Marsh is observed throughout the Johnson Springs system in isolated pockets of remnant channels, springs, and ponds. These habitats often integrate with Freshwater Emergent Marsh, which supports species indicative of more consistent freshwater output. Both Alkali Emergent Marsh and Freshwater Emergent Marsh are tolerant of extreme temperatures typically found in northeastern Nevada, including temperatures well below freezing (GBE, 2012). Common vegetation species observed include species such as hardstem bulrush (*Scirpus acutus*), broadleaf cattail (*Typha latifolia*), common mare's-tail (*Hippuris vulgaris*), and hemlock waterparsnip (*Sium suave*). As site conditions become drier (often upslope), the wetlands transition to Alkali Meadow. The Alkali Wet Meadow becomes more prominent toward the edge of the wetland complex (GBE, 2012).

**Figure 3.3-1 Inventoried Drainages and Wetlands within the Proposal Action**

Alkali Meadow and Alkali Wet Meadow differ in the level and duration of saturated soil conditions (GBE, 2012). Alkali Meadow occurs throughout the wetland integrating with wetter marsh systems, salt desert shrub, and sagebrush areas within the Johnson Springs system wetland complex. GBE identified that these areas predominantly supported alkaline tolerant perennial grasses, sedges, and forbs including fowl bluegrass (*Poa palustris*), foxtail barley (*Hordeum jubatum*), saltgrass (*Distichlis spicata*), alkali cordgrass (*Spartina gracilis*), scratchgrass (*Muhlenbergia asperifolia*), clustered field sedge (*Carex praegracilis*), Arctic rush (*Juncus arcticus*), seaside arrowgrass (*Triglochin maritima*), fringed willowherb (*Epilobium ciliatum* ssp. *ciliatum*), and rayless alkali aster (*Symphyotrichum ciliatum*) (GBE, 2012).

Long Canyon Spring

Long Canyon Spring is located in Long Canyon east of the Big Springs Ranch and is the only spring known to exist on public lands in the area. This spring has been developed for agricultural use. Two pipes have been installed at the discharge point and direct water from the spring into five troughs that have been assembled in a step-down fashion. The spring does not support hydrophytic vegetation or wetland habitat. The pipes were not discharging any water at the time of the 2013 delineation (JBR, 2013b). Furthermore, the area around the spring has been heavily disturbed and degraded due to ungulate use. Long Canyon Spring does not support hydrophytic vegetation, does not exhibit wetland hydrology, and has not developed hydric soils; therefore, it fails to meet all technical criteria for being considered a special aquatic site by the ACOE. Additionally, Long Canyon Spring is located adjacent to Long Canyon, a non-jurisdictional drainage, and would be considered an isolated feature regardless of whether or not it supports wetland habitat. Therefore, Long Canyon Spring is considered a non-jurisdictional feature and is not subject to regulation under Section 404 of the CWA (JBR, 2013b). This spring was classified by the BLM in 2000 as non-functional due to water development design (BLM, 2000).

**Riparian Areas**

Twenty-five drainages were identified within the Plan boundary. All are isolated with no interstate commerce use, and would not be subject to regulation under Section 404 of the CWA. Approximately 2.75 acres of non-jurisdictional drainages are present within the Plan boundary. Figure 3.3-1 displays the mapped drainages within the Plan boundary as well as the Proposed Action disturbance. Table 3.3-2 identifies the drainages surveyed and describes whether riparian habitat is present within each drainage.

Riparian areas within the Plan boundary are found primarily along the banks of Hardy Creek, which is located on private land. Vegetation communities are described as Alkali Wet Meadow (GBE, 2012). Hardy Creek is the primary waterway in the survey area and is the outflow of the Johnson Springs system; anthropogenic modifications have altered this system. Most notably, an earthen embankment has been constructed across the upper portion of Hardy Creek, most likely in an effort to improve grazing conditions for the Big Springs Ranch. This impoundment has caused the area immediately upgradient of the structure to become seasonally inundated. The inundated area now seasonally supports a large, open-water wetland ecosystem (JBR, 2013b). Hardy Creek begins where the combined flow of the northern springs and the

central springs converge into a single channel. Hardy Creek consists of a braided network of relict channels, some of which still support riparian habitat despite the lack of standing water in abandoned oxbows.

**Table 3.3-2 Summary of Drainages and Associated Riparian Areas Surveyed in the Plan Boundary**

| Drainage Name/Number | Acres Jurisdictional Waters | Acres Non-Jurisdictional Waters | Justification/Riparian Status |
|---|---|---|---|
| Hardy Creek | 0.00 | 2.75 | Although Hardy Creek supports wetland and riparian habitat and exhibits OHWM indicators, it does not connect to a jurisdictional drainage, it is not an interstate waterway, and there is no surface interstate commerce associated with its use. |
| Nanny Creek, Sixmile Creek, Long Canyon, and Unnamed Drainages 1 through 21 (Figure 3.3-1) | 0.00 | 0.00 | These drainages do not exhibit OHWM indicators or support riparian habitat. |
| | **0.00** | **2.75** | |

Dominant riparian vegetation associated with Hardy Creek consists of Woods' rose (*Rosa woodsii*), willow (*Salix* sp.), sedge (*Carex* sp.), rush (*Juncus* sp.), Kentucky bluegrass (*Poa pratensis*), and basin wildrye (*Leymus cinereus*).

**Power Supply Pipeline**

The power supply pipeline corridor is located within the Thousand Springs Valley Watershed (Basin 189D) of the Pilot-Thousand Springs Watershed Basin (HUC No. 16020307), which is part of the Great Salt Lake Region (Hydrographic Region 11) in eastern Nevada. Like the Goshute Basin, the Thousand Springs Valley Watershed is a "designated" watershed. On April 30, 1985, the State Engineer designated the Thousand Springs Valley Watershed as a ground water basin coming under the provisions of NRS 534 (Conservation and Distribution of Underground Waters) (NDWR, 1985).

The power supply pipeline corridor would run northeast along State Route 233 and then turn north at the town of Montello. Running north out of Montello, the power supply pipeline would follow Nevada County Road 765 and continue until meeting the Ruby Pipeline. This route crosses approximately 70 mapped drainages as identified on the 7.5 Minute USGS topographic quadrangle maps for the area. This route runs adjacent to the Johnson Springs wetland complex within the Plan boundary and through one spring north of Montello. Within the Plan boundary, the pipeline runs upgradient of the spring heads that feed the Johnson Springs wetland complex, and would bisect a portion of delineated wetland complex.

Approximately five miles north of Montello near the Gamble Ranch, the pipeline would run west of the Thousand Springs Valley. The pipeline would run through the outflow of Gamble Spring. Flow from Gamble Spring is collected behind an earthen dam pond. Outflow from this pond

runs east in a ditch where water is diverted into agricultural fields associated with the Winecup Gamble Ranch. According to the USFWS National Wetland Inventory, the pipeline would run adjacent to and outside of several mapped wetland and riparian areas (USFWS, 2013a). The pipeline would run across Thousand Springs Creek approximately 0.5 miles before reaching the Ruby Pipeline. This portion of Thousand Springs Creek is located downgradient of agricultural fields and was dry during the 2013 biological survey (JBR, 2013a). Waters associated with Thousand Spring Creek and the Thousand Springs Valley Watershed ultimately drain east to the Great Salt Lake Desert.

**Cities' Water Supply**

Approximately one cfs of water from Big Springs is diverted into the Cities' pipeline that begins at the spring house at Big Springs and traverses the valley where the flow is merged with that from the Shafter well field wells en route to West Wendover. The replacement municipal water supply for the Cities would run north from Section 21, T35N, R66E, where it would connect to the existing pipeline in Section 34, T36N, R66E. This water pipeline would cross approximately eight ephemeral and isolated channels. The pipeline would not cross any wetlands (JBR, 2013a).

#### 3.3.3.2 North Facilities Alternative

The existing conditions for the North Facilities Alternative are the same as those for the Proposed Action area for mining and process facilities; the summary of springs and associated wetlands presented in Table 3.3-1 and the summary of drainages and associated riparian areas presented in Table 3.3-2 for the Proposed Action are the same as those for the North Facilities Alternative. The North Facilities Alternative would relocate all the mine facilities except the pit and a borrow pit to the northeastern quadrant of the Plan boundary (Figure 3.3-2). This would result in the mine facilities being located further away from Big Springs; however, smaller adjacent springs would be located closer to proposed mine disturbance.

#### 3.3.3.3 No Action Alternative

The existing conditions for the No Action Alternative are the same as those for the Proposed Action area for mining and process facilities.

## 3.4 Geology and Minerals

The Plan boundary is located within the Basin and Range Physiographic Province, which encompasses the state of Nevada (Eaton, 1979). This province owes its name to the general geologic history common to this part of the country that has given rise to the present-day landscape of alternating generally north-south trending mountains and intervening valleys or basins.

The gold deposits at Long Canyon are located on the eastern flank of the Pequop Mountains, Elko County, Nevada. The Long Canyon gold deposits are hosted within the Cambrian-Ordovician aged marine limestones and dolomites of the Notch Peak Formation and the

Pogonip Group. The mineralization occurs as a series of subparallel northeast-trending zones. The gold mineralization at Long Canyon is best described as an oxidized sediment-hosted, Carlin-type gold mineralization where disseminated micron-sized to sub-micron-sized gold grains are often internal to iron-sulfide minerals and oxidation equivalents. Mineralization is thought to be Eocene in age (38 to 42 million years ago).

### 3.4.1 Areas of Analysis

#### 3.4.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis is the Plan boundary.

**Power Supply Pipeline**

The area of analysis includes the southern part of the power supply pipeline corridor that overlaps the area within the Plan boundary (Figure 2.2-1) and the proposed corridor as it continues northeast and then north to the existing Ruby Pipeline (Figure 2.2-8).

**Cities' Water Supply**

The area of analysis occurs within the Plan boundary and Section 21, T35N, R66E.

#### 3.4.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as the Proposed Action.

#### 3.4.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the approved exploration Plan boundary.

### 3.4.2 Data Sources and Methodology

#### 3.4.2.1 Proposed Action

**Mining and Processing Facilities**

Geological data and information were acquired primarily from existing geologic maps and reports: Smith et al., 2011; Eaton, 1979; SRK, 2012; SRK, 2013a; AUEX, 2010; Coats, 1987; Gustavson Associates, 2011; and USGS, 2013a. Additional data on mining claims, oil and gas leases, and geothermal leases were obtained from BLM's Legacy Rehost 2000 System (LR2000) (BLM, 2013a).

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

**Figure 3.3-2 Inventoried Drainages and Wetlands within the North Alternative**

#### 3.4.2.2 North Facilities Alternative

The data sources and methods for the North Facilities Alternative are the same as those for the Proposed Action.

#### 3.4.2.3 No Action Alternative

The data sources and methods for the No Action Alternative are the same as those for the Proposed Action.

### 3.4.3 Existing Conditions

#### 3.4.3.1 Proposed Action

**Mining and Processing Facilities**

The geology within the Plan boundary is shown on Figure 3.4-1.

Individual units are described in the following section and are shown in a stratigraphic column on Figure 3.4-2.

**Lithologies**

Ordovician/Cambrian

Notch Peak Formation - Cambrian carbonate rocks are widely distributed in the region, but are mostly referred to as "undifferentiated". The name "Notch Peak Formation" is used to describe mainly massive limestone and/or dolomite in adjacent ranges to the east, and has been adopted here.

The lowest mappable unit in the Notch Peak formation consists of a massive dolomite horizon approximately 100 feet thick exposed in the extreme south end of Long Canyon ridge.

Overlying the massive dolomite unit in the southern part of the Plan boundary is a unit of unknown thickness (probably up to nine hundred feet) of fairly massive dolomite and limestone with chert.

The cherty limestone unit grades upward into mainly limestone. This unit can be characterized by the predominance of fairly massive, medium- to thick-bedded, medium to pale grey, sparsely fossiliferous, finely crystalline limestone with areas of thinner, silty interbeds.

The highest unit in the Notch Peak Formation consists of a 225-foot thick sequence of massive dolomite. This unit ranges from light to dark grey in color, from coarse to (rarely) fine grained, and from massive to (rarely) well bedded (AUEX, 2010).

Pogonip Group - The Pogonip Group in the map area is up to 1,800 feet thick and is comprised of six main units and several sub-units. Nomenclature varies considerably throughout the region, likely a result of facies changes and the formation's broad regional extents (from eastern California to western Utah). Thorman (1970), following Hintze (1951), divided the Pogonip Group in the Wood Hills and Pequop Range into four formations, which include (from lowest to

highest) the Wahwah and Juab Limestone, Kanosh Shale, Lehman Formation and Crystal Peak Dolomite. The Wahwah and Juab Formations are also known as the Garden City Formation in the Toano Range. In the Toano Range, a quartzite referred to as the Swan Peak Quartzite occurs between the Lehman Formation and the Crystal Peak Dolomite. Smith et al. (2011) used a numbering system based on units felt to be consistently and reliably applicable in the field at the scale of mapping (approximately 1:2400).

The basal unit of the Pogonip Group in the Long Canyon area is the host for much of the mineralization in the Long Canyon deposit, and consists of thin-bedded, silty limestone with thicker (up to three feet thick) interbeds and areas of more massive limestone. Limestone ranges from medium grey to buff and typically weathers in a platy, rounded habit.

The second unit from the base is a massive, cliff-forming unit silty nodular limestone and dolomite exposed mainly in the northern part of the map area. The unit consists of massive beds of heavily burrowed limestone. Burrow fill consists of tan-weathering, partly dolomitic, silty, buff-colored, partially silicified limestone, giving the rock a “net-textured” or nodular appearance.

The third unit from the base consists of approximately 45 feet of white, cross-bedded quartz arenite. In the Wood Hills, this quartzite is named the “Kanosh Quartzite” by Thorman (1970). This unit is flanked by dolomitic sandy limestone in some areas.

The fourth unit from the base is a fairly massive, burrowed, “net textured” to nodular, silty limestone, as well as massively bedded limestone with minor wispy silt laminae, cherty limestone, and grainstone.

The next unit consists of a recessive weathering shale horizon, known regionally as the “Kanosh Shale”. The Kanosh Shale is rarely exposed, and is usually defined by a zone of grey to olive weathering shale and thin-bedded silty limestone float with minor outcrop of thin-bedded, silty limestone. The top unit consists mainly of grey limestone with silty beds. In some areas, this unit is overlain by the Crystal Peak dolomite, a thin, highly fossiliferous stratigraphic unit (AUEX, 2010).

<u>Ordovician</u>

Eureka Quartzite (Oe) - The Ordovician Eureka Quartzite caps the higher ridges above and to the north and west of the Long Canyon deposit. The Eureka quartzite consists of white to pale grey, hard, massive, variably cross-bedded orthoquartzite, and exceeds 300 feet in thickness in this area.

<u>Ordovician/Silurian</u>

Fish Haven Dolomite (SOd) - The Ordovician/Silurian Fish Haven Dolomite is a dolomite or dolomitic limestone that is commonly a dark gray that weathers to smoky brown. The beds are laminated, as much as five feet thick and cherty in many places (Coats, 1987).

**Figure 3.4-1 Geology**

**Figure 3.4-2 Stratigraphy of Long Canyon Project Area**

Devonian

Sevy Dolomite (Dd) - Sevy Dolomite Formation is light gray. This formation is very dense and weathers to light gray. The total thickness is approximately 450 feet (Coats, 1987).

Simonson Dolomite Formation (Dd) - The Simonson Dolomite is a medium to dark gray dolomitic rock with individual grains that can be seen by the unaided eye. The bedding is usually one to two feet in thickness with fine irregular laminations usually present. The total thickness is approximately 1,170 feet (Coats, 1987).

Guilmette Formation (Dgd) - The Guilmette is a light- to dark-bluish gray, generally medium-gray, thin- to thick-bedded, cliff forming, dense, medium-grained dolomite and limestone. The total thickness of the formation is 1,000 to 1,300 feet (Coats, 1987).

Mississippian/Devonian

Joanna Limestone (MDjp) - The Joana Limestone is characterized by coarse grained, medium gray, limestone beds. The limestone is medium bedded. Thickness of the formation ranges from 90 to 500 feet (Gustavson Associates, 2011).

Pennsylvanian/Mississippian

Ely Limestone (PPe) - In the central Pequop Mountains, the Ely Limestone is divided into five members: Member 1, the lowest, is 500 feet thick and consists of interbedded bioclastic, argillaceous, silty-sandy, and siliceous-cherty limestone, with subordinate units of calcareous, quartzitic siltstone to orthoquartzite, and chert-small-pebble conglomerate to conglomeratic limestone. Member 2 is 50 feet thick and contains a conglomeratic sequence of subrounded to subangular granules of chert and quartzite with secondary interbeds of sandy and pebbly limestone. Member 3 is about 537 feet thick and is similar to Member 1. Member 4 is 250 feet thick. Its composition is that of interbedded micritic limestone, dolomitic limestone, calcareous dolomite, gypsiferous limestone, hard siliceous fossiliferous limestone, silt, and fine-sand detritus. Member 5 is a cliff forming, medium- to thick-bedded unit that is very fine- to fine-grained limestone, argillaceous limestone, and silty to fine-sandy limestone. Chert nodules make up to five percent of this Member.

Chainman Shale (PPMdc) - The Chainman Shale consists of shale, siltstone, sandstone and conglomerate. The northern Pequop consists of black shale where the south Pequop is mostly siltstone. The various rock types alternate through the formation; however, the formation in a coarsening up sequence (Coats, 1987).

Diamond Peak Formation - The Diamond Peak is divided into two members in the southern Pequop Mountains. The lower member consists of consists of protoquartzite, small to medium pebble conglomerate, and some siliceous shale of argillite. The upper member is limestone in the lower three quarters and then upper quarter is the same as the lower member. The total thicknesses are; lower member 656 feet and upper member 775 feet (Coats, 1987).

Permian

Pequop Formation (Pp) - This formation is a purplish gray, thin irregularly bedded, platy limestone with interbedded fusiline coquinas. The thickness in the central Pequop Mountains is 1570 feet (Coats, 1987).

Tertiary

Sedimentary and Volcanics (Tr, Ts, Tt3) - These rocks consist of tuffs, vitric ash, tufficaceous siltstone and sandstone, conglomerate, and limestone (Coats, 1987).

Quaternary

Lacustrine Deposits (Qp) - These deposits include beach-and bar gravels and playa silts (Coats, 1987).

Alluvium (Qa) - These unconsolidated active deposits consist of silts, sands, and gravels along present streams; including a number of alluvial fans (Coats, 1987).

Table 3.4-1 shows the amounts of each waste rock type in the pit area as determined from drill cores.

**Table 3.4-1 Waste Rock by Material Type**

| Material Type | Percentage of Waste Rock | Tonnage of Waste Rock (MT) |
|---|---|---|
| Ki (Lamprophyre dike) | 1.00 | 6.0 |
| Alluvium | 6.19 | 37.2 |
| LC0 and LC1 (Pogonip limestone) | 44.1 | 264.6 |
| LC2 (Pogonip limestone) | 17.2 | 103.2 |
| LC3 (Pogonip limestone) | 3.32 | 19.8 |
| LC4 and LC5 (Notch Peak dolomite) | 21.6 | 129.6 |
| LC6 (Notch Peak limestone) | 0.74 | 4.2 |
| LC7 (Notch Peak limestone) | 5.88 | 35.4 |
| **Total** | **100** | **600** |

MT = million tons

**Structural Geology**

Long Canyon is more structurally complex on the south end, where the Notch Peak dolomite has been broken apart by a series of primarily northeast-striking, low and high angle normal faults. Geometries suggest a slightly earlier high angle component, with later lower angle faulting. Some of the faults are probably reactivated from Elko/Sevier compressional structures. Moving to the north, the dolomite is not broken apart, but logging and modeling have identified the structures extending. A series of northwest-striking, steeply dipping structures cut the northeast fabric, and may locally focus mineralization.

The latest phase of faulting in the Long Canyon area is represented by a large, north-trending, range bounding normal fault along the eastern edge of the Plan boundary. The existence of a range-front fault has been inferred by the presence of basins, a linear trend of the Johnson Springs system, and a rapid deepening of the basin fill on the east side of the fault. The deepening basin was identified as part of recent geophysical investigations in the area (Golder, 2012).

**Alteration and Mineralization**

Alteration is weak to strongly developed at Long Canyon. Typical alteration assemblages include decalcification, argillization, oxidation, hydrothermal dolomitization and local silicification. Variable decalcification and argillization are present primarily within the mineralized horizons. Strong, zoned oxidation is the most distinctive alteration associated with mineralization. Strong hematite oxidation is associated with the strongest mineralization. Local sewardite ($CaFe_2(AsO_4)_2(OH)_2$ ) is present in some of the highest grade mineralization. Minor silicification has been noted locally in logging, and is present on the surface at the south end of the deposit on Jasperoid Ridge. Mineralization is both stratigraphically and structurally controlled. Mineralization occurs most commonly at the upper and lower margins of the Notch Peak dolomite, but primarily within the limestone units. Mineralization within the dolomite tends to be structurally/breccia controlled, and is generally lower grade than in the adjacent limestone units. On the south end of the deposit, where the dolomite has been broken by faulting, these structures tend to be good hosts for mineralization. Age of mineralization at Long Canyon is unknown at this time, but is believed to be Eocene (38 to 42 million years ago).

Mineralization occurs as a series of subparallel northeast-trending zones. A resource of approximately 2.6 million ounces of gold occurs within the Plan boundary. The proposed project would mine from the open pit, approximately 29 million tons (MT) of ore and approximately 600 MT of waste rock for a total of 629 MT.

**Geologic Faults and Seismicity**

All earthquakes recorded since 1973 that occurred within a 50-mile radius of the Plan boundary are shown, with mapped Quaternary faults, on Figure 3.4-3 (USGS, 2013a; Oswald and Sawyer, 1998). In February 2008, a magnitude 6 earthquake struck northeastern Nevada, causing extensive damage in Wells, Nevada. This earthquake was the largest event in Nevada within the last 42 years, and the largest earthquake to occur in the Basin and Range Province in the last 15 years (NBMG, 2011). Damage in Wells was widespread, causing structural and non-structural damage to over half of the city's commercial and government buildings. Three houses were also destroyed in the earthquake. Details for this earthquake are described in Table 3.4-2. There have been no recorded earthquakes since 1973 within the boundaries of the Plan boundary. Faults and fault zones are shown in Table 3.4-3.

**Table 3.4-2 Earthquakes with Magnitude Greater than 5.0**

| Year | Latitude | Longitude | Depth (miles) | Magnitude $M_{L(ren)}$ |
|---|---|---|---|---|
| 2008 | 41.153 | -114.867 | 6.7 | 6.0 |

Source: USGS, 2013a

Ground shaking occurs during earthquakes and is commonly measured as a percent of the acceleration due to gravity (percent of gravity). According to national seismic hazard maps published by the USGS, the Proposed Action is located within an area where there is a 10 percent chance in the next 50 years that a peak ground acceleration of eight to nine percent of gravity would be exceeded. For the same area, there is a two percent chance in the next 50 years that a peak ground acceleration of 20 to 30 percent of gravity would be exceeded.

When an earthquake is strong enough, surface rupture will occur. The Basin and Range Province contains approximately 750 faults that have evidence of Quaternary movement. Fourteen historic earthquakes in the Intermountain Seismic Belt, in the Central Nevada Seismic Belt, and in the Eastern California Seismic Belt have had earthquakes large enough to rupture the ground surface.

**Table 3.4-3 Quaternary Faults and Fault Zones**

| Fault/Fault Zone | Age | Type | Slip Rate |
|---|---|---|---|
| Unnamed fault zone south of Pequop Summit (1588) | <1.6 MA | Normal | <0.2 mm/yr |
| Independence Valley fault zone, northern section (1582a) | <1.6 MA | Normal | <0.2 mm/yr |
| Independence Valley fault zone, southern section (1582b) | <130 ka | Normal | <0.2 mm/yr |
| Goshute Valley Fault Zone (1589) | <130 ka | Normal | <0.2 mm/yr |
| Unnamed faults north of Pequop Mountains (1587) | <1.6 MA | Normal | <0.2 mm/yr |

Source: Oswald and Sawyer, 1998

**Mineral and Energy Resource Authorizations and/or Leases Occurring in the Project Area**

The following lists the interests in geologic resources that could be impacted by the Proposed Action if they occur within or near the Plan boundary:

- Mining claims;
- Geothermal leases; and
- Oil and gas leases.

**Figure 3.4-3 Earthquakes (1973-Feb 2013) & Quaternary Faults**

An LR2000 Mining Claims Geographic Report was used to locate active mining claims in the Plan boundary. The following Township, Range, and Sections were searched:

- T42N, R69E Sections 31-34
- T42N, R68E Sections 36
- T41N, R69E Sections 3-10,15-22, 26-35
- T41N, R68E Sections 1, 12-13, 23-24, 36
- T40N, R69E Sections 2-11, 14-23, 26-35
- T40N, R68E Sections 1, 12-13, 24-25, 36
- T39N, R69E Sections 2-10, 15-22, 27-33
- T39N, R68E Sections 1-2, 11-15, 22-28, 33-36
- T38N, R69E Sections 4-8, 17-19, 30
- T38N, R68E Sections 1-5, 8-36
- T38N, R67E Sections 13, 22-28, 31-36
- T37N, R68E Sections 1-10, 17-19
- T37N, R67E Sections 1-24, 26-34
- T37N, R66E Sections 1, 11-15, 21-29, 32-36
- T36N, R67E Sections 4-8, 17-20, 29-32
- T36N, R66E Sections 1-36
- T36N, R65E Sections 1, 10-15, 22-27, 34-36
- T35N, R67E Sections 5-8, 17-20, 29-30
- T35N, R66E Sections 1-30
- T35N, R65E Sections 1-3, 11-14, 24-25

Table 3.4-4 identifies the active mining claims that are located within two miles of the Plan boundary.

**Table 3.4-4 Active Mining Claims**

| Lead File Number | Case Type | Claimant(s) | Location |
|---|---|---|---|
| NMC1001571 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC1003455 | 384101 | Enfocado Exploration Inc. | 35N 66E |
| NMC1003788 | 384101 | Pittston Nevada Gold Co Ltd | 36N 66E |
| NMC1003872 | 384101 | Pittston Nevada Gold Co Ltd | 36N 66E |
| NMC1007013 | 384101 | Pittston Nevada Gold Co Ltd | 35N 66E |
| NMC1007091 | 384101 | Pittston Nevada Gold Co Ltd | 36N 66E |
| NMC1009940 | 384101 | Fronteer Development USA Inc. | 35N 65E |
| NMC1020689 | 384101 | Fronteer Development USA Inc. | 37N 68E |
| NMC1026279 | 384101 | Genesis Gold Corp | 40N 69E |
| NMC1031511 | 384101 | Genesis Gold Corp | 40N 69E |
| NMC1047822 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC1051073 | 384101 | Newmont USA Ltd | 35N 65E |
| NMC1053229 | 384101 | WK Mining USA Ltd | 38N 67E |
| NMC1062893 | 384101 | Newmont USA Ltd | 37N 66E |

| Lead File Number | Case Type | Claimant(s) | Location |
|---|---|---|---|
| NMC1063100 | 384101 | Pittston Nevada Gold Co Ltd | 36N 66E |
| NMC1078491 | 384101 | Pittston Nevada Gold Co Ltd | 35N 66E |
| NMC704737 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC705722 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC742364 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC756905 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC806929 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC810872 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC814578 | 384101 | Pittston Nevada Gold Co Ltd | 35N 66E |
| NMC816749 | 384101 | Pittston Nevada Gold Co Ltd | 36N 66E |
| NMC817114 | 384101 | Jensen Bob | 35N 65E |
| NMC908173 | 384101 | Genesis Gold Corp | 41N 69E |
| NMC917721 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC918333 | 384101 | Columbus Gold (US) Corp | 35N 66E |
| NMC920249 | 384101 | Columbus Gold (US) Corp | 36N 65E |
| NMC920825 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC923331 | 384101 | Pittston Nevada Gold Co Ltd | 35N 66E |
| NMC930628 | 384101 | Columbus Gold (US) Corp | 35N 66E |
| NMC930637 | 384101 | Columbus Gold (US) Corp | 36N 65E |
| NMC932047 | 384101 | Pittston Nevada Gold Co Ltd | 36N 66E |
| NMC932340 | 384101 | Pittston Nevada Gold Co Ltd | 36N 66E |
| NMC936145 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC937148 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC937215 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC941368 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC946317 | 384101 | Pittston Nevada Gold Co Ltd | 35N 66E |
| NMC954750 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC960073 | 384101 | Pittston Nevada Gold Co Ltd | 35N 66E |
| NMC963017 | 384101 | L & S Mining | 38N 68E |
| NMC963020 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC985176 | 384101 | Agnico-Eagle (USA) Ltd | 36N 66E |
| NMC985238 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |
| NMC985340 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |
| NMC985886 | 384101 | Agnico-Eagle (USA) Ltd | 36N 66E |
| NMC986380 | 384101 | Enfocado Exploration Inc. | 37N 68E |
| NMC986422 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |
| NMC986460 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |
| NMC988052 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |
| NMC988100 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |
| NMC988166 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |
| NMC988200 | 384101 | Agnico-Eagle (USA) Ltd | 36N 65E |
| NMC989132 | 384101 | Agnico-Eagle (USA) Ltd | 36N 65E |
| NMC989231 | 384101 | Fronteer Development USA Inc. | 37N 68E |

| Lead File Number | Case Type | Claimant(s) | Location |
|---|---|---|---|
| NMC990110 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |
| NMC991393 | 384101 | Agnico-Eagle (USA) Ltd | 35N 65E |
| NMC993130 | 384101 | Agnico-Eagle (USA) Ltd | 36N 65E |
| NMC993806 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC993889 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC993925 | 384101 | Pittston Nevada Gold Co Ltd | 36N 65E |
| NMC994382 | 384101 | Pittston Nevada Gold Co Ltd | 35N 65E |
| NMC994413 | 384101 | Pittston Nevada Gold co Ltd | 36N 65E |
| NMC994525 | 384101 | Agnico-Eagle (USA) Ltd | 37N 66E |

Source: BLM, 2013a

BLM's LR200 was used to locate lands nominated for geothermal sale as well as any existing geothermal leases within the Plan boundary. The same Township, Range, and Sections as mining claims were searched.

No existing geothermal leases, and no lands identified for the potential of geothermal sale were identified.

BLM's LR2000 was used to locate authorized oil and gas leases. The same Townships, Ranges, and Sections as mining claims were searched.

Table 3.4-5 identifies the authorized oil and gas leases located within two miles of the Plan boundary.

**Table 3.4-5 Authorized Oil and Gas Leases**

| Serial Number | Township/Range | Sections | Total Acres | Case Type |
|---|---|---|---|---|
| NVN 090472 | T38N, R68E | 22, 24, 26, 28, 32, 34, and 36 | 4,942 | 311121 |

Source: BLM, 2013a

**Power Supply Pipeline**

Existing resources are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Existing resources are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.4.3.2 North Facilities Alternative

The existing conditions for the North Facilities Alternative are the same as those for the Proposed Action.

#### 3.4.3.3 No Action Alternative

The existing conditions for the No Action Alternative include the authorized exploration activities that are discussed in Section 2.2.

## 3.5 Soils

### 3.5.1 Areas of Analysis

#### 3.5.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for the mining and processing facilities portion of the Proposed Action is the area encompassed by the Plan boundary (Figure 2.2-1).

**Power Supply Pipeline**

The area of analysis for the power supply pipeline portion of the Proposed Action is the 50-foot power supply pipeline corridor.

**Cities' Water Supply**

The area of analysis for the Cities' water supply wells is Section 21, T35N, R66E, which is adjacent to the Plan boundary.

#### 3.5.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as that for the Proposed Action.

#### 3.5.1.3 No Action Alternative

The area of analysis for the No Action Alternative includes the previously approved exploration Plan boundary.

### 3.5.2 Data Sources and Methodology

#### 3.5.2.1 Proposed Action

**Mining and Processing Facilities**

Existing soil conditions in the Plan boundary were evaluated using data from the Natural Resources Conservation Service (NRCS), compiled specifically for this project (NRCS, 2011). Analysis of existing conditions focused on characteristics of soils within the areas of analysis for the Proposed Action. Descriptive and interpretive third-order soil association data from the NRCS was used for this section.

In addition, the suitability for soils in the Plan boundary to serve as growth medium during the reclamation process was evaluated for this section. Criteria used to determine suitability are included as Table 3.5-1.

The factors used for determining the suitability of soil as growth media include texture, percentage of coarse fragments, pH, and slope. Organic matter content and depth to high water table were not included in this analysis. Although organic material will be added to the material during stockpiling, which will increase the overall organic material content of the soil, most soils in this region contain very little organic matter naturally, and so organic matter content was not used as an indicator of suitability for growth media.

**Table 3.5-1 Criteria Used to Determine Growth Medium Suitability**

| Property | Topsoil/Growth Medium Suitability | | | | Restrictive Feature |
|---|---|---|---|---|---|
| | Good | Fair | Poor | Unsuitable | |
| Texture | Textures finer than sands and coarser than sandy clay and silty clay, with less than 35% clay | Loamy textures | Sand textures and clayey textures with <60% clay | >60% clay content | Excessive sands or clays |
| Organic Matter Content | >3% | <3% but greater than 1% | 0.5 to 1.0% | <0.5% | Low fertility |
| Coarse Fragments (0-40 inches) | <15% by volume | 15-25% by volume | 25-35% by volume | >35% | Equipment restrictions and low fertility |
| Depth to High Water Table | -- | -- | <1 foot to high water | Perennial wetness | Equipment restrictions |
| Soil Reaction - pH[1] (0-40 inches) | 6.0 to 8.0 | 5.0 to 6.0<br>8.0 to 8.5 | 4.5 to 5.0<br>8.5 to 9.0 | <4.5 or >9.0 | Excessive acidity or alkalinity |
| Slope Steepness | <8% slope | 8 to 25% slope | 25 to 40% slope | >40% slope | Equipment restrictions |

Sources: Soil Survey Division Staff, 1993 and NRCS, 2005
[1]pH in standard units

The depth of growth medium needed for reclamation is dependent on the characteristics of the material to be covered and the effectiveness of the bond between the base material and the applied growth medium. A six-inch depth of loose topsoil is likely to settle by one to two inches after reclamation. A final depth of three to six inches after settling is sufficient, with adequate irrigation, to establish grasses and legumes (NDEP, 1994). Table 3.5-2 shows the volume of material required to obtain various depths of growth medium applied during reclamation activities. Based on these calculations, approximately 807 cubic yards of growth medium would be required for every acre of land to be reclaimed to attain a pre-settling depth of six inches of loose topsoil.

Recommended salvage depths for each soil association horizon were estimated based on the depth of any soil horizon with fair or good suitability for growth medium. Soils with poor suitability and those considered unsuitable were not recommended for salvage.

**Table 3.5-2 Material Volume for Application of Growth Medium to Various Depths**

| Desired Depth of Growth Medium Application (inches) | Cubic Yards per 1,000 Square Feet Required | Cubic Yards per Acre Required |
|---|---|---|
| 1 | 3.1 | 134.4 |
| 2 | 6.2 | 268.9 |
| 3 | 9.3 | 403.3 |
| 4 | 12.4 | 537.8 |
| 5 | 15.5 | 672.2 |
| 6 | 18.6 | 806.7 |

Source: NDEP, 1994

**Power Supply Pipeline**

The data source and methods used for the power supply pipeline are the same as those used for the mining and processing facilities area.

**Cities' Water Supply**

The data source and methods used for the Cities' water supply are the same as those used for the mining and processing facilities area.

#### 3.5.2.2 North Facilities Alternative

The data source and methods used for the North Facilities Alternative are the same as those used for the Proposed Action.

#### 3.5.2.3 No Action Alternative

The data sources and methods used for the No Action Alternative are the same as those used for the Proposed Action.

### 3.5.3 Existing Conditions

Soils in and near the areas affected by the alternatives vary in depth, texture, erosion potential, and other characteristics based on several soil forming factors. These natural characteristics along with anthropogenic effects influence soil quality such as aggregate stability, compaction, organic matter, and other attributes, which is defined by NRCS as the "ability of a soil to perform the functions necessary for its intended use" (NRCS, 20013e). Soil surveys conducted by the NRCS classify soils based on natural conditions such as soil forming factors, and BLM uses its own protocols and anecdotal data to analyze soil quality conditions that result from land management type and intensity of use. Monitoring and assessment of soil condition have not been completed specifically for this project, but anecdotal and other data from previous analyses have been extrapolated to describe soil quality within and near the areas affected by the alternatives.

Soil quality in the areas analyzed is affected by a variety of natural and anthropogenic factors such as land use, weather events, climate change, and wildland fire. Land uses that affect soil quality include livestock grazing, construction and use of roads, cultivated agriculture, minerals exploration, and surface occupancy. These activities impact soil quality in varying degrees

ranging from complete alteration of soil attributes to diffuse impacts that result in small alterations to soil quality, or change soil quality slowly over time. The area is mostly undeveloped, but there are some heavy impacts such as roads, drill pads, structures and areas of livestock concentration where impacts to soils result in little or no soil productivity. Soil functions applicable for rangeland and grazing include the ability of soil to sustain biological diversity, activity, and production; to regulate and partition water and solute flow; to store and cycle nutrients and carbon; and to provide physical stability and support for plants (NRCS, 2013e). Most roads are associated with minerals exploration activities. These areas constitute less than one percent of the landscape in and near the affected area.

Livestock grazing, wildland fire, cultivated agriculture, and vegetation treatments have affected a considerable portion of soils within the affected area. Aerial photography shows that approximately 15 percent of the project area has undergone some kind of vegetation community alteration likely the result of mowing, seeding irrigation, and/or intensive livestock grazing. These land uses have permanently altered vegetation in affected areas and associated alterations to soil quality have also likely occurred. Fire history data indicate that two percent of the project area has burned in wildland fire in the past 20 years. BLM monitoring has indicated areas that were seeded following the fire have recovered with native vegetation; however, portions of the fire that burned on private land were not reseeded and may have a higher occurrence of non-native and annual species. These shifts in plant communities can have negative impacts to soil quality. Livestock grazing occurs in a large portion of the project area, and can also result in negative effects to soil quality. BLM data indicate that grazing has not resulted in impacts to soil quality that are heavy enough to change infiltration rates or shift vegetation communities except in a few areas near water resources and along livestock trails.

#### 3.5.3.1 Proposed Action

The Plan boundary lies in the Basin and Range Province in the western United States. Soils within the Plan boundary and within the 50-foot power supply pipeline are derived from a variety of parent materials, although sedimentary marine rocks are the parent material for the majority of soils within the Plan boundary boundary. Parent materials for some of the other soils in the Plan boundary boundary include mixed rocks, lacustrine (lake) deposits, and volcanic deposits.

Soils within the area of analysis are generally moderately deep (between 40 to 60 inches), although some shallower soils do exist. The deepest soils occur on alluvial fans and terraces. The shallower soils are present along ridges and other areas of rock outcrops. Soils in the Proposed Action Plan boundary exhibit a variety of textures, and are generally neutral to moderately alkaline (basic). The upper portion of Soil map unit 183 (Sonoma-Sonoma, occasionally flooded association) is the only soil unit within the Plan boundary that is classified as hydric. Soil map unit 183 occupies approximately 2.5 acres along the power supply pipeline corridor. A more detailed description of the third-order soil associations within the Plan boundary boundary and the associated 50-foot gas line corridor is provided below.

**Mining and Processing Facilities**

Third-order soil surveys are produced for land uses that do not require detailed soils information, and are commonly conducted for areas with a single land use, such as range and forest lands (Soil Survey Division Staff, 1993). The mining and processing facilities area encompasses 13 third-order NRCS soil map units (Figure 3.5-1). A table of soil units in the mining and processing area, Table 3C-1, is in Appendix 3C.

The majority of soil resources within the project boundary area are classified as well drained soils. Soil textures are generally loamy with a high percentage of coarse fragments. Slope steepness in the basin ranges from two to 50 percent, reflective of the area, which transitions from relatively flat alluvial basin at approximately 5,600 feet AMSL to high slopes of the Pequop Mountains at elevations of almost 8,500 feet AMSL. Soil depths in the Plan boundary range from rock outcrop areas with little measurable soil to profiles greater than five feet thick.

**Prime Farmland**

Prime farmland is classified as available lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops (Soil Survey Division Staff, 1993). Prime soils have the quality, growing season, and moisture supply needed to produce economical crops, including few or no rocks. There are no soils classified as prime farmland within the Plan boundary. Lands designated as Farmland of Statewide Importance are not Prime Farmland. In Nevada, Farmland of Statewide Importance includes all farmland with a full or partial irrigation water supply (NRCS, 2013a). The only soil unit in the Plan boundary that is classified as Farmland of Statewide Importance is soil unit 1213 (Blimo - Threesee association). There are approximately 2,479 acres of this soil unit within the Plan boundary area.

**Erosion Potential**

The erosion potential of soils within the project boundary ranges from low to moderate, indicating that the soils in the area are minimally to moderately susceptible to wind and water erosion. In general, soils with more fine-grained particles are more susceptible to both wind and water erosion; exposure to heavy vehicular traffic and other pulverizing mechanisms would result in an increase in the erodibility of soils in the project boundary. Higher percentages of coarse fragments at the surface and more vegetative cover would serve to decrease soil erodibility.

**Power Supply Pipeline**

The power supply pipeline corridor covers 22 third-order NRCS soil map units (Figure 3.5-2). A table showing soil units along the power supply pipeline route, Table 3C-2, is in Appendix 3C.

The majority of soil resources along the 50-foot power supply pipeline corridor are classified as well drained soils. Soil textures are generally loamy with a high percentage of coarse fragments. Slope steepness ranges from two to 50 percent. Soil depths in the power supply pipeline corridor range from 15 inches with no measurable soil to profiles greater than five feet thick.

**Figure 3.5-1 NRCS Soil Map Units in the Project Area**

**Figure 3.5-2 NRCS Soil Map Units along Power Supply Pipeline**

**Prime Farmland**
Five soil units in the power supply pipeline corridor are classified as farmland of statewide importance. Soil unit 183 (Sonoma-Sonoma, occasionally flooded association), soil unit 186 (Sondoa-Ixian-Ixian, strongly saline-Sodic association), soil unit 432 (Ocala-Ixian association), soil unit 1213 (Blimo-Threesee association), and soil unit 2080 (Toano-Toano association) are considered farmland of statewide importance.

Many of the soil units within the power supply pipeline corridor have a loamy texture, and often contain coarse fragments. The only soil unit in either the project boundary area or the power supply pipeline corridor was identified as being hydric is soil unit 183, the Sonoma-Sonoma unit, (occasionally flooded association) (Table 3C-2).

**Erosion Potential**
The erosion potential of soils within the power supply pipeline corridor ranges from low to moderate, indicating that the soils in the area are minimally to moderately susceptible to wind and water erosion. In general, soils with more fine-grained particles are more susceptible to both wind and water erosion; exposure to heavy vehicular traffic and other pulverizing mechanisms would result in an increase in the erodibility of soils in the project boundary. Higher percentages of coarse fragments at the surface and more vegetative cover would serve to decrease soil erodibility.

**Cities' Water Supply**
Existing conditions for the soil resources within the area for the portion of the Proposed Action related to the Cities' water supply were included in the mining and processing facilities analysis.

#### 3.5.3.2 North Facilities Alternative
Existing conditions for the soil resources within the area for the North Facilities Alternative is the same as that for the Proposed Action.

#### 3.5.3.3 No Action Alternative
The existing soil conditions for the No Action Alternative are the same as those for the Proposed Action.

## 3.6 Air Resources

### 3.6.1 Areas of Analysis
#### 3.6.1.1 Proposed Action
**Mining and Processing Facilities**
The air quality area of analysis occurs within a 50-kilometer (31-mile) radius surrounding the Plan boundary. This area includes all maximum predicted impact areas where air dispersion modeling showed a significant contribution to the ambient air quality as shown in the *Air Quality Assessment Report* (EMA, 2013). In addition, the area includes a 200-meter (656-foot) corridor centered along I-80, the associated access roads, and power supply pipeline corridor.

**Power Supply Pipeline**

The area of analysis is the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

The area of analysis is the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.6.1.2 North Facilities Alternative

The air quality area of analysis for the North Facilities Alternative is the same as for the Proposed Action.

#### 3.6.1.3 No Action Alternative

The air quality area of analysis for the No Action Alternative occurs within the approved exploration Plan boundary.

### 3.6.2 Data Sources and Methodology

**Regulatory Framework**

The regulatory framework for air quality includes state and federal rules, regulations, and standards. The EPA codifies the air quality framework and delegates the NDEP, Bureau's of Air Quality Planning and Air Pollution Control (BAPC) to implement and enforce the state and federal rules, regulations, and standards. The Clean Air Act (CAA) requires the EPA to establish the National Ambient Air Quality Standards (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 ($PM_{10}$) in diameter or less, particulate matter 2.5 microns ($PM_{2.5}$) in diameter or less, and sulfur dioxide. Table 3.6-1 lists the final rule of the NAAQS as signed on June 2, 2010.

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 classify the region. A Non-Attainment classification represents an area in which monitoring data shows 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 that 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. The federal PSD regulations limit the maximum allowable increase of certain pollutants in Class I, Class II, and Class III Areas as shown in Table 3.6-2. There are no Class I Areas located within 100 kilometers (62 miles) of the Plan boundary. The Jarbidge Wilderness Area is located approximately 140 kilometers (87 miles) northwest of the Plan boundary. Class II Areas are regions that have been designated as Non-Attainment or Maintenance. The closest Class II Area to the Plan boundary is Hydrographic Basin 191, located approximately 20 kilometers (12 miles) to the east of the Plan boundary. The Plan boundary is located in Hydrographic Basin 187, which is in Attainment for all pollutants.

**Table 3.6-1 National Ambient Air Quality Standards**

| Pollutant [final rule cite] | | Primary/ Secondary | Averaging Time | Level | Form |
|---|---|---|---|---|---|
| Carbon Monoxide [76 FR 54294, Aug 31, 2011] | | primary | 8-hour | 9 ppm | Not to be exceeded more than once per year |
| | | | 1-hour | 35 ppm | |
| Lead [73 FR 66964, Nov 12, 2008] | | primary and secondary | rolling 3 month average | 0.15 $\mu g/m^3$ | Not to be exceeded |
| Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] | | primary | 1-hour | 100 ppb | 98th percentile, averaged over 3 years |
| [61 FR 52852, Oct 8, 1996] | | primary and secondary | annual | 53 ppb | Annual mean |
| Ozone [73 FR 16436, Mar 27, 2008] | | primary and secondary | 8-hour | 0.075 ppm | Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years |
| Particle Pollution Dec 14, 2012 | $PM_{2.5}$ | primary | annual | 12 $\mu g/m^3$ | Annual mean, averaged over 3 years |
| | | secondary | annual | 15 $\mu g/m^3$ | Annual mean, averaged over 3 years |
| | | primary and secondary | 24-hour | 35 $\mu g/m^3$ | 98th percentile, averaged over 3 years |
| | $PM_{10}$ | primary and secondary | 24-hour | 150 $\mu g/m^3$ | Not to be exceeded more than once per year on average over 3 years |
| Sulfur Dioxide [75 FR 35520, Jun 22, 2010] | | primary | 1-hour | 75 ppb | 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
| [38 FR 25678, Sep 14, 1973] | | secondary | 3-hour | 0.5 ppm | Not to be exceeded more than once per year |

Source: EPA, 2013
ppm = parts per million; $\mu g/m^3$ = Micrograms per cubic meter; ppb = parts per billion

The CAA also enacted the New Source Performance Standards (NSPS) for specific types of new or modified equipment located at affected sources. The NSPS regulations limit emissions

from source categories to minimize the deterioration of the ambient air quality. In addition to the NSPS regulations, the CAA also enacted the National Emission Standards for Hazardous Air Pollutants (NESHAP). NESHAP regulations focus on pollutants known to cause serious health effects or serious environmental effects. The Plan boundary would include equipment that is subject to various NSPS and NESHAP regulations.

**Table 3.6-2 Prevention of Significant Deterioration Limits**

| Pollutant | Averaging Time | Maximum Allowable Increase (µg/m3) | | |
|---|---|---|---|---|
| | | Class I Area | Class II Area | Class III Area |
| $PM_{2.5}$ | Annual | 1 | 4 | 8 |
| | 24-hour | 2 | 9 | 18 |
| $PM_{10}$ | Annual | 4 | 17 | 34 |
| | 24-hour | 8 | 30 | 60 |
| $SO_2$ | Annual | 2 | 20 | 40 |
| | 24-hour | 5 | 91 | 182 |
| | 3-hour | 25 | 512 | 700 |
| $NO_2$ | Annual | 2.5 | 25 | 50 |

Source: OFR, 2013

The 1990 CAA Amendment introduced a new federal operating permit program, the Title V Permit. Title V Permits are required for facilities with the potential to emit greater than 100 tons per year of a regulated pollutant, 10 tons per year of any single hazardous air pollutant, or 25 tons per year of any combination of hazardous air pollutants.

#### 3.6.2.1 Proposed Action

**Mining and Processing Facilities**

One year of on-site meteorological data (03/01/2011 through 02/29/2012) was used in the modeling analysis, which follows. The meteorological data was collected by IML Air Science and processed by AECOM using AERMET Version 12345. Cloud cover data was used from the Wendover/AF (WBAN 24193) weather station in the AERMET Stage 3 planetary boundary layer parameterizations. Upper air soundings from the Elko, Nevada National Weather Service Station were used (WBAN 24121).

Historical data on meteorological conditions from the Western Regional Climate Center and the National Oceanic and Atmospheric Administration were analyzed for the area of analysis.

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.6.2.2 North Facilities Alternative

The data sources and methodology used to describe the existing air quality for the North Facilities Alternative are the same as the Proposed Action.

#### 3.6.2.3 No Action Alternative

The data sources and methodology used to describe the existing air quality for the No Action Alternative are the same as the Proposed Action.

### 3.6.3 Existing Conditions

#### 3.6.3.1 Proposed Action

**Mining and Processing Facilities**

**Local Climatological Conditions**

The Plan boundary is located at approximately 5,800 feet AMSL on the eastern flank of the Pequop Mountain Range in Goshute Valley. Terrain to the west of the Plan boundary increases in elevation due to the Pequop Mountains running north and south. Winds are affected by the local terrain and topography, and generally flow from the south or north due to the mountain ranges to the east and west of the Plan boundary. Atop the mountain ranges, winds exhibit a stronger west to east flow, which translates to winds flowing predominately from the west or northwest at the Plan boundary. Wind speeds are generally highest in the daylight hours and lighter throughout the night.

Existing conditions in the Plan boundary include a four-season environment that ranges in intensity depending on elevation. Valley locations register warmer mean temperatures than those found in higher elevations. Greater precipitation and snowfall occur in the higher elevations and less on the valley floor. Table 3.6-3 summarizes the meteorological conditions found near the Plan boundary.

**Table 3.6-3 Meteorological Conditions Near the Project Area**

| Monitor | Elevation (feet) | Winter | Spring | Summer | Fall | Annual |
|---|---|---|---|---|---|---|
| **Mean Seasonal Temperature Average (°F)** | | | | | | |
| Oasis | 5,830 | 25.0 | 43.2 | 65.2 | 45.3 | 44.7 |
| Pequop | 6,030 | 26.5 | 41.5 | 64.5 | 45.6 | 44.5 |
| Wendover WSO Airport | 4,240 | 29.9 | 51.7 | 75.9 | 52.3 | 52.5 |
| Montello 1 SE | 4,900 | 25.6 | 45.5 | 67.6 | 46.6 | 46.3 |
| Wilkins | 5,640 | 24.5 | 40.9 | 61.9 | 44.0 | 42.8 |
| Wells | 5,650 | 25.4 | 42.9 | 64.6 | 44.9 | 44.5 |
| Currie Highway STN | 5,820 | 25.5 | 42.7 | 64.0 | 45.1 | 44.4 |
| **Mean Seasonal Precipitation Average (inches)** | | | | | | |
| Oasis | 5,830 | 1.82 | 2.88 | 2.02 | 1.86 | 8.58 |
| Pequop | 6,030 | 2.98 | 3.51 | 2.98 | 2.83 | 12.30 |
| Wendover WSO Airport | 4,240 | 0.81 | 1.57 | 1.10 | 1.10 | 4.59 |
| Montello 1 SE | 4,900 | 1.55 | 1.95 | 1.91 | 1.55 | 6.95 |
| Wilkins | 5,640 | 3.05 | 3.18 | 1.95 | 1.73 | 9.89 |

| Monitor | Elevation (feet) | Winter | Spring | Summer | Fall | Annual |
|---|---|---|---|---|---|---|
| Wells | 5,650 | 2.79 | 3.12 | 1.70 | 2.26 | 9.85 |
| Currie Highway STN | 5,820 | 1.32 | 1.71 | 2.51 | 1.62 | 7.16 |
| **Mean Snow Fall Average (inches)** | | | | | | |
| Oasis | 5,830 | 16.5 | 5.4 | 0.1 | 3.0 | 25.0 |
| Pequop | 6,030 | 24.9 | 12.6 | 0.0 | 5.8 | 43.3 |
| Wendover WSO Airport | 4,240 | 4.3 | 0.7 | 0.0 | 0.5 | 5.5 |
| Montello 1 SE | 4,900 | 13.1 | 2.6 | 0.0 | 2.2 | 17.9 |
| Wilkins | 5,640 | 29.7 | 8.1 | 0.1 | 2.8 | 40.6 |
| Wells | 5,650 | 29.2 | 13.1 | 0.2 | 6.8 | 49.3 |
| Currie Highway STN | 5,820 | 15.3 | 7.3 | 0.0 | 3.0 | 25.6 |
| **Mean Snow Cover Average (inches)** | | | | | | |
| Oasis | 5,830 | 2.0 | 0.3 | 0.0 | 0.0 | 1.0 |
| Pequop | 6,030 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Wendover WSO Airport | 4,240 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Montello 1 SE | 4,900 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Wilkins | 5,640 | 2.3 | 0.3 | 0.0 | 0.0 | 1.0 |
| Wells | 5,650 | 2.7 | 0.3 | 0.0 | 0.0 | 1.0 |
| Currie Highway STN | 5,820 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Source: WRCC, 2013

**Regional Air Quality**

The area of analysis and immediate surrounding areas are currently in Attainment or unclassified for all criteria pollutants. Monitoring of criteria pollutants has been discontinued in the area since the late 1990s when the EPA allowed monitoring to cease where monitoring showed less than 60 percent of the NAAQS. Ongoing monitoring in the state of Nevada is conducted primarily in urban areas where ambient air pollution concentrations are known to be close to the EPA limits. These sites are not representative of the rural project location. Background concentrations for modeled pollutants were selected using monitoring stations located in unindustrialized smaller communities in the surrounding states.

Background concentrations for particulates used the Great Basin National Park IMPROVE site, located in White Pine County, Nevada. The $PM_{10}$ background concentrations for the 24-hour period used the average of the highest 24-hour period during the 2005-2007 period of record. Annual background concentrations for $PM_{10}$ and $PM_{2.5}$ used the average annual concentration over the period of record. The $PM_{2.5}$ background concentration for the 24-hour period was calculated using the average of the 98$^{th}$ percentile of the 24-hour concentrations over the period of record.

The Turtleback Dome monitoring station located near Yosemite National Park, California was used for both the nitrogen oxide ($NO_x$) and carbon monoxide (CO) background concentrations. The period of record for the monitoring station was 2006-2007. Since the data covered less than three years, the 98$^{th}$ percentile (8$^{th}$ high) was the added background used for the one-hour

$NO_x$ background concentration. The annual $NO_x$, one-hour CO, and the eight-hour CO background concentrations used the average of the highest period for each pollutant over the period of record.

The SLAMS monitoring station located near Trona, California was selected as representative background concentrations for the sulphur dioxide ($SO_2$) averaging periods. The one-hour, three-hour, 24-hour, and, annual averaging periods used the average of the highest period for each respective period over the 2005-2007 period or record. Table 3.6-4 summarizes the background concentrations used in the modeling analysis.

**Table 3.6-4 Background Concentrations Utilized**

| Criteria Pollutant | Averaging Period | Background Concentration | |
|---|---|---|---|
| | | ($\mu g/m^3$) | Location - Period of Record |
| $PM_{10}$ | 24-Hour | 19.628 | Great Basin National Park, Nevada - 2005 to 2007 |
| | Annual | 4.775 | Great Basin National Park, Nevada - 2005 to 2007 |
| $PM_{2.5}$ | 24-Hour | 6.726 | Great Basin National Park, Nevada - 2005 to 2007 |
| | Annual | 2.36 | Great Basin National Park, Nevada - 2005 to 2007 |
| $SO_2$ | 1-Hour | 56.49 | Trona, California - 2005 to 2007 |
| | 3-Hour | 32.15 | Trona, California - 2005 to 2007 |
| | 24-Hour | 11.3 | Trona, California - 2005 to 2007 |
| | Annual | 2.61 | Trona, California - 2005 to 2007 |
| NOx | 1-Hour | 9.62 | Turtleback Dome, Yosemite National Park, California - 2006 to 2007 |
| | Annual | 1.89 | Turtleback Dome, Yosemite National Park, California - 2006 to 2007 |
| CO | 1-Hour | 1942.86 | Turtleback Dome, Yosemite National Park, California - 2006 to 2007 |
| | 8-Hour | 800 | Turtleback Dome, Yosemite National Park, California - 2006 to 2007 |

**Existing Air Pollution Sources**

There are no existing, permitted emission sources located in the immediate Plan boundary. Land use in the impact analysis is dominated by mining and mineral exploration, oil and gas exploration, ranching, and recreation. The dominant land uses typically are temporary mobile sources with minimal emissions.

**Climate Change**

Ongoing scientific research has identified anthropogenic greenhouse gas (GHG) emissions as potential impacts to the global climate. Through complex interactions on a global scale, GHG emissions 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. GHG emissions are comprised of many separate chemicals, but the most notable is carbon dioxide ($CO_2$). Industrialization and the burning of fossil fuels have increased the levels of $CO_2$ in the atmosphere over the past century. The EPA has formed a correlation of the various gasses with $CO_2$ so that any particular GHG can be shown as a carbon dioxide equivalent ($CO_2e$). This methodology allows gaseous emissions to be reduced to the $CO_2e$ and compared with area wide GHG emissions on a local, state-wide, country-wide, or global level.

The Intergovernmental Panel on Climate Change concluded that "Both past and future anthropogenic $CO_2$ emissions would continue to contribute to warming and sea level rise for more than a millennium, due to the time scales required for removal of this gas from the atmosphere" (IPCC, 2007).

According to the EPA, over the past century, the global average temperature has risen by 1.4°F and is expected to rise another 2°F to 11.5°F over the next century (EPA, 2012). Increasing the GHG emissions to the atmosphere is expected to accelerate this temperature change.

In addition to the overall increase in global average temperature, other changes in the environment have been observed and attributed to climate change. In the Great Basin, these include the following:

- Changes in the quantity and timing of precipitation;
- Magnitude and frequency of extreme weather events;
- Earlier average snowmelt and decrease in annual snowpack volume;
- Increase in frequency and severity of drought conditions;
- Changes in the geographic ranges of plant communities and individual species;
- Changes in plant community composition;
- Increased tree mortality due to increased frequency, size and duration of wildfires, and synergistic association between drought stress and insect outbreaks; and
- Increased probability of plant and animal extinctions as ecological niches move or disappear (Loehman, 2010).

Scientists have used such tools as woodrat middens, pollen deposition, tree rings, and other climate records to study past climate changes and their effects on vegetation and the biosphere. In addition to the effects on the biosphere, scientists have been able to ascertain the time periods over which the changes occurred and how quickly vegetation and animals were able to respond or adapt to the changes (HTNF, 2011).

Observed climate changes in the Great Basin over the past 100 years include the following:

- Region-wide warming of 0.6°F to 1.1°F. Minimum temperatures have increased more than maximum temperatures. The probability of very warm years has increased and the probability of very cold years has decreased.
- Annual precipitation has increased from six to 16 percent since the 1950s, but interannual variability in precipitation has also increased. The probability of extreme high precipitation events has increased, which has been reflected in increased streamflow, especially in winter and spring.

- April 1 snowpack volumes have declined.
- Spring snowmelt is 10 to 15 days earlier than in the mid-1900s, and there has been an increase in interannual variability in spring flow.
- Phenological studies indicate that in much of the west, the average bloom date is earlier for both purple lilac (two days per decade for the period of 1957-1994) and honeysuckle (3.8 days per decade for the period 1968 to 1994) (Chambers, 2008).
- Since 1986, the length of the active wildfire season has increased by 78 days and the average duration of large fires has increased from 7.5 days to 37.1 days (HTNF, 2011).
- Scientists have observed plant communities shifting their range north and to higher elevation to compensate for increasing temperatures; these migrations tend to isolate those communities that move to higher elevations (Loehman, 2010; Finch, 2012).

While in some cases climate change tends to mitigate ongoing impacts to vegetation and animals in the Great Basin (i.e., increased $CO_2$ in the atmosphere promotes vegetative growth), in most cases it exacerbates impacts from irrigation (i.e., less water available for other uses in the summer and increased evapotranspiration from higher temperatures), overgrazing (i.e., native grasses and forbs further stressed by higher temperatures and lower availability of water during the growing season), and invasive species (Chambers, 2008).

In 2013, the BLM developed the Rapid Ecoregional Assessment (REA) for the Central Basin and Range to document and demonstrate a large-scale rapid spatial assessment of potential change as a result of certain change agents (BLM, 2013j). The REA developed a list of questions to help management identify current or anticipated landscape-scale problems concerning resource management. In the REA, the BLM identifies climate change as one of four change agent categories. Climate change has the potential to affect organisms by chancing the locations where species and their associated communities can exist. As a result of the effects of climate change, frequency and distribution of fire regimes, threats from invasive, non-native species, and disease are likely to change over time (BLM, 2013j).

The REA looks through 2060, and identifies that there is potential for changes to the current distributions of many elements in low elevation basins throughout the ecoregion. These low-elevation areas could transition from cool semi-desert into very warm and sparsely-vegetated desert landscapes more typical of the Mojave Basin and Range. For example, expanses of primarily sagebrush species may, overtime, convert to salt-desert scrub. Additionally, climate change is expected to cause stress across the entire ecoregion, as well as add to other stressors such as fire and invasive species (BLM, 2013j).

**Power Supply Pipeline**

Existing resources are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Existing resources are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.6.3.2 North Facilities Alternative

The existing conditions of air quality for the North Facilities Alternative are the same as the Proposed Action.

#### 3.6.3.3 No Action Alternative

The existing conditions of air quality for the No Action Alternative are the same as the Proposed Action.

## 3.7 Vegetation, Including Noxious and Invasive Weeds and Special Status Plants

This section identifies and describes vegetation communities, noxious and invasive weeds, and special status plant species that could be affected by the Proposed Action and alternatives. The Plan boundary area is located within the Calcareous Mountains Floristic Section, Great Basin Division, of the Intermountain Region (Cronquist et al., 1972) and is typical of the Great Basin in northern Nevada. It follows the characteristic Basin and Range topography with high elevation, xeric valleys flanked by mountain ranges. The Plan boundary area is located at the northern end of Goshute Valley at the base of the Pequop Mountain range. Elevations within the Plan boundary area range from 5,600 to 7,700 feet AMSL.

### 3.7.1 Areas of Analysis

#### 3.7.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for the mining and processing facilities occurs within the Plan boundary.

**Power Supply Pipeline**

The area of analysis for the power supply pipeline occurs within the 200-foot power supply pipeline corridor.

**Cities' Water Supply**

The area of analysis for the Cities' water supply is adjacent to the Plan boundary and encompasses Section 21, T35N, R66E.

#### 3.7.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as for the Proposed Action.

#### 3.7.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the approved exploration Plan boundary, as described in the Expanded Long Canyon Exploration Project Environmental Assessment (BLM, 2011d).

### 3.7.2 Data Sources and Methodology

**Regulatory Framework**

Noxious Weeds

A "noxious weed" is defined as any species of plant that is, or is likely to be, detrimental or destructive and difficult to control or eradicate (NRS 555.010-555.220). Noxious weeds and invasive plant species have become a growing concern in Nevada based on their ability to increase in cover relative to surrounding vegetation and exclude native plants from an area. The spread of noxious weeds and invasive plant species have resulted in substantial economic impacts on some sectors of Nevada. As a result, Nevada has enacted laws requiring the control of noxious weed species (NRS 555.005, NAC 555.010). In addition, the federal Noxious Weed Act of 1974, as amended (United States Code 2801 et. seq.) requires cooperation with state, local, and other federal agencies in the application and enforcement of all laws and regulations relating to the management and control of noxious weeds and invasive plant species. Recognizing these regulations, the BLM requires that NEPA documents consider and analyze the potential for the spread of noxious weeds and invasive plant species and provide preventative rehabilitation measures for each management action involving surface disturbance.

Noxious weed species in Nevada that are considered detrimental to the environment have been placed on a special list in NAC and have been divided into three categories based on their ability to spread and to identify state control requirements (NRS 555.010):

- Category A noxious weeds have limited distribution and are actively excluded and eradicated; control is required by Nevada in all infestations.
- Category B noxious weeds have established themselves in scattered populations and require control.
- Category C noxious weeds are currently established and widespread in many counties of the state and require management.

Federal Endangered Species Act

Pursuant to the Endangered Species Act of 1973 (ESA), USFWS has regulatory authority over federally listed species. The status-listed species, that of threatened, endangered, candidate and proposed species, is determined by the USFWS under the provisions of the ESA, as amended. Under the ESA, endangered species are defined as being in danger of extinction throughout all or a significant portion of their range. Threatened species are likely to become endangered in the foreseeable future. The USFWS also maintains a listing of species or subspecies (i.e., taxa) that may warrant listing as threatened or endangered for which the USFWS has sufficient biological information to support a rule to list as threatened or endangered, but are preclued by higher priority species. These species are referred to as

candidate species. Proposed species are species for which the USFWS has published a proposal to list as threatened or endangered in the Federal Register.

BLM Sensitive Species

In addition to federally listed, candidate, or proposed species, the BLM maintains a list of Nevada sensitive species. The BLM Manual 6840.06 E states that native species may be listed as sensitive if the species:

- Could become endangered or extirpated from a state, or within a significant portion of its range in the foreseeable future;
- Is under review (for listing as threatened or endangered) by the USFWS and/or National Marine Fisheries Service;
- Is undergoing significant current or predicted downward trend in habitat capability that would reduce the species' existing distribution, and/or population or density such that federally listed, proposed, candidate, or state-listed status may become necessary;
- Typically consists of small and widely dispersed populations;
- Inhabits ecological refugia, or specialized or unique habitats;
- Is state listed but may be better conserved through application of BLM sensitive species status; and
- The BLM affords these sensitive species the same level of protection as federal candidate species. The BLM's policy for sensitive species is to avoid authorizing actions that would contribute to the listing of a species as threatened or endangered.

#### 3.7.2.1 Proposed Action

**Mining and Processing Facilities**

**Vegetation Communities**

The area of analysis for the mining and processing facilities was evaluated through a review of existing data, including the NRCS Ecological Site Descriptions, soil surveys, previous biological surveys, aerial photographs, and biological field surveys conducted in the fall of 2011 and spring of 2012. Field preparation and surveys were conducted by GBE. Ecological sites were reviewed prior to field surveys. Potential special status plant species and their habitat requirements were also reviewed. In the field, the major ecological sites were visited and an inventory of plants was developed. Community composition, plant species inventories, locations of noxious and invasive weeds, and potential special status plant habitat were recorded during field surveys (GBE, 2012). Ecological sites integrated with data from the field surveys were used to map vegetation communities, using the dominant species to delineate distinct communities.

**Noxious and Invasive Weeds**

The presence of noxious and invasive weeds (as defined by the State of Nevada in NAC 555.010) within the area of analysis for the mining and processing facilities area was recorded

during the ecological site inventory, vegetation surveys, and while conducting other biological field surveys. Special attention was given to roadsides, berms, or other areas of disturbed soils. Noxious and invasive weed occurrences were recorded with a Global Positioning System (GPS) unit, and data was collected for each observation, including species type, location, and approximate size of infestation (GBE, 2012; Slater Seeding, 2013). A list of noxious weeds and their mapped locations within the Plan boundary was also obtained from the BLM.

**Special Status Plants**

Prior to conducting field surveys in the area of analysis for the mining and processing facilities area, a list of special status plant species with the potential to occur within the vicinity of the Plan boundary was compiled by GBE. Existing special status species lists from the USFWS, Nevada Natural Heritage Program (NNHP), and BLM were reviewed in preparation for field surveys. Vegetative communities were used to identify potential suitable habitat for special status plant species within the Plan boundary, and field surveys conducted in the fall of 2011 and spring of 2012 focused on these areas (GBE, 2012).

Species identified by GBE as having potential to occur in the Plan boundary include:

- Grouse Creek rockcress (*Boechera falcatoria*);
- Lamoille Canyon milkvetch (*Astragalus robbinsii* var. *occidentalis*);
- Long calyx eggvetch (Astragalus oophorus var. lonchocalyx);
- Barren Valley collomia (*Collomia renacta*);
- Sunnyside green-gentian (*Frasera gypsicola*); and
- Tunnel Springs beardtongue (*Penstemon concinnus*).

For additional field surveys in the areas of analysis for all components of the Proposed Action and alternatives, plant species identified as having the potential to occur in Elko County according to the BLM Sensitive Species list, and whether they have potential habitat in the Plan boundary area, are identified in Table 3.7-1. All species in the list are considered sensitive by the BLM Elko District. Existing special status species lists from USFWS and NNHP were also reviewed. Additional species identified during consultation with NNHP include rayless tansy aster (*Machaeranthera grindelioides var. depressa*). USFWS identified whitebark pine (*Pinus albicaulis*), a candidate species, as having the potential to occur in the Plan boundary.

**<u>Power Supply Pipeline</u>**

**Vegetation Communities**

Ecological Site Descriptions were consulted to map vegetation community types and determine potential native vegetation along the power supply pipeline corridor. Field surveys were conducted by JBR in the summer of 2013 (JBR, 2013a). Vegetation communities were defined using the dominant species to delineate distinct communities.

**Noxious and Invasive Weeds**

The presence of noxious and invasive weeds within the power supply pipeline corridor was recorded during vegetation surveys. Special attention was given to roadsides, berms, or other

areas of disturbed soils. Noxious and invasive weed occurrences were recorded with a handheld GPS unit, and data was collected for each observation, including species type, location, and approximate size of infestation (JBR, 2013a). A list of noxious weeds and their mapped locations within the power supply pipeline corridor was obtained from the BLM.

**Special Status Plants**

Special status plant species with the potential to occur within the vicinity of the power supply pipeline are identified in Table 3.7-1.

**<u>Cities' Water Supply</u>**

**Vegetation Communities**

Ecological Site Descriptions were consulted to map vegetation community types and determine potential native vegetation along the corridor for the proposed wells, water pipeline, and service road located in Section 21 and into the mining and processing facilities area. Field surveys were conducted by JBR in summer 2013. Vegetation communities were defined using the dominant species to delineate distinct communities.

**Noxious and Invasive Weeds**

The presence of noxious and invasive weeds within Section 21 was recorded during vegetation surveys. Special attention was given to roadsides, berms, or other areas of disturbed soils. Noxious and invasive weed occurrences were recorded with a handheld GPS unit, and data was collected for each observation, including species type, location, and approximate size of infestation (JBR, 2013a). A list of noxious weeds and their mapped locations within Section 21 was obtained from the BLM.

**Special Status Plants**

Special status plant species with the potential to occur within the vicinity of the Cities' water supply pipeline, wells, and service road are identified in Table 3.7.1.

#### 3.7.2.2 North Facilities Alternative

The data sources and methods used to describe the vegetation communities, noxious and invasive weeds, and special status plant species within the area of analysis for the North Facilities Alternative are the same as those for the Proposed Action mining and processing facilities area.

#### 3.7.2.3 No Action Alternative

The data sources and methods used for the No Action Alternative are the same as those used for the Proposed Action for mining and processing facilities area.

**Table 3.7-1 BLM Elko District Sensitive Species List and Potential to Occur in Project Area**

| Species | Status | Habitat | Nevada Range | Potential to Occur in Project Area |
|---|---|---|---|---|
| Meadow pussytoes *Antennaria arcuata* | NNHP Tracking List | Seasonally wet meadows, usually around the edges or on hummocks. Nevada populations often found in hay meadows. (NatureServe, 2013; NNHP, 2001). | North-central Elko County. | Not likely to occur; Potential habitat available, but outside of known range (Cronquist, 1994). |
| Goose Creek milkvetch *Astragalus anserinus* | ESA Candidate; NNHP Tracking List | Deeply weathered sandy ash of the Salt Lake Formation overlain by black glassy gravel, within open juniper or sagebrush communities. In Nevada restricted to west and southeast exposures (NatureServe, 2013; NNHP, 2001). | Northeastern Elko County. | Power Supply Pipeline. Could occur if ash deposits are present (Barneby, 1989). |
| Elko rockcress *Boechera falcifructa* | NNHP Tracking List | Densely vegetated north-facing slopes in sagebrush communities with high cryptogamic soil cover (NatureServe, 2013; NNHP, 2001). | Northeastern Elko County and a small population in Lander County. | Power Supply Pipeline. Could occur (Al-Shehbaz & Windham, 2010). |
| Barren Valley collomia *Collomia renacta* | NNHP Tracking List | Rocky soils on south-facing slopes where temperature and moisture fluctuations are high, 4,900-7,550 feet (NatureServe, 2013). | Pequop Mountains just west of the area of analysis. | Could occur; however, limited surveys found *Collomia linearis* (GBE, 2012). |
| Broad fleabane *Erigeron latus* | NNHP Tracking List | Thin gravelly soils on rocky hillsides and outcrops in sagebrush near juniper woodlands, 5,250-6,575 feet (NatureServe, 2013). | North-central Elko County. | Not likely to occur, no suitable habitat present (Cronquist, 1994). |
| Beatley buckwheat *Eriogonum rosense* var. *beatleyae* | NNHP Tracking List | Light colored volcanic ash outcrops (NatureServe, 2013; NNHP, 2001). | Central to western Nevada. | Not likely to occur, no suitable habitat present, outside known range (Reveal, 2005, 2012). |
| Lewis buckwheat *Eriogonum lewisii* | NNHP Tracking List | Dry, exposed rocky ridgelines and crests, 6,460-9,720 feet (NatureServe, 2013; NNHP, 2001). | North-central Elko County and Northern Eureka County. | Not likely to occur, no suitable habitat present (Reveal, 2005, 2012). |
| Deeth buckwheat *Eriogonum nutans* var. *glabratum* | NNHP Tracking List | Sandy soils in sagebrush communities, 4,900-6,240 feet. | Elko and Eureka Counties. | Potential habitat, known from near Wells, NV (Reveal, 2005, 2012). |
| Grimy mousetails *Ivesia rhypara* var. *rhypara* | NNHP Tracking List | Dry, relatively barren badland or welded tuff soils, sometimes hydrothermally altered and re-cemented, 5,370-6,200 feet (NNHP, 2001). | Western Elko and northern Washoe counties. | Not likely to occur, no suitable habitat present (Holmgren, 1997). |

| Species | Status | Habitat | Nevada Range | Potential to Occur in Project Area |
|---|---|---|---|---|
| Grimes vetchling *Lathyrus grimesii* | NNHP Tracking List | Relatively barren, dry, shallow, gravelly soils, 6,065-8,285 feet (NatureServe, 2013). | Northern Independence Mtns., Bull Run Mtns, and Elko County. | Not likely to occur, no suitable habitat present (Barneby, 1989). |
| Davis peppercress *Lepidium davisii* | NNHP Tracking List | Hard-bottomed, vernally wet clay playas (NNHP, 2001). | Northern Elko County in the Owyhee Desert. | Not likely to occur, no potential habitat in the Plan boundary; known to occur NW of the Plan boundary. |
| Owyhee prickly phlox *Leptodactylon glabrum* | NNHP Tracking List | Crevices in steep to vertical coarse-crumbling volcanic canyon walls, 4,710 to 5,300 feet. (NatureServe, 2013; NNHP, 2001). | Elko, Humboldt, and Pershing counties. | Not likely to occur; no potential habitat in the Plan boundary. |
| Tiehm blazingstar *Mentzelia tiehmii* | NNHP Tracking List | Barren looking, light colored clay flats and knolls. | Lincoln and Nye counties in the White River Valley. | Not likely to occur; Plan boundary is outside of known range (Holmgren & Holmgren, 2005). |
| Idaho beardtongue *Penstemon idahoensis* | NNHP Tracking List | Restricted to outcrops of the Salt Lake Formation; associated with Utah juniper communities, 4,880-5,700 feet (NatureServe, 2013). | Northeastern corner of Elko County. | Power Supply Pipeline. Could occur, potentially suitable habitat in the foothill areas. |
| Least phacelia *Phacelia minutissima* | NNHP Tracking List | Vernally saturated, sparsely vegetated areas of meadows, creek beds, or springs (NNHP, 2001). | Northwestern Elko and Eureka counties. | Not likely to occur, occurs at much higher elevations than the Plan boundary. |
| Cottam cinquefoil *Potentilla cottamii* | NNHP Tracking List | Cracks and crevices in quartzite outcrops, 7,200-10,500 feet (NatureServe, 2013; NNHP, 2001) | Eastern Elko County. | Not likely to occur, known to occur at higher elevations (Holmgren, 1997). |
| Obscure buttercup *Ranunculus triternatus* | NNHP Tracking List | Meadow-steppe dominated by perennial bunchgrasses (NatureServe, 2013). | Southwestern Elko County. | Not likely to occur (Holmgren & Holmgren, 2012). |
| Nachlinger catchfly *Silene nachlingerae* | NNHP Tracking List | Dry crevices or rocky soils on steep slopes or cliffs in the subalpine conifer zone. 7,100-11,300 feet (NNHP, 2001). | Elko, White Pine, and Nye counties. | Not likely to occur, occurs at much higher elevations. |
| **Additional Species Identified by NNHP** | | | | |
| Rayless tansy aster *Machaeranthera grindelioides var. depressa* | NNHP Watch List | Nearly barren rocky clay to clay soils in sagebrush, pinyon-juniper, and mountain mahogany. 5,000-9,200 feet (NNHP, 2001) | Clark, Elko, Eureka, Lincoln, Nye, and White Pine counties. | Power Supply Pipeline. could occur, known to occur within 5 miles of the Plan boundary. |
| **Additional Species Identified by USFWS** | | | | |
| Whitebark pine *Pinus albicaulis* | ESA Candidate | Thin, rocky, cold soils at or near timberline. 4,265-12,140 feet. (NatureServe, 2013) | Sierra Nevada range, and Elko and Humboldt counties. | Not likely to occur, occurs at much higher elevations. |

### 3.7.3 Existing Conditions

#### 3.7.3.1 Proposed Action

Distribution of vegetation types in the Plan boundary is strongly influenced by variations in landscape position, soil type, moisture, elevation, and aspect. Plant species composition, abundance, and vegetative structure have been affected by previous disturbances within the Plan boundary including livestock grazing, exploration operations, wildfire, and reclamation.

The vegetation of the Plan boundary can be categorized into four general vegetation types: Sagebrush, Woodland, Salt Desert Shrubland, and Wet Meadow Complex. The sagebrush type can be further divided into the Big Sagebrush Community, the Black Sagebrush Community, and the Low Sagebrush Community, while the Salt Desert Shrubland type can be divided into the Greasewood Flat Community and the Salt Desert Scrub Community. Ecological sites integrated with information from field surveys were used to map vegetation communities, using the dominant species to delineate communities.

Table 3.7-2 summarizes the general vegetation types, specific vegetation types, ecological sites, and dominant species that occur in the Plan boundary and along the power supply pipeline. An ecological site is a landform with specific physical characteristics, which differs from other landforms in its ability to produce distinctive kinds and amounts of vegetation and in its response to management. Ecological sites are shown on Figures 3.7-1, 3.7-2, and 3.7-3. General vegetation types are comprised of multiple ecological sites (Figure 3.7-6). Each community is described in more detail below. Wetland areas are described in more detail in Section 3.3.

**Table 3.7-2 Vegetation Communities within the Plan Boundary and Power Supply Pipeline Corridor**

| General Vegetation Type | Specific Vegetation Community | Ecological Site ID | Ecological Site Name | Potential Native Vegetation (Dominant Species) |
|---|---|---|---|---|
| Sagebrush Shrubland | Big Sagebrush | 025XY019NV | Loamy 8-10" P.Z. | Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis)*, bluebunch wheatgrass (*Pseudoroegneria spicata*), and Thurber's needlegrass (*Achnatherum thurberianum*). |
| | | 028BY010NV | Loamy 8-10" P.Z. | Wyoming big sagebrush, Indian ricegrass (*Achnatherum hymenoides*), needle-and-thread (*Hesperostipa comata*), and squirreltail (*Elymus elymoides*). |
| | Black Sagebrush | 024XY030NV | Shallow Calcareous Loam 8-10" P.Z. | Black sagebrush (*Artemisia nova*), Thurber's needlegrass, and Indian ricegrass. |
| | | 025XY057NV | Shallow Clay Loam 10-14" P.Z. | Black sagebrush, bluebunch wheatgrass, Thurber's needlegrass, and Indian ricegrass. |
| | | 028BY011NV | Shallow Calcareous Loam 8-10" P.Z. | Black sagebrush, Indian ricegrass, needle-and-thread, green rabbitbrush (*Chrysothamnus viscidiflorus*), and shadscale (*Atriplex confertifolia*). |
| | Low Sagebrush | 025XY017NV | Claypan 12-16' P.Z. | Low sagebrush (*Artemisia arbuscula*), Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass, and antelope bitterbrush (*Purshia tridentata*). |
| Salt Desert Shrubland | Greasewood Flat | 028BY004NV | Saline Bottom | Black greasewood (*Sarcobatus vermiculatus*), basin wildrye (*Leymus cinereus*), alkali sacaton (*Sporobolus airoides*), and rubber rabbitbrush (*Ericameria nauseosus*). |
| | | 028BY020NV | Sodic Flat 5-8" | Black greasewood, alkali sacaton, saltgrass (*Distichlis spicata*), shadscale, rubber rabbitbrush, and basin wildrye. |
| | Salt Desert Scrub | 028AY002NV | Coarse Silty 5-8" P.Z | Indian ricegrass, winterfat (*Krascheninnikovia lanata*), bud sagebrush (*Picrothamnus desertorum*), shadscale, and galleta (*Pleuraphis jamesii*). |
| | | 028BY017NV | Loamy 5-8" P.Z. | Shadscale, bud sagebrush, Indian ricegrass, and squirreltail. |
| | | 028BY047NV | Saline Terrace 5-8" P.Z. | Sickle saltbush (*Atriplex falcata*), western wheatgrass (*Pascopyrum smithii*), winterfat, Indian ricegrass, shadscale, and squirreltail. |
| | | 028BY074NV | Sodic Terrace 5-8' P.Z. | Shadscale, black greasewood, bud sagebrush, Indian ricegrass, and squirreltail. |
| | | 028BY078NV | Droughty Loam 5-8" P.Z. | Fourwing saltbush (*Atriplex canescens*), spiny hopsage (*Grayia spinosa*), Indian ricegrass, winterfat, and squirreltail. |

| General Vegetation Type | Specific Vegetation Community | Ecological Site ID | Ecological Site Name | Potential Native Vegetation (Dominant Species) |
|---|---|---|---|---|
| | | 028BY084NV | Coarse silty 6-8" P.Z. | Winterfat, bud sagebrush, Indian ricegrass, squirreltail, and globemallow (*Sphaeralcea* sp.). |
| Woodland | Woodland | 028BY043NV | Calcareous Mahogany Savanna | Curl-leaf mountain mahogany (*Cercocarpus ledifolius*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), bluebunch wheatgrass, and needlegrass (*Achnatherum* spp). |
| | | F028BY060NV | Pinus monophylla-Juniperus osteosperma/Artemisia nova/Pseudoroegneria spicata-Achnatherum hymenoides. | Singleleaf pinyon (*Pinus monophylla*), Utah juniper (*Juniperus osteosperma*), black sagebrush, bluebunch wheatgrass, and Indian ricegrass. |
| Riparian | Riparian | 025XY001NV | Moist Floodplain | Basin wildrye, beardless wildrye (*Leymus triticoides*), willow (*Salix* sp.), Nevada bluegrass (*Poa nevadensis*), sedge (*Carex* sp.), and saltgrass. |

**Mining and Processing Facilities**

**Vegetation Communities**

The mining and processing facilities area encompasses nine ecological sites, which can be categorized into seven vegetation communities: Big Sagebrush, Black Sagebrush, Low Sagebrush, Greasewood Flat, Salt Desert Scrub, Woodland, and Wet Meadow. Acreages of each community type within the mining and processing facilities area are shown in Table 3.7-3.

**Table 3.7-3 Acreage of Vegetation Communities in the Mining and Processing Facilities**

| Vegetation Community | Acres within Plan Boundary | Percent of Area |
|---|---|---|
| Big Sagebrush | 4,536 | 18.8 |
| Black Sagebrush | 3,247 | 13.5 |
| Burn Area | 123 | 0.5 |
| Low Sagebrush | 35 | 0.1 |
| Greasewood Flat | 5,749 | 23.8 |
| Salt Desert Scrub | 3,980 | 16.5 |
| Woodland | 6,062 | 25.1 |
| Wet Meadow | 392 | 1.6 |
| **Total** | **24,124** | **100** |

The Big Sagebrush Community is dominated by Wyoming big sagebrush, with varying amounts of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), rubber rabbitbrush, and green rabbitbrush. Where soils are moderately sodic, black greasewood and fourwing saltbush may also be present. Perennial grasses commonly found associated with big sagebrush include Indian ricegrass, needle-and-thread, squirreltail, Great Basin wildrye, alkali sacaton, thickspike wheatgrass (*Elymus lanceolatus var. lanceolatus*), and Sandberg bluegrass (*Poa secunda*). Cheatgrass (*Bromus tectorum*), a non-native invasive annual grass is common in this community. Where the soils have been disturbed, cheatgrass, and other invasive annual species may occur in dense patches. Where mixed with shrubs and perennial grasses, it tends to be less abundant.

The Black Sagebrush Community occurs on summits, piedmont slopes, erosional fan piedmonts, hills, and lower mountains where soils are calcareous with a shallow duripan. The Black Sagebrush Community is dominated by black sagebrush, a low growing form of sagebrush, with varying amounts of Nevada ephedra (*Ephedra nevadensis*), green rabbitbrush and shadscale. The black sagebrush sites also support scattered single-leaf pinyon pine and Utah juniper, which may increase and dominate the site over time with the lack of disturbance. Where the soils are deeper, mountain big sagebrush and antelope bitterbrush are common. Common perennial grasses include Indian ricegrass, bluebunch wheatgrass, needle-and-thread grass, western needlegrass (*Achnatherum occidentale)*, Thurber's needlegrass, squirreltail, and Sandberg bluegrass. Cheatgrass is also present in this community.

**Figure 3.7-1 Ecological Site Descriptions, Project Area**

**Figure 3.7-2 Ecological Site Descriptions, Power Supply Pipeline, South**

**Figure 3.7-3 Ecological Site Descriptions, Power Supply Pipeline, North**

The Low Sagebrush Community is found at high elevations on claypan soils where the restrictive zone is within 18 inches of the surface or shallow soil on mountain ridges. The Low Sagebrush sites are dominated by low sagebrush, with some antelope bitterbrush, green rabbitbrush, and Utah serviceberry (*Amelanchier utahensis*). Perennial grasses include Idaho fescue, bluebunch wheatgrass, and squirreltail. Because of high elevations, plant growth is delayed until mid- to late spring.

The Woodland type is found primarily on the higher elevation areas, mountain side-slopes, and piedmont slopes. Woodland is dominated by single-leaf pinyon pine, Utah juniper, and curl-leaf mountain mahogany. Woodland includes true woodland sites, which occur on rock outcrops and extremely shallow soils, as well as sites where pinyon and juniper have encroached and replaced the sagebrush community. In the true woodland sites, the understory lacks shrubs, grasses, and most forbs. Where encroachment has occurred, there is a diverse plant community. Each site is varied as to which understory species were present, but overall, this community includes a large number of species. Common understory species are black sagebrush, mountain big sagebrush, antelope bitterbrush, snowberry (*Symphoricarpos* sp.), bluebunch wheatgrass, needlegrass, green rabbitbrush, serviceberry, Thurber's needlegrass, squirreltail, mutton grass (*Poa fendleriana*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and basin wildrye.

Greasewood Flat Community is found on lakeplain terraces, alluvial flats, and stream terraces where soils are deep, saline, and poorly drained. Dominant vegetation includes black greasewood, basin wildrye, and alkali sacaton, with shadscale, rubber rabbitbrush, and saltgrass frequently occurring.

Salt Desert Scrub Community is found on fan skirts, alluvial flats, fan piedmont summits, and lake terraces. Soils are formed over lacustrine sediments that are calcareous and sodic or silty. Dominant vegetation includes shadscale, winterfat, Indian ricegrass, black greasewood, bud sagebrush, and squirreltail. Other species include green rabbitbrush, spiny hopsage, fourwing saltbush, and horsebrush (*Tetradymia* sp.).

The Wetland Meadow Complex consists of two basic communities: Emergent Mash and Alkali Meadow. Emergent Marsh can be divided into Alkali Emergent Marsh and Freshwater Emergent Marsh. Alkali Emergent Marsh was observed throughout the Big Springs wetland in isolated pockets of springs, ponds, and remnant channels. Freshwater Emergent Marsh is similar, but supports species indicative of a more consistent freshwater output. Common species observed in both habitats include a majority of obligate (OBL) and facultative wet (FACW) species such as hardstem bulrush (*Schoenoplectus acutus*), broadleaf cattail (*Typha latifolia*), common mare's-tail (*Hippuris vulgaris*), and hemlock waterparsnip (*Sium suave)*. As site conditions become drier (often upslope), the wetlands transitioned to Alkali Meadow.

Alkali Meadow is present throughout the wetland, integrating with wetter marsh systems, salt desert shrub, and sagebrush upland areas within Big Springs. Downstream where Hardy Creek no longer has an incised stream channel, Alkali Wet Meadow is associated with terraces of the

floodplain. These areas support a predominance of facultative (FAC) or wetter, alkaline tolerant perennial grasses, sedges, and forbs. Grass species include fowl bluegrass (*Poa palustris),* foxtail barley (*Hordeum jubatum*), saltgrass (*Distichlis spicata*), alkali cordgrass (*Puccinella lemmonii*), and scratchgrass (*Muhlenbergia asperifolia*). Common sedges and rushes include clustered field sedge (*Carex praegracilis*) and Baltic rush (*Juncus arcticus*). Forbs include seaside arrowgrass (*Triglochin maritima*), fringed willowherb (*Epilobium ciliatum* ssp. *ciliatum*), and rayless alkali aster (*Aster brachyactis*) (GBE, 2012).

**Noxious and Invasive Weeds**

Several noxious weeds were observed within the wet meadow. Category A noxious weeds included yellow toadflax (*Linaria vulagris*) and spotted knapweed (*Centaurea maculosa*). Category B noxious weeds included Russian knapweed (*Acroptilon repens*) and Scotch thistle (*Onopordum acanthium*). Category C noxious weeds included hoary cress (*Cardaria draba*), Canada thistle (*Cirsium arvense*), and salt cedar (*Tamarix* spp.). Also found in the wet meadow were bull thistle (*Cirsium vulgare*) and hairy whitetop (*Cardaria pubescens*) (Figure 3.7-4) (GBE, 2012; Slater Seeding, 2013).

Black henbane (*Hyscyamus niger*), a Category A noxious weed, has been recorded in the existing exploration area. Hoary cress was observed in the Salt Desert Shrub community (GBE, 2012). Other invasive species included cheatgrass, halogeton (*Halogeton glomeratus*), Russian thistle (*Salsola tragus*), bur buttercup (*Ceratocephla testiculatus*), burdock (*Arctium minus*), tansy mustard (*Descurainia pinnata*), tumble mustard (*Sisymbrium altissimum*), and bird's rape mustard (*Brassica rapa*) (GBE, 2012).

Cheatgrass, halogeton, Russian thistle, and bur buttercup were common in dense patches of one species in areas adjacent to roads and where disturbance has occurred. All invasive species observed were found scattered throughout the Plan boundary. Past and present disturbance in the Plan boundary, such as livestock grazing, mineral exploration, and wildfire have likely led to noxious and invasive weed introduction, spreading, and establishment within the Plan boundary.

**Special Status Plant Species**

Field surveys were conducted by GBE in the fall of 2011 and spring of 2012 (GBE, 2012). The fall surveys were outside of the blooming period for all the species identified by GBE as having potential habitat in the Plan boundary, so botanical surveys were repeated during the blooming period in 2012.

While potential suitable habitat was identified for all species identified by GBE, the likelihood was low for some species to be present. Grouse Creek rockcress is only known from the southern Ruby Mountains, approximately 90 miles away from the Plan boundary. Lamoille Canyon milkvetch is endemic to the Ruby Mountains. Long calyx eggvetch is found in Lincoln County, Nevada. Sunnyside green-gentian is found in Nye and White Pine counties, Nevada, and Tunnel Springs beardtongue is found in Lincoln and White Pine counties, Nevada. In addition, the elevation range of the project is outside of the known elevation ranges for Grouse

Creek rockcress and Sunnyside green-gentian. Therefore, while the general habitat description may be similar, the Plan boundary is remote to known locations of these species. The exception is Barren Valley collomia. The likelihood of occurrence of the species on the BLM Sensitive Species list is described in Table 3.7-1. From that list of species, Barren Valley collomia was identified as having the potential to occur in the Plan boundary.

Although not encountered during the 2011 field surveys, the query of the NNHP database revealed two records of populations of Barren Valley collomia occurring just north of Pequop Summit, within approximately three miles from the Plan boundary. In Nevada, this species is known only to occur in the Pequop Range. Barren Valley collomia is associated with upland habitats (north-facing rocky slopes and drainages of the sagebrush zone) (NNHP, 2001).

Several populations of Collomia, thought to be dwarf narrowleaf collomia (*Collomia linearis*), were observed in 2011 on the western edge (on the northern and southern end) of the Plan boundary but no flowers or fruits were found and plant identification was inconclusive. Because Barren Valley collomia is associated with upland habitats, surveys in 2012 focused on known populations of collomia and previously identified habitat. The 2012 field surveys of the suitable habitat for this species indicated that the species present was narrowleaf collomia, not Barren Valley collomia (GBE, 2012).

**Power Supply Pipeline**

**Vegetation Communities**

The power supply pipeline passes through 13 ecological sites (Figure 3.7-2 and Figure 3.7-3). They can be categorized into six different vegetation communities: Big Sagebrush, Black Sagebrush, Greasewood Flat, Salt Desert Scrub, Riparian, and Woodland. They are shown above in Table 3.7-2. Acreages of each community type along the power supply pipeline are shown in Table 3.7-4.

**Table 3.7-4 Acreage of Vegetation Communities along Power Supply Pipeline**

| Vegetation Community | Acres in Pipeline Corridor | Percent of Area |
|---|---|---|
| Big Sagebrush | 176 | 17.17 |
| Black Sagebrush | 284 | 27.70 |
| Greasewood Flat | 161 | 15.64 |
| Salt Desert Scrub | 383 | 37.33 |
| Riparian | 10 | 0.98 |
| Woodland | 12 | 1.17 |
| **Total** | **1,026** | **100** |

The Big Sagebrush Community adjacent to the power supply pipeline corridor is found on valley bottoms, hillslopes, and alluvial fans. Dominant shrubs include Wyoming big sagebrush, yellow rabbitbrush, black sagebrush, rubber rabbitbrush, and spiny hopsage. Basin big sagebrush occupies topographic lowas and drainages. Herbaceous understory includes squirreltail, Indian ricegrass, needle and thread, Sandberg bluegrass, beardless wildrye, and Great Basin wildrye.

The sparse understory is often also be composed of halogeton, thorn skeleton weed (*Plieacanthus spinosus*), mountain phlox, woolypod milkvetch, and pale madwort.

The Black Sagebrush Community occupies alluvial fans and hillslopes. Dominated by black sagebrush, shrub associates are variable and include yellow rabbitbrush and shadscale. Occasional grasses include Sandberg bluegrass, Indian ricegrass and Thurber needlegrass. The herbaceous layer is sparse and includes longleaf phlox (*Phlox longifolia*), mountain phlox (*Phlox austromontana*), and stemless mock goldenweed (*Stenotus acaulis*).

The Greasewood Flat Community occurs on valley bottoms. Black greasewood dominates the shrub layer, with spiny hopsage and littleleaf horsebrush (*Tetradymia glabrata*) occasionally present. Grasses include mesa dropseed (*Sporobolus flexuosus*) and Great Basin wildrye, while herbaceous plant species include povertyweed, globemallow (*Sphaeralcea munroana* and *S. parviflora*), halogeton, and desert princes plume (*Stanleya pinnata*).

The Salt Desert Scrub Community is found on fan skirts, alluvial flats, fan piedmont summits, and lake terraces. Soils are formed over lacustrine sediments that are calcareous and sodic or silty, and generally well drained. Dominant shrubs include shadscale, winterfat, bud sagebrush, and sickle saltbush. Other common species include spiny hopsage, black greasewood, green rabbitbrush, and horsebrush. Common perennial grasses include Indian ricegrass, squirreltail, galleta, and western wheatgrass.

Along the power supply pipeline, the Woodland Community is found on the higher elevation areas, mountain side-slopes, summits, and crests. Utah juniper dominates the community, with Wyoming big sagebrush providing the dominant shrub cover. Yellow rabbitbrush, granite prickly phlox, and spiny hopsage also present. Grasses include Indian ricegrass and needle and thread grass. Understory vegetation cover may vary substantially, from scarce to diverse.

The Riparian Community occurs along perennial streams on the floodplain. Soils are very deep and poorly drained, and flooding occurs seasonally. Dominant vegetation includes basin wildrye, creeping wildrye (*Leymus triticoides*), willow (*Salix* sp.), Nevada bluegrass (*Poa nevadensis*), sedge (*Carex* sp.), and saltgrass. More information on Wetlands and Riparian areas can be found in Section 3.3.

**Noxious and Invasive Weeds**

Data from the BLM identified Category A noxious weeds black henbane and Dalmatian toadflax (*Linaria dalmatica*), Category B noxious weed Russian knapweed, and Category C noxious weed hoary cress, as well as unidentified thistle species, which are likely Category B or C noxious weeds (Figure 3.7-5). During field surveys, Russian knapweed, hoary cress, and black henbane were observed along Elko County Route 765, north of Montello (JBR, 2013a).

**Special Status Species**

There are currently no records of any special status plant species occurring within the power supply pipeline corridor.

**Figure 3.7-4 Noxious Weeds, Project Area**

**Figure 3.7-5 Noxious Weeds, Power Supply Pipeline**

According to NNHP, three special status plant species are known to occur within five miles of the power supply pipeline: Barren Valley collomia, rayless tansy aster, and Deeth buckwheat.

As shown in Table 3.7-1, potential habitat was identified for Goose Creek milkvetch, Elko rockcress, Deeth buckwheat, Idaho beardtongue, and rayless tansy aster. Surveys within the power supply pipeline corridor did not find any occurrences of these species (JBR, 2013a).

**Cities' Water Supply**

**Vegetation Communities**

The Cities' water supply line is in Section 21, just south of the mining and processing facilities area. It occurs in the Big Sagebrush, Black Sagebrush, and Greasewood Flat Communities, which are described above. Table 3.7-5 shows the acres of each community type within this area.

**Table 3.7-5 Acreage of Vegetation Communities along the Cities' Water Supply (Section 21)**

| Vegetation Community | Acres | Percent of Area |
|---|---|---|
| Big Sagebrush | 537 | 82.4 |
| Black Sagebrush | 25 | 3.8 |
| Greasewood Flat | 90 | 13.8 |
| **Total** | **652** | **100** |

A fire burned the northern half of Section 21 (Figure 3.7-6), which was re-seeded in 2000. The area now supports a revegetated plant community dominated by forage kochia (*Bassia prostrate*). While the revegetation has resulted in a near monoculture of forage kochia, there are areas where Wyoming sagebrush has begun to re-establish. Other species occasionally found are halogeton and cheatgrass (JBR, 2013a).

**Noxious and Invasive Weeds**

The Cities' water supply pipeline is in Section 21, just south of the mining and processing facilities area. No noxious weeds were mapped within the Cities' water supply area, but invasive weeds cheatgrass and halogeton are found throughout the area (JBR, 2013a).

**Special Status Species**

The Cities' water supply pipeline occurs in Section 21, just south of the mining and facilities Plan boundary. No special status plant species have been recorded in the area (JBR, 2013a).

### 3.7.3.2 North Facilities Alternative

The North Facilities Alternative is the same as the Proposed Action.

### 3.7.3.3 No Action Alternative

The existing conditions for the No Action Alternative include the authorized exploration activities as discussed in Section 2.2.

## 3.8 Wildlife Resources, Including Migratory Birds and Special Status Species

This section describes wildlife resources, including special status species that may be affected by the Proposed Action or other action alternative. This section will refer to Section 3.2, Water Resources, and Section 3.3, Wetlands and Riparian Resources, as they both relate to habitat for a variety of wildlife species, including fisheries.

The project occurs within typical basin and range topography of the Great Basin, and is located within the eastern flanks of the Pequop Mountains, the northern portion of Goshute Valley, and north to Tecoma Valley. Within Goshute Valley, the Plan boundary encompasses over 24,000 acres (Figures 1.4-1 and 2.2-1). Habitats in the area include pinyon-juniper woodland, mountain mahogany, and mountain brush within the mountainous areas, transitioning into big and low/black sagebrush habitat along the fans on the eastern side of the Pequop Range front, ending within the valley bottom consisting of black greasewood and shadscale. An extensive wetland area supported by the Johnson Springs system includes open water ponds, springs, and wet and dry meadows.

Features that may support wildlife include ridges, cliffs, canyons, rock outcrops, riparian areas, and ephemeral drainages. The most obvious feature is the Johnson Springs system, including Big Springs that provides a year-round water source for wildlife, irrigation, and other uses. Drainages within the Plan boundary only carry water during snowmelt or rain events. The Johnson Springs system feeds Hardy Creek, which exits the springs complex and flows to the south for approximately three miles, then transitions to dry meadow habitat at approximately the Plan boundary. Section 3.2 describes the hydrology of the site, while Section 3.3 describes the spring and riparian habitat of the site. Big Springs has been developed over the years to irrigate fields and to supply the Cities with a municipal water source. To quantify wildlife habitat in the Plan boundary, Ecoregional GAP Analysis of the Southwestern United States (SWReGAP) analysis mapping of the Plan boundary is used in this document (Figure 3.8-1). This mapping indicates Inter-Mountain Basins Big Sagebrush Shrubland is the most common habitat type in the area. Great Basin Pinyon-Juniper Woodland and Inter-Mountain Basins Mixed Salt Desert Scrub are also fairly common habitat types in the Plan boundary.

**Figure 3.7-6 Vegetation Communities**

**Figure 3.8-1 Southwest Regional GAP Data Proposed Action**

### 3.8.1 Areas of Analysis

#### 3.8.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for this section includes all areas that could be disturbed under the Proposed Action and areas that may affect wildlife species adjacent to the Plan boundary, such as for migratory habitat or other habitat required for a species' survival. In general, the area of analysis for wildlife resources is larger than the Plan boundary; it encompasses the Pequop Mountains and Goshute Valley. Additionally, golden eagles (*Aquila chrysaetos*) are analyzed up to 10 miles from the Plan boundary. These areas are included in the area of analysis and are referred to as the project area. For example, mule deer may not occupy the Plan boundary during the entire year, but may move through the Plan boundary migrating from one seasonal habitat to another. The Proposed Action includes activities that could impact wildlife habitats along the Pequop Mountains and mine facilities at the base of the mountains as well as within Goshute Valley, north and south of the Johnson Springs system, adjacent to Hardy Creek (Figure 2.2-1).

**Power Supply Pipeline**

Natural gas to power the electrical generation plant would be piped from the Ruby Pipeline, which is located approximately 35 miles north of the Plan boundary. The area of analysis for wildlife includes the southern part of the pipeline corridor that overlaps the area within the proposed Long Canyon project boundary (Figure 2.2-1); the proposed corridor as it continues northeast and then north to the existing Ruby Pipeline (Figure 2.2-8); and the habitat within approximately one mile either side of the power supply pipeline. This corridor passes through portions of the Goshute and Tecoma valleys.

**Cities' Water Supply**

The Cities' water supply area of analysis for wildlife includes the southern portion of the Plan boundary (Section 21, T35N, R66E) and the area immediately north where the water supply is proposed to connect to the existing waterline. This area is located within the Plan boundary. The existing pipeline extends from the spring house at Big Springs then east to the Cities.

#### 3.8.1.2 North Facilities Alternative

The area of analysis for wildlife for the North Facilities Alternative is similar to that of the Proposed Action though many mine features are in different locations (Figure 2.3-1). These include areas within the northern end of Goshute Valley, primarily north of the Johnson Springs system, the east slope of the Pequop Mountains, and areas adjacent to Hardy Creek.

#### 3.8.1.3 No Action Alternative

The area of analysis for wildlife resources encompasses all of the analysis areas for wildlife that are described above for the Proposed Action and the North Facilities Alternative.

### 3.8.2 Data Sources and Methodology

**Regulatory Framework**

**BLM/NDOW Memorandum of Understanding**

Wildlife and fish resources and their habitat on public lands are managed cooperatively by the BLM and Nevada Department of Wildlife (NDOW) under a Memorandum of Understanding (MOU) established in 1971. The MOU describes the BLM's commitment to manage wildlife and fisheries resource habitat and NDOW's role in managing populations. The ecological definition of population is a group of organisms of one species that interbreed and live in the same place at the same time. The BLM meets its obligations by managing public lands to protect and enhance food, shelter, and breeding areas for wild animals. NDOW assures healthy wildlife numbers through a variety of management tools including wildlife and fisheries stocking programs, hunting and fishing regulations, land purchases for wildlife management, cooperative enhancement projects, and other activities.

**The Migratory Bird Treaty Act**

The Migratory Bird Treaty Act of 1918 (MBTA) (16 United States Code [USC] 703-712) is administered by the USFWS and is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements a series of international treaties that provide for migratory bird protection. The MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds; it provides that it shall be unlawful, except as permitted by regulations, “to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird” (16 USC 703). The MBTA does not regulate habitat. The list of species protected by the MBTA was revised in March 2010, and includes almost all bird species (1,007 species) that are native to the United States.

**Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds**

Signed on January 11, 2001, this Executive Order directs each federal agency taking actions that are likely to have a measureable effect on migratory bird populations to develop and implement a MOU with the USFWS that promotes the conservation of migratory bird populations. In 2010, the BLM signed an MOU with the USFWS (BLM MOU 230-2010-4) to promote the conservation of migratory birds. The mission of the MOU for the BLM is to manage habitat suitable to a variety of migratory birds, manage lands in a manner as to minimize activities that may negatively affect populations of migratory birds, and promote conservation measures that avoid impacts to nesting birds through a variety of actions, particularly for birds of conservation concern as identified by the USFWS.

**Federal Endangered Species Act**

Pursuant to the Endangered Species Act of 1973 (ESA), USFWS has regulatory authority over federally listed species that may occur in the Plan boundary. Under the ESA, the USFWS determines if a species should be listed under the ESA, and whether these species should be listed as candidate, proposed, threatened, or endangered. Within the ESA, endangered species are defined as being in danger of extinction throughout all or a significant portion of their range. Threatened species are likely to become endangered in the foreseeable future. The USFWS also maintains a listing of species or subspecies (i.e., taxa) that may warrant listing as

threatened or endangered and which the USFWS has sufficient biological information to support a rule to list as threatened or endangered, but are precluded by higher priority species. These species are referred to as candidate species. Proposed species are species for which the USFWS has published a proposal to list as threatened or endangered in the Federal Register.

**Bald and Golden Eagle Protection Act**

The Bald and Golden Eagle Protection Act of 1940 (as amended) (BGEPA) prohibits the "take" or possession of bald eagles (*Haliaeetus leucocephalus*) and golden eagles with limited exceptions. Take, as defined in the BGEPA, includes, "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Disturb means, "to agitate or bother a bald or golden eagle to a degree that causes or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding or sheltering behavior."

On September 11, 2009, the USFWS published a rule under the BGEPA (50 CFR 22.26) authorizing limited issuance of permits to take bald and golden eagles ''for the protection of …other interests in any particular locality'' (USFWS, 2009a) where the take is compatible with the preservation of the bald and golden eagle, is associated with and not the purpose of an otherwise lawful activity, and cannot practicably be avoided (USFWS, 2009a).

**BLM Sensitive Species**

In addition to federally listed, candidate, or proposed species, the BLM maintains a list of Nevada sensitive species. The BLM Manual 6840.06 E states that native species may be listed as sensitive if the species:

- Could become endangered or extirpated from a state, or within a significant portion of its range in the foreseeable future;
- Is under review (for listing as threatened or endangered) by the USFWS and/or National Marine Fisheries Service;
- Is undergoing significant current or predicted downward trend in habitat capability that would reduce the species' existing distribution, and/or population or density such that federally listed, proposed, candidate, or state-listed status may become necessary;
- Typically consists of small and widely dispersed populations;
- Inhabits ecological refugia, or specialized or unique habitats; and
- Is state listed but may be better conserved through application of BLM sensitive species status.

The BLM affords these sensitive species the same level of protection as federal candidate species. The BLM's policy for sensitive species is to avoid authorizing actions that would contribute to the listing of a species as threatened or endangered.

#### 3.8.2.1 Proposed Action

**Mining and Processing Facilities**

Data sources used for wildlife resources include a variety of sources as follows:

- Great Basin Ecology, Inc. (GBE). 2013a. Long Canyon 2012 and 2013 Raptor Surveys. July 2013;
- Great Basin Ecology, Inc. (GBE). 2014b. Memo Eagle Nest Survey. Verification of eagle nests with the Plan Boundary. January 2014;
- Blum, Marcus and Dr. Kelley Stewart. 2013a. Preliminary Observations of Winter Migration and Collaring Update of the Pequop Mule Deer Herds. Department of Natural Resources and Environmental Sciences, University of Nevada, Reno. March 2013;
- Blum, Marcus and Dr. Kelley Stewart. 2013b. Preliminary Observations of Spring Migration and Collaring Update of the Pequop Mule Deer Herd. Department of Natural Resources and Environmental Sciences, University of Nevada, Reno. July 2013;
- Blum, Marcus and Dr. Kelley Stewart. 2014. Preliminary Observations of Fall Migration of the Pequop Mule Deer Herd. Department of Natural Resources and Environmental Sciences, University of Nevada, Reno. March 2014; and
- Nevada Department of Wildlife (NDOW). 2013b. Sage-Grouse and Raptor Data Table. July 23, 2013.

Pequop Mountains and Pit Area:

- Enviroscientists, Inc. 2007. Memo Summarizing the Results for the Long Canyon Project Bat Survey. October 15, 2007;
- Enviroscientists, Inc. 2009a. Memo Summarizing the Results for the Long Canyon Migratory Bird Survey. April 20, 2009;
- Enviroscientists, Inc. 2009b. Memo Summarizing the Results for the Long Canyon Migratory Bird Survey. May 6, 2009;
- Enviroscientists, Inc. 2009c. Memo Summarizing the Results for the Expanded Long Canyon Biological Survey. October 7, 2009; and
- Bureau of Land Management (BLM). 2008f. Environmental Assessment Long Canyon Exploration Project. United States Department of the Interior, BLM Elko District Office. July 2008.

Main Mine Facilities (both Proposed Action and North Facilities Alternative):

- Great Basin Ecology, Inc. (GBE). 2012. *Long Canyon 2012 and 2013 Biological Baseline Inventory*. Prepared for Newmont USA Limited, Long Canyon Project. February 2012;

- Great Basin Ecology, Inc. (GBE). 2013b. *Long Canyon 2013 Pygmy Rabbit Burrow Surveys*. July 2013;
- J.C. Brennan and Associates, Inc. (Brennan) 2014. Environmental Noise Assessment Long Canyon Mine Project. Prepared for Great Basin Ecology, Inc. January 24, 2014;
- JBR Environmental Consultants, Inc. (JBR). 2013b. Waters of the United States Jurisdictional Determination, Long Canyon Project, Elko County, Nevada. July 2013;
- Great Basin Ecology, Inc. (GBE). 2013c. Raw Data from *Long Canyon 2013 Pygmy Rabbit Burrow Surveys (April-October)*. October 2013; and
- Great Basin Ecology, Inc. (GBE). 2014a. Long Canyon 2013 Pygmy Rabbit Burrow Surveys – Summary Report. January 2014.

Detailed methodologies for each survey are presented within these individual documents.

Baseline wildlife surveys for portions of the Plan boundary were conducted for exploration activities which in this section are described roughly as the "pit" area, and were begun in 2007 (Enviroscientists, Inc., 2007; 2009a; 2009b; 2009c). The surveys included general wildlife surveys, nesting bird surveys, searches for special status species including raptors and raptor nests, greater sage-grouse (*Centrocercus urophasianus*), pygmy rabbits (*Brachylagus idahoensis*), acoustic surveys for bats and surveys for Mattoni's blue butterfly (*Euphilotes pallescens mattonii*) and its host plant, slender buckwheat (*Eriogonum microthecum* var. *laxiflorum*).

Baseline surveys of the proposed mine development area, including the mining and processing facilities area, were conducted by Great Basin Ecology, Inc. (GBE) during the summer of 2011, spring and summer of 2012, and additional targeted surveys in 2013 and 2014. These baseline surveys included reviewing past baseline environmental surveys conducted for exploration activities, reviewing BLM, NDOW, and USFWS information on wildlife occurrence and use of the area and reviewing an Environmental Assessment (EA) prepared for exploration activities in the area (BLM, 2011a). GBE then conducted dedicated baseline surveys, including mapping of soils and vegetation communities, general wildlife surveys, migratory bird surveys, surveys for threatened, endangered, and sensitive species, and BLM sensitive species including greater sage-grouse, pygmy rabbits, western burrowing owls (*Athene cunicularia*) and other sensitive bird species, and surveys for the host plant of the Mattoni's blue butterfly. A 2012 aerial survey of the Plan boundary and five-mile buffer was conducted to search for nesting golden eagles and other raptors. In 2013, the survey was repeated using a larger (10-mile) buffer and included the natural gas pipeline corridor (GBE, 2013a). Some concern regarding one nest location occurring within the pit area prompted a verification survey by GBE in January 2014 (GBE, 2014b).

An in-depth survey was conducted for pygmy rabbits, which began during the winter of 2013 and ended in December 2013. The survey effort was collaborative with NDOW, BLM, Newmont, and GBE conducting surveys approximately every two months. The survey was originally designed to include capturing and collaring pygmy rabbits for the purpose of

monitoring their movements, use areas, and to determine if any connectivity occurred between use areas. Due to a high mortality rate of collared pygmy rabbits, the telemetry portion of the study was abandoned. This study included pedestrian surveys that follow previously defined protocols proposed by the BLM. The Plan boundary was first delineated into potentially suitable habitats (areas with big sagebrush [*Artemisia tridentata* sp.]), then pedestrian surveys were conducted using targeted examinations in areas of potentially suitable habitat for burrows and presence of pygmy rabbits (GBE, 2013b; 2013c; and 2014a).

In 2011, Newmont, BLM, and NDOW established a Wildlife Working Group for the purpose of identifying and addressing potential wildlife concerns associated with the project. This Wildlife Working Group cooperatively developed alternate mine plans that addressed the wildlife concerns to the extent practical.

**Power Supply Pipeline**

Baseline data was collected for general wildlife, migratory birds, and BLM sensitive species including pygmy rabbit, bats, and western burrowing owl, as directed by the BLM, along the power supply pipeline corridor by JBR during the summer of 2013 (JBR, 2013a); GBE surveyed for nesting golden eagles as well as other raptors (GBE, 2013a).

**Cities' Water Supply**

Baseline data was collected by JBR within Section 21, T35N, R66E (JBR, 2013a), the remaining portion of the Cities' water supply area was covered by baseline and targeted surveys conducted by GBE (GBE, 2013a).

#### 3.8.2.2 North Facilities Alternative

The same data sources and methodologies as those for the Proposed Action were used for the North Facilities Alternative.

#### 3.8.2.3 No Action Alternative

The same data sources and methodologies as those for the Proposed Action and other action alternative were used for the No Action Alternative.

### 3.8.3 Existing Conditions

The following section presents the current wildlife habitat and species assemblages within the Plan boundary, including common and special status wildlife species. SWReGAP landcover data represents the potential habitat available for wildlife within the general context of the region. Many special status species of wildlife are habitat obligates, meaning they rely on a particular habitat for all aspects of their lives or are a critical component to a species (e.g., aquatic environments for gill breathing snails or sagebrush habitats for greater sage-grouse). Other wildlife may utilize a variety of habitats and are not dependent on one habitat alone. Habitats which obligate species are dependent upon are sometimes considered more valuable for wildlife than other habitats.

### 3.8.3.1 Proposed Action

Habitats present in the Plan boundary provide habitat to a variety of wildlife typical of the Intermountain Region (Figure 3.8-1). Baseline surveys conducted from 2007 to the present that supported previous proposed actions are used for descriptions of the existing environment as well as regional game data and other relevant information from BLM and NDOW.

**Mining and Processing Facilities**

Chapter 2 presents the Proposed Action and all elements of the mine facilities. Table 3.8-1 quantifies the habitats within the proposed mining and processing facilities area available to wildlife. These habitats are shown on Figure 3.8-1.

**Table 3.8-1 SWReGAP Landcover within the Mine Plan Boundary**

| Landcover/Habitat Description | Acres |
|---|---|
| Inter-Mountain Basins Big Sagebrush Shrubland | 10,930 |
| Great Basin Pinyon-Juniper Woodland | 5,139 |
| Inter-Mountain Basins Mixed Salt Desert Scrub | 3,592 |
| Great Basin Xeric Mixed Sagebrush Shrubland | 1,249 |
| Inter-Mountain Basins Montane Sagebrush Steppe | 1,185 |
| Inter-Mountain Basins Greasewood Flat | 1,109 |
| Inter-Mountain Basins Semi-Desert Grassland | 432 |
| Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland | 209 |
| Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland | 119 |
| Developed, Medium - High Intensity | 60 |
| North American Arid West Emergent Marsh | 39 |
| Developed, Open Space - Low Intensity | 37 |
| Invasive Annual and Biennial Forbland | 17 |
| Inter-Mountain Basins Cliff and Canyon | 8 |
| **Total** | **24,125** |

**Big Game Species**

The Plan boundary is located within NDOW Management Unit 7, Hunt Unit 078. Big game species occurring in the area include mule deer, elk, and pronghorn antelope. NDOW-mapped seasonal habitat for big game species is presented in Figure 3.8-2.

*Mule Deer*

Mule deer occur throughout the Plan boundary utilizing a variety of habitats, including Intermountain Basins Big Sagebrush Shrubland, Inter-Mountain Basins Montane Sagebrush Steppe, and Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland. NDOW has mapped habitats utilized by mule deer from 2009; these are presented on Figure 3.8-3. As defined by NDOW, winter range is the part of the overall range where the majority of the deer are located during the typical winter season (generally January through April), as influenced by snow depth and forage availability. Winter range is not necessarily exclusive of other seasonal ranges. Crucial winter range is winter range that is vital or crucial to the continued existence of the population (Lesmeister, 2014). NDOW considers habitat designated as crucial winter habitat particularly important to a herd. The Plan Boundary encompasses approximately 7,130 acres of crucial winter habitat. NDOW post-hunting season survey flights conducted in

northeastern Elko County area, Units 071 through 079, and Unit 091 classified a total of 1,563 mule deer in 2009, 1,643 deer in 2010, 2,664 deer in 2011, 4,243 deer in 2012 and 2,949 deer in 2013 (Newmont, 2012a; NDOW, 2012b and 2013a). The herd in the short-term is increasing though the ratios of bucks to does to fawns have fluctuated.

A small resident deer population resides within the Pequop Mountains; however, a large portion of this Management Unit 7 (Area 7) herd migrates annually. The herd migrates from the winter habitat in the Pequop and Toano mountains to their summer ranges within northeastern Elko County; some traveling over 100 miles from Wildhorse Reservoir and the Jarbidge Mountains (NDOW, 2012a; Blum and Stewart, 2013a). The eastern side of the Pequop Mountain Range is identified as a major deer migration corridor for the Area 7 deer herd (Figure 3.8-2).

NDOW indicates that deer in Area 7 have declined as a result of habitat loss due to wildland fires that have occurred in the area since 1999. Invasive weeds have invaded some of the burned areas; however, in time and in some burned areas, shrubs are expected to recover to pre-burn levels, benefitting the local deer populations (NDOW, 2013a). The herd has a long migration pattern, which crosses busy I-80 and U.S. Highway 93, and which often results in mortalities due to deer crossing I-80 and resulting in vehicular collisions. In 2010 and 2011, two overpasses and three undercrossings were installed on U.S. Highway 93. NDOW has installed cameras at all crossings to document deer usage. Thus far, 16,000 individual deer crossings have been recorded on cameras at the five crossings on Highway 93. It has been noted that there is a decrease in deer and vehicle collisions reported. The crossings are largely a success. Construction of the Shafter Summit crossing is being completed on I-80 and, upon completion, will make the migration route much safer (NDOW, 2013a).

Unlike other northeastern Nevada deer migrations, this herd begins moving south before winter weather forces the deer to migrate. According to mule deer collar data, the average start of migration southward began September 29 and the average end was January 1. Some deer arrived on winter range as early as October 4 and as late as February 6 (Blum and Stewart, 2013a). The deer remain on the winter ranges until early April when they begin their return migration to the summer ranges in northern Elko County. During mild winters, deer will remain further north, including the Long Canyon area, only moving south if significant snow accumulates in the mountain basins. The mountain basins provide better quality winter habitat than the Hogan Tunnel area at the south end of the Pequop Mountains (BLM, 2008e and 2011a).

A Wildlife Working Group was formed in 2011 to address potential concerns regarding wildlife in the project area. The Wildlife Working Group agreed to a minimum 500-foot corridor between the proposed pit and WRSF, with concurrent reclamation and phased mining to maintain a 500-foot or greater distance from the pit to WRSF. Concurrent reclamation, including slope and top material, would be designed to allow for mule deer passage. This corridor and reclaimed habitat could allow north-south deer migrational movement through the Plan boundary, near the traditional migration passageway along the pinyon-juniper woodland/sagebrush interface (Figure 3.8-2).

**Figure 3.8-2 Big Game Habitat Map of Project Area**

**Figure 3.8-3 Mule Deer Habitat Map of Project Area**

In a collaborative effort between NDOW, University of Nevada, Reno, and Newmont, biologists collared 45 deer in the early winter of 2012 and additional collars were deployed in 2013 with 35 collars still active in the spring of 2013 (NDOW, 2013a). Additional collars were deployed in January 2014, bringing the total collard deer number to 45 (Blum and Stewart, 2014). The collaring effort is described to monitor mule deer responses to mining (Blum and Stewart, 2013a) as well as migration timing, migration corridor use, and future monitoring will include habitat use (Blum and Stewart, 2014). The 2012 GPS data of mule deer fall/winter migration and habitat use shows that the deer will utilize drainage systems to move south within the Pequop Mountains. Mule deer travel from north to south via Sixmile Canyon, down through Long Canyon to access the habitat along the alluvial fans of the east side of the Pequop Mountains. Some deer remained within the basins of the mountains, while others traveled further south. Migration from summer range to winter range varied by deer, taking an average of 94 days ranging from six to 132 days (Blum and Stewart, 2013a). Spring migration from winter range to summer range, according to 2013 GPS data of 33 active collars, determined that the average migration began March 23, with a range of eight to 49 days to complete their journey. The average migration was 23 days (Blum and Stewart, 2013b). The spring data indicated that some deer were moving through corridors that were not recognized previously. Of the 33 active collars, six mule deer utilized the Toano Mountains on the east side of Goshute Valley, traveling across the valley in one night. Another five continued south from Long Canyon returning to their summer grounds via the west side of the Pequop Mountains (Blum and Stewart, 2013b). The study is ongoing with NDOW and Newmont receiving updates. NDOW indicated that Long Canyon proper is wintering habitat and mapped as crucial winter range; the deer heavily use the western portion of the Plan boundary during winter (Huebner, 2013a) (Figure 3.8-3), which is supported by the GPS data. Mule deer migratory corridors are shown on Figure 3.8-2.

*Elk*

Elk were reintroduced south of the project area in 1997 (NDOW, 2013a). Elk occur in the area throughout the year and are known to inhabit areas within and surrounding the Plan boundary, typically at higher elevations. They forage seasonally in the wetlands and meadow complex at the Johnson Springs system. Past use of the Big Springs Ranch hayfields and haystacks by elk resulted in NDOW installing elk fence around these facilities to limit the winter use of ranch hay (GBE, 2012). According to NDOW records, the elk fence was installed in 2001 (Huebner, 2013b). NDOW notes elk utilize Long Canyon Spring and the Spud Patch big game guzzler (Figure 3.8-2) (NDOW, 2011, in GBE, 2012).

Post-season inventory in January 2013 resulted in classification of 202 elk yielding age and gender ratios of 56 bulls to 100 cows to 20 calves (NDOW, 2013a). This management unit appears to interchange with other near-by units and the low calf-ratios are likely a result of low precipitation resulting in low forage production (NDOW, 2013a). Nevertheless, the long-term trend for elk in this area is increasing.

*Pronghorn Antelope*
Pronghorn antelope occupy all habitats in the lower elevations of the Plan boundary. A ground survey of hunt units 078, 105, 106, 107, and 121 in January 2013 resulted in 378 classified antelope (NDOW, 2013a). The trend for the herd is stable to slightly increasing.

*Other*
Bighorn sheep (*Ovis canadensis*) do not currently occur in the Pequop Mountains (NDOW, 2013a). However, NDOW has identified suitable habitat in the Pequop Mountains as a future release site for bighorn sheep.

**Game Birds**
Dusky grouse (*Dendragapus obscurus*) have been observed at higher elevations in the Plan boundary (BLM, 2011a). Surveys conducted in 2009 detected 16 dusky grouse (then classified as blue grouse) in Long Canyon (Enviroscientists, Inc., 2009b and 2009c).

Mourning doves (*Zenaida macroura*) were the most commonly observed game bird in the area during baseline surveys conducted in 2011 and 2012 (GBE, 2012). In addition to greater sage-grouse, which are discussed below under Special Status Species, other upland game birds occurring in the area include chukar (*Alectoris chukar*), gray partridge (*Perdix perdix*), and California quail (*Callipepla californica*).

Waterfowl observed in the Johnson Springs system in 2011 and 2012 included Canada goose (*Branta canadensis*), mallards (*Anas platyrhynchos*), gadwall (*Anas strepera*), canvasback (*Aythya valisineria*), and American coot (*Fulica americana*).

**Mammals**
Small mammals occur throughout the Plan boundary. Small mammals observed in the area during baseline surveys include black-tailed jackrabbits (*Lepus californicus*), mountain cottontails (*Sylvilagus nuttallii*), golden-mantled ground squirrels (*Spermophilus lateralis*), and least and cliff chipmunks (*Neotamias minimus* and *Neotamias dorsalis*, respectively). Pygmy rabbits occur in the area and are discussed below under Special Status Species. Nocturnal rodents documented in the area include kangaroo rats (*Dipodomys* sp.), deer mouse (*Peromyscus maniculatus*), desert wood rats (*Neotoma lepida*) and sagebrush voles (*Lemmiscus curtatus*).

Mountain lions (*Puma concolor*) are closely tied to their main prey base of mule deer, following seasonal movements of deer (Pierce et al., 1999). Pierce et al. (1999) tracked mountain lions in the Sierra Nevada Mountains and found that populations of mountain lions that feed on migratory mule deer followed the mule deer during seasonal migrations. They also found that mountain lions that depend on migratory prey may adapt several strategies of migration to deal with changing densities of prey. Regardless of this, when the number of prey species fluxuates, this likely also causes the mountain lion population to fluxuate (Pierce et al., 1999). Mountain lion sign was noted during baseline surveys. Other mammalian predators were detected in the

area including coyotes (*Canis latrans*), bobcats (*Lynx rufus*) and American badgers (*Taxidea taxus*).

**Raptors**

In addition to the special status raptors discussed below, raptors observed in the Plan boundary in 2009 and 2012 included northern harriers (*Circus cyaneus*), Cooper's hawks (*Accipiter cooperii*), red-tailed hawks (*Buteo jamaicensis*), rough-legged hawks (*Buteo lagopus*), turkey vultures (*Cathartes aura*), great horned owls (*Bubo virginiana*), prairie falcons (*Falco mexicanus*), and American kestrels (*Falco sparverius*) (Enviroscientists, Inc., 2009c; GBE, 2012). Rough-legged hawks that may occur in the area are migratory, as they nest in the Arctic and Subarctic zone of Canada and Alaska.

In 2012, GBE conducted auditory surveys for sharp-shinned (*Accipiter striatus*) and Cooper's hawks. Recorded calls of these species were played in suitable habitat on four occasions between April 2 and July 18, 2012. Territorial (nesting) birds typically respond aggressively to recorded calls, but no response to the calls was elicited (GBE, 2012). GBE noted the Plan boundary also has the potential to support short-eared and long-eared owls (*Asio otus* and *Asio flammeus*, respectively) and northern pygmy owls (*Glaucidium gnoma*).

A major migration corridor exists east of the Plan boundary along the spine of the Goshute Mountains. Here, fall migration counts have tallied over 12,000 raptors per migration season. The numbers of raptors that tally in the 1,000's are sharp-shinned hawk, Cooper's hawk, red-tailed hawk, and American kestrel with 20 species recorded (HawkWatch, 2013).

**Migratory Birds**

Migratory birds include those species that nest in the area but migrate south, out of the area, prior to the onset of winter, or those birds that pass through the area during migratory movements. The USFWS maintains a list of birds identified as migratory under the MBTA. While not all birds included on this list are migratory throughout their range, the migratory bird list includes most species of birds that occur in North America other than introduced species and hunted upland bird species. Migratory bird species that are included on the BLM's sensitive species list are discussed below under Special Status Species.

Enviroscienstists conducted baseline bird surveys and nesting migratory bird surveys in portions of the Plan boundary in 2009. Species observed during these surveys included northern flickers (*Colaptes auratus*), mountain chickadees (*Poecile gambeli*), black-throated gray warblers (*Setophaga nigrescens*), and chipping sparrows (*Spizella passerina*), all common pinyon-juniper woodland species. Montane brush including sagebrush and mountain mahogany woodland habitats support other species including green-tailed towhees (*Pipilo chlorurus*) and bushtits (*Psaltriparus minimums*) which were noted in 2009. Clark's nutcrackers (*Nucifraga columbiana*), a species generally occurring in higher elevation woodland habitats, were also noted. Common nighthawks (*Chordeiles minor*) and common poorwills (*Phalaenoptilus nuttallii*), crepuscular and nocturnal foragers, were recorded in the area (Enviroscientists, Inc., 2009c).

As part of their baseline investigations of the Plan boundary, GBE established 14 bird survey stations within the Long Canyon survey area and six stations were established outside the current Plan boundary. At least two stations were located within each vegetation community, as defined by GBE. Each station was surveyed at least four times during the nesting season of 2012 (between April 2 and July 18, 2012).

Common migratory birds observed in the area during the GBE surveys included northern flickers, gray flycatchers (*Empidonax wrightii*), western scrub jays (*Aphelocoma californica*), common ravens (*Corvus corax*), mountain chickadees, blue-gray gnatcatchers (*Polioptila caerulea*), mountain bluebirds (*Sialia currucoides*), black-throated gray warblers, and spotted towhees (*Pipilo maculatus*). Red-winged and Brewer's blackbirds (*Agelaius phoeniceus* and *Euphagus cyanocephalus*, respectively) were observed in and near the Johnson Springs wetland complex.

A number of bird species recorded during the surveys are considered watch-list species, including species listed by Nevada Partners in Flight (NPIF), which is a multi-agency, multi-national organization that strives to manage habitats for migrant species on a hemispheric scale. The USFWS maintains a list of bird species considered to be of management concern within bird conservation regions; Nevada is within Region 9. The Great Basin Bird Observatory (GBBO) developed a document in support of management for these species called the Nevada Comprehensive Bird Conservation Plan (GBBO, 2010), which outlines 20 different habitat types that are critical to the birds of management concern. Twelve of these habitat types occur within the Plan boundary. The Plan boundary has the potential to support a variety of bird species of conservation concern either by providing migratory stop-over habitat or breeding habitat (GBBO, 2010). Other species of conservation concern that are not BLM sensitive noted during the baseline surveys include: gray flycatcher, prairie falcon, mountain bluebird, green-tailed towhee, sagebrush sparrow (*Artemisiospiza nevadensis*) and short-eared owl, were detected by GBE or Enviroscientists, Inc. during their surveys. The Plan boundary has the potential to provide habitat for many other species as well.

**Reptiles and Amphibians**

A variety of reptiles were documented in the survey area during baseline surveys conducted in 2011 and 2012 (GBE, 2012). These included the western fence lizard and sagebrush lizard (*Sceloporus occidentalis* and *Sceloporus graciosus*, respectively), the desert horned lizard (*Phrynosoma platyrhinos*) and the Great Basin gopher snake (*Pituophis catenifer* ssp. *deserticola*). Earlier surveys conducted in the original exploration area documented the occurrence of the common side-blotched lizard (*Uta stansburiana*), western fence lizard, Great Basin skink (*Plestiodon skiltonianus* ssp. *utahensis*), Great Basin whiptail (*Aspidoscelis tigris*), and short-horned lizard (*Phrynosoma hernandesi*) (BLM, 2011a).

**Other Wildlife**

According to the EA prepared for exploration activities, three colonies of mountain land snails (*Oreohelix sp.)* were located in 2010 by Mark Ports of Great Basin College in Elko (BLM, 2011a), who has subsequently proposed this land snail as a new species (*Oreohelix pequopensis*) (Ports, 2013). These land snails occur in isolated stands of relict white fir (*Abies concolor)* associations within the talus of limestone canyons in the northern part of the Pequop Mountains. Colonies are not known to occur within the Plan boundary. It was determined targeted surveys were not necessary since the Plan boundary is too low in elevation and white fir were not documented in previous surveys of the Plan boundary. The known populations occur west of the Plan boundary in Sixmile Canyon (BLM, 2011a; Ports, 2013).

**Special Status Species**

For purposes of this evaluation, special status species are animals that are legally protected or otherwise considered sensitive by federal or state agencies, including:

- Wildlife species that are listed under the federal ESA as threatened or endangered;
- Wildlife species considered candidates for listing or proposed for listing;
- Wildlife species identified by NDOW as species of special concern; and
- Wildlife listed as BLM sensitive.

Table 3.8-2 presents special status wildlife species that may occur in the Plan boundary, based on the BLM sensitive species list. Federally listed threatened or endangered species do not occur within the Plan boundary.

BLM Elko District Office sensitive species not presented in the table were not included because the project is located outside their known range or suitable habitat does not exist for these species. These species are not discussed further in this document. Appendix 3D provides the complete list of the BLM Elko District sensitive species.

**Greater Sage-Grouse**

The greater sage-grouse is currently listed as a federal candidate species. Greater sage-grouse are known obligates of sagebrush habitats, meaning that they require sagebrush for some part of their life cycle. Greater sage-grouse use sagebrush for roosting, cover, and food. During Nevada winters, they select wind-swept ridges with short, scattered black sagebrush (*Artemisia nova*) or low sagebrush (*Artemisia arbuscula*) plants as winter feeding areas (Connelly, et al., 2011; Thacker, 2010; Young and Palmquist, 1992). Despite the fact that this species occurs widely in sagebrush throughout the west it has undergone a decline in numbers due to a variety of interrelated impacts, from wildland fire affected habitat, habitat fragmentation and increased predation. The greater sage-grouse is also a BLM sensitive species and considered a game bird in Nevada.

Greater sage-grouse court and mate on traditional communal display grounds called strutting grounds, or leks. Male birds establish territories on the lek and display and vocalize to hold these territories and to attract female birds. Greater sage-grouse utilize springs, streams and wet meadow habitats as brood-rearing sites, where young birds can find insects and nutritious green vegetation.

In 2011, greater sage-grouse were observed in the Pequop Mountains near Long Canyon Spring and in the wet meadow habitats associated with Big Springs (GBE, 2012). Sagebrush habitat is utilized during winter, though areas adjacent to woodlands appear to be avoided, as trees in the woodland represent potential perch sites for raptors and ravens, which may prey on greater sage-grouse or their young (GBE, 2012).

**Table 3.8-2 Special Status Wildlife Species with Habitat in the Project Area**

| Species Common/ Scientific Name | Status | Description and Habitat | Potential to Occur in Project Area | Documented During Surveys |
|---|---|---|---|---|
| **MAMMALS** | | | | |
| Pallid Bat *Antrozous pallidus* | BLM Sensitive Nevada Protected | The pallid bat inhabits low desert shrubland, juniper woodlands, and grasslands. Pallid bats most commonly occur in low, dry regions with rock outcrops, usually near water, and roost in rock crevices, buildings, rock piles, tree cavities, shallow caves, and abandoned mines (NatureServe, 2013, WBWG, 2005). Their primary food sources are arthropods such as crickets, grasshoppers, beetles, scorpions, and spiders. | Could occur in mining and processing area, potential roosting and foraging habitat is available. Know to occur within the power supply pipeline (JBR, 2013a). | Yes (Power supply pipeline) |
| Townsend's Big-Eared Bat *Corynorhinus townsendii* | BLM Sensitive Nevada Protected | Townsend's big-eared bat is a permanent resident in North America. Maternity and hibernation colonies generally occur in caves and abandoned mine workings. This species may roost in buildings and has often been found utilizing mine shafts and adits as maternity roosts and hibernacula. Habitats in the vicinity of roosts include pine forests, pinyon-juniper woodland, and cottonwood bottomland. The Townsend's big-eared bat is a moth specialist with over 90% of its diet composed of *Lepidopterans* (WBWG, 2005). | Could occur; foraging habitat occurs. | No |
| Big Brown Bat *Eptesicus fuscus* | BLM Sensitive | The big brown bat is a medium- to large-sized bat that is known to roost in buildings, bridges, mines, caves, rock crevices, and even in giant saguaro cacti (WBWG, 2005). Their primary diet includes beetles and they usually forage within a few kilometers of their roost. This bat can be locally common in some urbanized environments. | Known to occur (Enviroscientists, Inc., 2009c; JBR, 2013a). | Yes (Pit and Power supply pipeline) |
| Spotted Bat *Euderma maculatum* | BLM Sensitive Nevada Protected | The spotted bat occurs in varied habitats, including desert-scrub, pinyon-juniper woodland, mixed conifer forest, canyon bottoms, riparian areas, fields, and open pastures (WBWG, 2005). Spotted bats roost in cracks, crevices and caves high in rock cliffs. Their primary diet consists of moths. | Could occur; potential roosting and foraging habitat is available within Plan boundary. | No |
| Silver-Haired Bat *Lasionycteris noctivagans* | BLM Sensitive | The silver-haired bat is known to roost primarily in large trees but will also roost in mines and caves. These bats forage in the open canopy over meadows and water courses and are associated primarily with North Temperate Zone conifer and mixed conifer/hardwood forests, eating medium-sized flying insects (WBWG, 2005). | Known to occur (Enviroscientists, Inc., 2009c). | Yes (Pit) |
| Hoary Bat *Lasiurus cinereus* | BLM Sensitive | The hoary bat is known for its relatively large size and golden-colored fur. Common roosting sites include coniferous and deciduous trees and caves. In the Pacific Northwest, hoary bats are common where they are highly associated with forested habitats (WBWG, 2005). Primary food sources include beetles, moths, grasshoppers, dragonflies, and wasps. | Could occur; potential roosting and foraging habitat is available within Plan boundary. Known to occur in power supply pipeline (JBR, 2013a). | Yes (Power supply pipeline) |

| Species Common/ Scientific Name | Status | Description and Habitat | Potential to Occur in Project Area | Documented During Surveys |
|---|---|---|---|---|
| California Myotis *Myotis californicus* | BLM Sensitive | The California myotis inhabits riparian woodlands, canyons, grasslands, and desert habitats and utilizes rock crevices, caves, buildings, and abandoned mine workings for roosting, maternity and hibernation. These bats forage on insects along margins of tree canopy and over water (NatureServe, 2013). | Could occur; potential foraging habitat occurs throughout the site. | No |
| Western Small-Footed Myotis *Myotis ciliolabrum* | BLM Sensitive | The western small-footed myotis inhabits desert habitats and utilizes rock crevices, caves, buildings, and abandoned mine workings for roosting, maternity and hibernation. Its primary food source is small insects found along cliffs and rocky slopes (NatureServe, 2013; WBWG, 2005). | Known to occur (Enviroscientists, Inc., 2009c; JBR 2013a). | Yes (Pit and power supply Pipeline) |
| Long-Eared Myotis *Myotis evotis* | BLM Sensitive | The long-eared myotis is a hovering feeder that eats insects such as moths, beetles, flies, lacewings, and true bugs off foliage and from the ground (WBWG, 2005). Known roosting sites include hollow trees, caves, mines, cliff crevices, sinkholes, and rocky outcrops. | Known to occur (Enviroscientists, Inc., 2009c). | Yes (Pit) |
| Little Brown Myotis *Myotis lucifugus* | BLM Sensitive | The little brown myotis is also commonly called the little brown bat and is among the most widespread and common bats of temperate North America. Common roosting sites for this bat include tree cavities, caves, mines, and buildings. They are also known to utilize caves and abandoned mines for hibernation (WBWG, 2005). The little brown myotis eats flying insects such as mosquitoes, moths, caddis flies, spiders, and small beetles (NatureServe, 2013). | Known to occur (Enviroscientists, Inc., 2009c). | Yes (Pit) |
| Fringed Myotis *Myotis thysanodes* | BLM Sensitive Nevada Protected | The fringed myotis ranges through much of western North America. It occurs most commonly in middle elevations. Distribution is patchy. It appears to be most common in drier woodlands (oak, pinyon-juniper, ponderosa pine) but is found in a wide variety of habitats including desert scrub, mesic coniferous forest, grassland, and sage-grass steppe. It feeds on a variety of invertebrate taxa and the relative importance of prey items may vary according to prey availability, geography, or time period (WBWG, 2005). | Could occur; potential foraging habitat occurs. | No |
| Long-Legged Myotis *Myotis volans* | BLM Sensitive | The long-legged myotis occurs throughout the western United States primarily in coniferous forests and seasonally in riparian and desert habitats where it is known to roost in abandoned buildings, caves, mines, cliff crevices, and hollow trees (WBWG, 2005). Its primary food sources include moths and other soft-bodied insects. | Could occur; potential foraging habitat occurs. Known to occur in power supply pipeline (JBR, 2013a). | Yes (Power supply pipeline) |

| Species Common/ Scientific Name | Status | Description and Habitat | Potential to Occur in Project Area | Documented During Surveys |
|---|---|---|---|---|
| Yuma Myotis *Myotis yumanensis* | BLM Sensitive | The Yuma myotis inhabits riparian areas, scrublands, deserts, and forests and is commonly found roosting in bridges, buildings, cliff crevices, caves, mines, and trees. Its primary diet is emergent aquatic insects such as caddis flies, midges, and small moths and beetles (WBWG, 2005). | Could occur; potential foraging habitat occurs. | No |
| Western Pipistrelle *Pipistrellus hesperus* | BLM Sensitive | The western pipistrelle is the smallest of all North American bats and is usually associated with rocky canyons and outcrops where they are known to roost in small crevices. It is also known to occupy mines and caves (WBWG, 2005). Its food sources include ants, mosquitoes, fruit flies, and leafhoppers. | Could occur; potential roosting and foraging habitat is available within Plan boundary. | No |
| Brazilian Free-Tailed Bat *Tadarida brasiliensis* | BLM Sensitive Nevada Protected | The Brazilian free-tailed bat is one of the most widely distributed mammalian species in the Western Hemisphere. It is highly colonial and commonly roosts in large caves, rock crevices, and abandoned mines where maternity colonies can range in size from a few hundred to 20 million (WBWG, 2005). Its primary diet consists of moths, but includes flying ants, weevils, and ground beetles. | Known to occur (Enviroscientists, Inc., 2009c; GBE, 2012; JBR, 2013a). | Yes (Pit and Power supply pipeline) |
| Dark Kangaroo Mouse *Microdipodops megacephalus* | BLM Sensitive Nevada Protected | The dark kangaroo mouse burrows in gravelly sandy soils at the base of sagebrush. Its primary food source is seeds and insects. Dark kangaroo mice do not need to be near a water source, and instead obtain water from the food they consume (NDOW, 2012a). | Could occur; potential habitat may occur if sandy soils occur with sagebrush. | No species specific surveys conducted |
| Preble's Shrew *Sorex preblei* | BLM Sensitive | This rarely detected shrew is thought to occur throughout the northern half of the western states and British Columbia. Within Nevada, it is known to occur from three areas in the northwest and northeast corners of the state (Patterson et al., 2003). It prefers habitats that include a mixture of sagebrush and grassland or wetland (NatureServe, 2013) where this shrew forages on a variety of invertebrates. | Could occur; potential habitat occurs within sagebrush and meadow/grassland communities of the springs complex. | No species specific surveys conducted |
| Pygmy Rabbit *Brachylagus idahoensis* | BLM Sensitive | Restricted to denser sagebrush habitats with friable soils suitable for digging burrows. Generally in valley bottoms within stands of basin big sagebrush, but may be found in a mosaic of sagebrush and other shrub species (Ulmschneider et al., 2008). | Known to occur (GBE 2012, 2013b; JBR, 2013a). | Yes (Mine facilities, power supply pipeline) |
| Bighorn Sheep *Ovis canadensis* | BLM Sensitive | Bighorn sheep inhabit a variety of vegetation communities depending on the season. They can be found anywhere from alpine mountains to desert grasslands. They primarily graze on grass, forbs, and shrubs. Northern populations of bighorn sheep are not dependent on a freestanding water source and may obtain all water from the food they consume (NDOW, 2012a). | Unlikely to occur; not known to occur in the Pequop Mountains. | No |

| Species Common/ Scientific Name | Status | Description and Habitat | Potential to Occur in Project Area | Documented During Surveys |
|---|---|---|---|---|
| **INSECTS** | | | | |
| Mattoni's Blue Butterfly *Euphilotes pallescens mattonii* | BLM Sensitive | The *Euphilotes pallescens* species of butterfly occurs scattered across the Great Basin and southern California. The *mattonii* subspecies occurs in eastern Nevada in Long-Ruby Valleys, Pilot-Thousand Springs and Bruneau watersheds of Elko County, NV and northern Great Salt Lake of Utah (NatureServe, 2013). The known host plant is slender buckwheat (*Eriogonum microthecum*), which occurs widely across the west. This plant blooms late, resulting in butterfly flight time in July and August. | Known to occur (Enviroscientists, Inc., 2009c). | Yes (adjacent to pit) |
| **BIRDS** | | | | |
| Northern Goshawk *Accipiter gentilis* | BLM Sensitive Nevada Protected | The northern goshawk is a fairly large hawk (55 – 61 cm in length) with rounded wing tips and conspicuous pale eye brow. It nests in a variety of habitat types including deciduous, coniferous, and mixed forests. Western birds, including most Nevada birds, are known to nest in deciduous forests dominated by aspen (NatureServe, 2013). | Unlikely to occur; typical nesting habitat (aspen stands) do not occur in the Plan boundary. | No |
| Western Burrowing Owl *Athene cunicularia* | BLM Sensitive | The western burrowing owl is a small (9 to 10 inches) ground-dwelling owl with long legs, white chin stripe, round head, and stubby tail (NatureServe, 2012). It often nests in burrows that have been abandoned by other burrowing mammals and usually in open areas with good surrounding visibility. Western burrowing owls are present in northern Nevada in the spring and summer months and winter in the southwestern states (GBBO, 2010). | Known to occur (GBE, 2012; JBR, 2013a). | Yes (Power supply pipeline, mine facilities) |
| Golden Eagle *Aquila chrysaetos* | BLM Sensitive BGEPA | Golden eagle inhabit wide open terrain, both agricultural and shrub covered, with suitable nest features, generally rock outcrops, crags, and cliffs but are also known to nest in conifers (Ryser, 1985). Nest sites are normally located with expansive views of their home range territory, which is generally large. Habitats include mountains, canyons, sagebrush steppe, and deserts, plains (Floyd et al., 2007). Primary food base are rabbits and hares, particularly black-tailed jackrabbit (*Lepus californicus*). | Known to occur (GBE, 2012; 2013a). | Yes (Pit, power supply pipeline) |
| Ferruginous Hawk *Buteo regalis* | BLM Sensitive | In pinyon-juniper habitats of the Great Basin, ferruginous hawks typically nest in juniper trees along the forest shrubland edge, where their nests are often located on the closest trees adjacent to shrubland habitats. They also nest on rock outcrops. Ferruginous hawks prey heavily on ground squirrels. Because their principal prey (ground squirrels) enters aestivation by late July or early August, ferruginous hawks typically fledge young and leave the area by early August (GBBO, 2010). | Known to occur (GBE, 2012). | Yes (near Plan boundary, power supply pipeline) |

| Species Common/ Scientific Name | Status | Description and Habitat | Potential to Occur in Project Area | Documented During Surveys |
|---|---|---|---|---|
| Greater Sage-Grouse *Centrocercus urophasianus* | ESA Candidate BLM Sensitive | The greater sage-grouse occupies habitats dominated by sagebrush, which the birds utilize for both cover and forage. During the breeding season, greater sage-grouse congregate on historic open sites known as leks where males display in attempt to attract females. Nesting habitat is generally adjacent to lek sites and is comprised of denser brush canopy for concealment of nests, while brood-rearing and summer habitat encompasses sagebrush and meadow interfaces or other habitats, which supply a diversity of forbs and insects consumed by growing chicks. The majority of the year greater sage-grouse feed on sagebrush (Schroeder et al., 1999; NDOW, 2004). | Known to occur; lek, summer and winter habitat occurs in the Plan boundary. | Yes (Mine Facilities) |
| Lewis's Woodpecker *Melanerpes lewis* | BLM Sensitive | Lewis's woodpecker favors open forests, ranging in altitude from low-elevation riparian areas to higher-elevation burns and pine forests. Like all other woodpeckers, it requires snags (standing dead or partly dead trees) for nesting, although it is not anatomically specialized for excavating in wood and the trees it selects for nesting are generally well decayed (Vierling et al., 2013). Northeastern Nevada Breeding Bird Atlas records for the species are concentrated in the Ruby, East Humboldt, and Jarbidge mountain ranges (Floyd et al., 2007). | Unlikely to occur; suitable forested or riparian woodland habitat does not occur. | No |
| Peregrine Falcon *Falco peregrinus* | BLM Sensitive Nevada Protected | Peregrine falcons typically nest on vertical cliffs and ledges, generally near water. They are known to nest on man-made structures including buildings, bridges, and raised platforms or old nests of ravens or bald eagles. These birds of prey are not commonly found in Nevada. They feed primarily on medium sized birds, but are known to sometimes forage on small mammals, lizards, fish, and insects (White et al., 2002). | Unlikely to occur; suitable nesting habitat is not available; however, potential foraging habitat is available. | No |
| Pinyon Jay *Gymnorhinus cyanocephalus* | BLM Sensitive | The pinyon jay is a highly social, cooperative-breeding, seed-caching bird. Pinyon jays inhabit higher elevations of the Great Basin year round, commonly within pinyon-juniper woodlands with diverse age class distribution. They are the earliest of the passerines to breed, synchronously nesting in winter, depending on seed caches from the fall crop of pine seeds. Systematic destruction of pinyon woodlands has been the reason for their decline (Balda, 2002). | Known to occur (Enviroscientists, Inc., 2009c; GBE, 2012). | Yes (Pit) |
| Bald Eagle *Haliaeetus leucocephalus* | BLM Sensitive Nevada Protected BGEPA | The bald eagle inhabits areas near water and feeds on fish and waterfowl, but also inhabits areas where other food is available, such as rabbits and road kill (NatureServe, 2012). Bald eagle nests are most commonly built in trees. During winter months, eastern Nevada bald eagles roost in trees at ranches or on sagebrush in the valley bottoms (NDOW, 2012a). | Could occur; suitable nesting habitat is not present. Potential foraging habitat is available. | No |

| Species Common/ Scientific Name | Status | Description and Habitat | Potential to Occur in Project Area | Documented During Surveys |
|---|---|---|---|---|
| Black Rosy-Finch *Leucosticte atrata* | BLM Sensitive | Black rosy-finches are alpine breeders nesting in cliffs overlooking glaciers and snowfields. Within Nevada, they have been found nesting in the Ruby, Snake and Santa Rosa mountain ranges (Floyd et al., 2007). They are more commonly seen in the winter, when they may be found in open fields and cultivated lands in relatively large flocks feeding on seeds and insects. During the winter, black rosy-finches are known to roost in mine shafts, caves, barns and old cliff swallow nests (Johnson, 2002). | Not likely to occur; however, potential winter habitat is available. | No |
| Sage Thrasher *Oreoscoptes montanus* | BLM Sensitive Nevada Protected | The sage thrasher is considered a sagebrush obligate and is commonly found in habitats of intact, fairly dense stands of sagebrush. Nonetheless, they may also occur in greasewood or bitterbrush (Floyd et al., 2007). Sage thrashers situate their nests within dense brush or on the ground. They primarily feed on insects but occasionally eat berries (Reynolds et al., 1999). | Known to occur (GBE, 2012; JRB, 2013a). | Yes (Mine facilities, power supply pipeline) |
| Brewer's Sparrow *Spizella breweri* | BLM Sensitive Nevada Protected | This species is found throughout Nevada in sagebrush and mixed shrub communities. Brewer's sparrows nest in brush communities with low shrubs and grasses, and primarily feed on insects and seeds (NDOW, 2012a). | Known to occur (GBE, 2012; JBR, 2013a). | Yes (Mine facilities, power supply pipeline) |
| Loggerhead Shrike *Lanius ludovicianus* | BLM Sensitive | Loggerhead shrikes occur in open country in greasewood, sagebrush, agricultural areas, where this avian predator can hunt reptiles, insects, small mammals, and birds (Floyd et al., 2007). Large prey are always impaled (barbed wire or vegetation) before eating (Yosef, 1996). | Known to occur (JBR, 2013a). | Yes (Power supply pipeline) |
| **AMPHIBIANS** | | | | |
| Northern Leopard Frog *Lithobates* (*Rana*) *pipiens* | BLM Sensitive Nevada Protected | The northern leopard frog requires a mosaic of habitats to meet the requirements of all of its life stages. Northern leopard frogs breed in a variety of aquatic habitats that include slow-moving or still water along streams and rivers, wetlands, permanent or temporary pools, beaver ponds, and human-constructed habitats such as earthen stock tanks and borrow pits. Subadult frogs typically migrate to feeding sites near larger, more permanent bodies of water (USFWS, 2012). Their documented distribution across the Great Basin is limited. | Could occur; potentially suitable habitat exists within the Johnson Springs system. | No species specific surveys conducted |

| Species Common/ Scientific Name | Status | Description and Habitat | Potential to Occur in Project Area | Documented During Surveys |
|---|---|---|---|---|
| Columbia Spotted Frog, Great Basin Distinct Population Segment (DPS) *Lithobates* (*Rana*) *luteiventris* | ESA Candidate BLM Sensitive | Columbia spotted frogs appear to be widely distributed throughout southwest Idaho, southeast Oregon, northeast and central Nevada, but most populations within this range appear to be small and isolated from each other (USFWS, 2012). In general, Columbia spotted frogs use the shallows of lentic habitats for breeding and egg deposition. These habitats are usually permanent, although naturally ephemeral pools are used successfully by some populations. Springs are often nearby. Floating and/or emergent vegetation is usually present. Percent sun exposure is typically high (AmphiaWeb, 2013). | Not likely to occur; the extent of this DPS is not thought to overlap the Plan boundary. | No species specific surveys conducted |
| **FISH** | | | | |
| Relict Dace *Relictus solitarius* | BLM Sensitive | This fish is a Nevada endemic, restricted to lakes, ponds and spring-fed streams associated with Pleistocene lakes, including Franklin, Gale, Waring, Steptoe, and Spring basins (Ruby, Butte, Steptoe, Goshute, and Spring valleys) in eastern Nevada (White Pine and Elko counties) (NatureServe, 2013; La Rivers, 1994; Sigler and Sigler, 1987). | Known to occur; documented within the ponds and drainages of Big Springs and Johnson Springs system (NNHP, 2012). | Yes (adjacent to mine facilities) |
| **MOLLUSKS** | | | | |
| California Floater *Anodonta californiensis* | BLM Sensitive | This freshwater bivalve occurs in slow moving rivers, streams, lakes, and impoundments with sand or less commonly gravel bottoms in the western U.S. and British Columbia. In Nevada, it occurs in the northern half of the state, except along the eastern edge, where it is does not appear to occur south of I-80 (Jepsen et al., 2013) | Could occur; potentially suitable habitat exists within the Johnson Springs system. | No species specific surveys conducted |
| Humboldt Pyrg *Pyrgulopsis humboltensis* Duckwater Warm Spring Pyrg *Pyrgulopsis villacampae* Vinyard's Pyrg *Pyrgulopsis vinyardi* | BLM Sensitive | These aquatic obligate snails encompass a diverse group with some 80 species in the Great Basin alone, many of which are locally endemic (Hershler and Sada, 2002). Their presence in springs is a sign of permanent water sources, many of which have persisted for thousands of years, having become isolated as Pleistocene lakes receded. The Johnson Springs system would have been a part of the Pleistocene lake Waring. In eastern Nevada, the common pyrg snail is *P. kolobensis* (Hershler, 1998). The BLM sensitive *Pyrgulopsis* species are known to occur in hydrographic basins beyond the Plan boundary (e.g., Lahontan and Railroad hydrographic basins). Potential habitat within the Plan Boundary is found on private land. | Could occur; potentially suitable habitat exists within the Johnson Springs system on private land. | No species specific surveys conducted |

**Status of Greater Sage-Grouse**

Between July 2002 and December 2003, the USFWS received several petitions requesting that the greater sage-grouse be listed as threatened or endangered range-wide. A variety of petitions, findings, litigation, and rulings led the USFWS in March 2010 to publish its decision on the petition to list the greater sage-grouse as "Warranted but Precluded" (75 FR 13910). In its "Warranted but Precluded" listing decision, USFWS concluded that existing regulatory mechanisms, defined as “specific direction regarding greater sage-grouse habitat, conservation, or management” in the BLM's Land Use Plans, were inadequate to protect the species. The USFWS is scheduled to make a new listing decision in fiscal year 2015.

In response to USFWS' inadequate regulatory mechanism findings and in order to avoid a potential listing, the BLM and the USFS began a process to amend their land use management plans affecting greater sage-grouse habitat to incorporate greater sage-grouse conservation measures. Interior Secretary Salazar invited the states impacted by a potential greater sage-grouse listing to develop state-specific regulatory mechanisms to conserve the species and preclude the need for listing.

In August 2011, the BLM convened the Sage-Grouse National Technical Team (NTT), which brought together resource specialists and scientists from the BLM, State Fish and Wildlife Agencies, USFWS, NRCS, and USGS. In December 2011, the NTT developed a series of science-based conservation measures to be considered and analyzed through the land use planning process in a report titled *A Report on National Greater Sage-Grouse Conservation Measures* (NTT, 2011). As a result of the NTT guidance, the BLM released a series of Instructional Memorandums (IMs) (IM 2012-044; IM 2012-043) that provides direction to the BLM on how to consider the NTT conservation measures in the land use planning process and implement new or revised regulatory mechanisms through the land use planning process to conserve and restore the greater sage-grouse and their habitat. BLM's National Strategy emphasizes protecting unfragmented habitats; minimization of habitat loss and fragmentation; and management of habitat to maintain, enhance or restore conditions that meet greater sage-grouse life history needs (IM-2012-043). In an effort to better understand the distribution of important greater sage-grouse habitat, both the BLM and NDOW have undertaken programs to identify and map various categories of greater sage-grouse habitat.

BLM has developed categories for habitat within BLM-managed land that assist them with meeting the goals and objectives of the current MOUs and IMs for greater sage-grouse habitat conservation measures. BLM greater sage-grouse habitat is categorized into Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH). These habitats have been identified by the BLM in coordination with respective state wildlife agencies. Available data was used to create a statewide prioritization of greater sage-grouse habitat. The habitat determination of PPH is defined as having the highest conservation value to maintaining sustainable greater sage-grouse populations. These habitats include breeding, brood rearing, and winter concentration areas. The habitat determination of PGH is defined as occupied seasonal or year-round habitat that includes areas of higher quality habitat that may lack a key component such as vegetative structure or herbaceous understory, which prevents it from

meeting PPH. The portions of the Plan boundary not classified as PPH or PGH habitat have been considered low value habitat.

Table 3.8-3 presents BLM's greater sage-grouse habitat categorization within the Plan boundary. Figure 3.8-4 depicts the distribution of these categories of greater sage-grouse habitat in the Plan boundary.

**Table 3.8-3 Acres of Greater Sage-Grouse Habitat Present in the Mining and Process Area**

| Habitat Category | Acres in Plan Boundary | | |
|---|---|---|---|
| | Public | Private | Total |
| PPH | 5,176 | 8,017 | 13,193 |
| PGH | 2,006 | 2,481 | 4,487 |
| **Total** | **7,182** | **10,498** | **17,680** |

The Plan boundary is located within the East Valley Population Management Unit (PMU) designated by NDOW. There are 10 PMUs in Elko County, which vary in area and population size; the East Valley PMU is the smallest with the fewest known leks and lowest population size. The East Valley PMU is located within the eastern edge of occupied habitat in Nevada. According to NDOW, as of 2014, there are six active leks within this PMU. Historically, there were 15, though some of these sites may not have been leks, but rather a single observation of birds displaying. None of the East Valley PMU leks are trend leks (leks monitored three to four times annually by NDOW to aid in the assessment of population trends) (NDOW, 2014b).

Two leks are known to occur in close proximity to the Plan boundary (Figure 3.8-5). The Big Springs lek is located less than 400 feet from the southwest edge of the Plan boundary. The Little Lake Pass lek is located approximately 4.3 miles south of the Plan boundary.

The Big Springs lek was attended by as many as 38 birds as recently as 2007. Four birds were observed on the lek in 2011, only a single bird was observed at the site in 2012, and in 2013 and 2014, no greater sage-grouse were observed. However, NDOW was able to capture and collar one male near the Big Springs lek and two males near the Little Lake Pass Lek during the 2013 breeding season. The individual collared near the Big Springs lek was subsequently killed by a raptor and the two remaining birds have been tracked to date (Roberts, 2013a; NDOW, 2014b). The collared birds were most recently tracked to the benches above Spud Patch Guzzler approximately 0.75 mile west of the Plan boundary (Roberts, 2013b) (Figure 3.8-5). The battery on one of the collars has failed and the other continues to produce a weak signal. During October of 2014, the bird was located on the ridgeline above the Spud Patch burn (NDOW, 2014b).

The Little Lake Pass lek was identified in 2006. Twelve birds were observed on the lek that year. Four birds were recorded at the lek in 2011, five birds were present in 2012 (GBE, 2012). In 2014, there were three males and one female observed at the Little Lake Pass lek. Five birds were noted during the trapping session in 2013 (Roberts, 2013b) and four birds were present in

2014 (Roberts, 2014a). Although these leks are not trend leks, they follow a similar decline as others in Elko County. Overall, NDOW states the average male attendance rate at trend leks for the 15-year period was 32.5 and annual average male attendance rates have not exceeded that average since 2007 (NDOW, 2012c; NDOW, 2014b).

A number of contributing factors have likely led to the low attendance at the Big Springs lek, though none can be validated. NDOW hypothesizes the low numbers in the East Valley PMU could be a result of limited suitable habitat, habitat fragmentation, juniper encroachment, wildland fire affected habitats, invasive plant species, livestock management, feral horses, increasing disturbance, and limited water. Within the Plan boundary, the decline in numbers may have to do with limited access to the meadows of the Johnson Springs system. NDOW installed elk fencing at the request of the rancher because of herbivory issues with elk and records indicate this occurred in 2001. Elk fencing precludes most wildlife with the exception of small animals (i.e., small mammals, reptiles) and most birds from access to either side. The limited access to prime brood rearing habitat may have lead to low recruitment numbers for the greater sage-grouse (Roberts, 2013). Additionally, alfalfa or other forage crops may have also been used by greater sage-grouse, all of which are no longer cultivated. Minerals exploration was also expanding during this time. For the most part, the only suitable brood rearing habitat within the area is associated with the Johnson Springs system and Hardy Creek.

Male greater sage-grouse conduct courtship displays incorporating plumage, posture, movement and sound during pre-dawn and dawn hours. Males auditory display includes five sounds generally characterized as *wing swish*, which is produced by wing brushing against stiff, white feathers of neck and breast; *coos,* which are three low, single-frequency coos uttered after second wing swish; *plop*, which is a sound amplified by the air-filled esophageal pouches, these are broadband sounds and can be heard up to five kilometers away; w*histle*, which is a frequency-modulated whistle that is uttered between first and second plops; *snoring or hooting*, is an unusual series of several short notes that appear to be caused by sudden release of air at end of strutting display; and finally; *tail rattle*, which is a sound produced by tail-feathers when they rub against each other as they vibrate and occurs at end of strutting displays (Schroeder et al., 1999). Greater sage-grouse are thought to leave suitable habitat where anthropogenic noise is chronic and more so if it is intermittent (Blickley, Blackwood, Patricelli, 2012a). Because sounds are essential to greater sage-grouse courtship displays, leks in particular are susceptible to impacts from noise as they are locales that are used annually over decades and are central to the bird's reproduction. A reduction in lek attendance results in lower greater sage-grouse numbers.

**Figure 3.8-4 Greater Sage-Grouse Habitat Map (PPH & PGH) of Plan Boundary**

**Figure 3.8-5 Special Status Species Project Boundary**

Measuring and perceiving sound is dependent on many factors such as sound pressure and frequency. Measuring environmental noise levels includes measuring how the human or sensitive receptor perceives the sound. Measurement of sound is measuring sound pressure in a decibel scale (dB); this number is then weighted (in a mathematical curve in 1/3 octave bands), in this case A-weighted. A-weighting is thought to correspond closely to human perception of relative loudness and is the accepted standard for measuring environmental noise or industrial noise. The dB scale is logarithmic and not linear, meaning a change in 10 dB is a difference in acoustic energy by a factor of 10, or essentially doubles the sound. However, despite the existing tools applied to measuring and modeling noise, these are based on how humans perceive noise, not the sensitive animal receptor.

Ambient or baseline noise assessment was conducted at sensitive receptors, including the Big Springs lek located near the Plan boundary and the Big Springs Ranch headquarters. The baseline sound recordings were collected for six consecutive days between June 15 and 20, 2012, at the two continuous hourly noise level monitoring sites. Ambient noise was measured using Larson Davis Laboratories model 820, 824, and 831 precision integrating sound level meters (calibrated). Measures were taken to reduce effects of wind on the recording devices (Brennan, 2014). Further descriptions of sound monitoring and measuring are described in Section 4.8.

**Table 3.8-4 Ambient Noise Monitoring at Big Springs Lek Adjacent to the Plan Boundary**

| Lek | Daytime Hourly Average Noise Levels (dBA) | | | Nightime Hourly Average Noise Levels (dBA) | | | Lekking Hourly Average Noise Levels (dBA) 5 AM – 10 AM | | |
|---|---|---|---|---|---|---|---|---|---|
| | Leq | L50 | L90 | Leq | L50 | L90 | Leq | L50 | L90 |
| Big Springs Mean Sound Level | 39.2 | 29 | 21 | 29 | 21 | 17 | 34.9 | 24 | 17 |

Source: Brennan, 2014

**Pygmy Rabbit**

Pygmy rabbits are BLM sensitive species and are classified as a species of special concern as well as a game species in the state of Nevada. The USFWS has been petitioned to list them as threatened or endangered under the ESA, although they found listing was not warranted.

Pygmy rabbits occur in areas of dense sagebrush cover and deep friable soils (Ulmschneider et al., 2008). Pygmy rabbit were noted in 2010 and potential habitat was delineated during baseline surveys of 2011 (GBE, 2012). Some of these locations were associated with historic lake terraces where basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) are found in relatively dense patches (GBE, 2012). In 2012, as part of a Notice inspection, the BLM reported the observation of a pygmy rabbit and the discovery of occupied burrows in an area north of Big Springs. Starting in 2013, in a collaborative effort involving GBE, NDOW, BLM, and Newmont, a pedestrian survey for pygmy rabbits was conducted every other month covering nearly the entire northern tip of

Goshute Valley. The survey included counting burrow entrances, and it should be noted that one burrow can have multiple entrances. The surveys identified 16 complexes and 14 individual burrows (GBE, 2014). A group or cluster of burrows in close proximity to each other were identified as colonies and colonies located in close proximity to other colonies are considered complexes (GBE, 2013c). The sites exhibit seasonal variation in occupancy and considerable fluctuations in burrow numbers within each complex. Ulmschneider, et al. (2008) discusses similar seasonal variations throughout the rabbits' range. GBE (2014) describes that these variations in occupancy and/or potential seasonal movement may be due in part to nutritional needs of lactating does and juvenile rabbits. These nutritional needs of requiring herbaceous forbs and grasses are described by Green and Flinders (1980). Many of the rabbit complexes lack sufficient herbaceous understory (GBE, 2014a). The lowest count for entrances to burrows was 855 and the highest was 1,924 entrances to burrows per survey. Within complexes, numbers of burrows ranged from four to 1,101 per complex (GBE, 2014). Fourteen additional isolated burrows were observed, four were considered to be active and five were collapsed/inactive. The most extensive complex is in the northern portion of the Plan boundary (GBE, 2014). Figure 3.8-5 depicts the locations of mapped pygmy rabbit habitat found in the Plan boundary.

**Small Mammals**

The Plan boundary contains potential habitat for both dark kangaroo mouse (*Microdipodops megacephalus*) and Preble's shrew (*Sorex preblei*); however, species-specific surveys were not conducted for either species. The dark kangaroo mouse inhabits sagebrush communities with sandy or fine gravely sandy soils (Hall, 1995; O'Farrell, 1974). Preble's shrew has been documented in Elko County and potentially suitable habitat occurs surrounding the spring complex where sagebrush and meadow, grassland or wetlands occur (Ports and George, 1990).

**Mattoni's Blue Butterfly**

Mattoni's blue butterfly has been documented as occurring in the Pequop Mountains, in association with slender buckwheat (*Eriogonum microthecum* var. *laxiflorum*), the host plant for the butterfly (Enviroscientists, Inc., 2009c; GBE, 2012). Mattoni's blue butterfly was petitioned for listing under the ESA, but the USFWS determined that the species was not warranted for listing. The butterfly remains on the BLM's sensitive species list.

In 2009, biologists with Enviroscientists, Inc. observed a number of Mattoni's blue butterflies foraging in slender buckwheat habitat at several locations along both the north and south slopes of Long Canyon and in a drainage to the north. Enviroscientists, Inc. identified potential Mattoni's blue butterfly habitat at higher elevations (mostly above Long Canyon Spring) in the Plan boundary (Enviroscientists, Inc., 2009c). The buckwheat generally occurs between 6,000 and 7,900 feet in elevation within the Pequop Mountains (Figure 3.8-5).

GBE conducted a systematic survey for slender buckwheat in all suitable habitats within the expanded Plan boundary area and in the western foothill region just beyond the southern Plan boundary; it was concluded that slender buckwheat is ubiquitous throughout most of the higher

pinyon/juniper forests within the Plan boundary and is concentrated on ridgelines and north-facing slopes. GBE ranked the distribution of the buckwheat into low (0-250 plants), medium (250-500 plants), and high (500+ plants) categories. Approximately 83.4 acres of the buckwheat occur (mostly on ridgelines). Higher density areas totaled about 8.0 acres (on knolls and a higher elevation northeastern-facing slopes) and low density populations were observed on heavily vegetated north-facing slopes and piedmont slopes with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and snowberry (*Symphoricarpos albus*) totaling 263 acres.

**Bats**

Enviroscientists, Inc. conducted acoustic surveys for bats within and near the proposed pit areas (exploration area) in 2007 and 2009 (Enviroscientists, Inc., 2007 and 2009c) (Figure 3.8-5). Bat species identified in the Plan boundary and identified by the BLM as sensitive species included seven species whose calls could be identified and two other species that could not be positively identified by recorded calls. Species documented in the area during these surveys included the long-eared myotis (*Myotis evotis*), the western small-footed myotis (*Myotis ciliolabrum*), the little brown myotis (*Myotis lucifugus*), the silver-haired bat (*Lasionycteris noctivagans*), the Brazilian free-tailed bat (*Tadarida brasiliensis*), and the big brown bat (*Eptesicus fuscus*). The fringed myotis (*Myotis thysanodes*) and hoary bat (*Lasiurus cinereus*) may also be present. The Johnson Springs system and Long Canyon Spring provide ample foraging opportunities for species of bats.

**Birds**

Other BLM sensitive species identified in the Plan boundary included the pinyon jay (*Gymnorhinus cyanocephalus*), sage thrasher (*Oreoscoptes montanus*), and Brewer's sparrow (*Spizella breweri*). These avian species were identified in the proposed pit area during surveys conducted in 2007 and 2009 (Enviroscientists, Inc., 2007, 2009a, 2009b, and 2009c).

The pinyon jay uses a variety of pinyon-juniper density classes. The abundance of pine seeds (pine nuts) may be a determining factor in nest location and clutch size. The pinyon-juniper woodland habitat occurs on the west portion of the Plan boundary within the proposed pit area (Figure 3.8-1). The sage thrasher is typically found in habitats of intact, fairly dense stands of sagebrush, but may also occur in greasewood or bitterbrush. Sage thrashers feed on insects but occasionally eat some fruits and berries. The Brewer's sparrow occurs in sagebrush and mixed shrub communities. Brewer's sparrows nest in low shrubs and grasses, and feed on insects and seeds.

BLM sensitive raptor species that were observed during 2011, 2012 and 2013 within the Plan boundary include golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), and western burrowing owl.

Golden eagles are found throughout the Great Basin, where black-tailed jackrabbits and squirrels are preferred prey, but golden eagles are powerful birds capable of taking a wide variety of prey. Golden eagles typically nest on cliffs and outcrops, but also utilize trees as nest sites. Enviroscientists, Inc. checked the location of a reported golden eagle nest in the Plan

boundary in 2009, but found no evidence of recent activity (Enviroscientists, Inc., 2009a and 2009b). GBE conducted an aerial survey of the Plan boundary and a surrounding five-mile buffer in July 2012. While young had fledged by the date of the survey, the survey found three nests that appeared to have been used in 2012 and two nests were recorded as inactive in 2012. One abandoned nest holding a single egg was found within the Plan boundary (GBE, 2012). The area was flown again in 2013 in two flights: one in mid-April and the other in mid-June incorporating a ten-mile buffer. The flights added three inactive golden eagle nests to the Plan boundary (confirming the abandoned nest identified in 2012 was golden eagle). The area of the proposed pit was flown again in 2014 to verify locations of nests. The total number of potential golden eagle nests inventoried over four flights within the 10-mile buffer is 18 with two nests believed to be active in 2013. A data request to NDOW listed an additional eight nests within the 10-mile buffer of which none were relocated during the aerial surveys; therefore, some of these nests may no longer exist. Figure 3.8-6 presents raptor nests within the region.

Ferruginous hawks typically nest in juniper trees along the juniper-shrubland edge or on rock outcrops, and prey heavily on ground squirrels. GBE observed foraging ferruginous hawks in the Plan boundary during baseline surveys. Three ferruginous hawk nests, two of which appeared to have been used in 2012, were found north of I-80 during the July aerial survey. During a mid-April 2013 flight, these nests were inactive. Ferruginous hawk nests were not found within the Plan boundary (GBE, 2012).

Western burrowing owls nest in underground burrows, typically in habitats with low-stature vegetation, allowing a view of the surrounding area. GBE observed western burrowing owls in the Plan boundary July and September 2011, but no occupied burrows were found. GBE examined approximately 140 burrows in the area during the 2012 surveys, but no western burrowing owl burrows were encountered (GBE, 2012 and 2013a).

**Aquatic Species**

In 2006, NDOW biologists inventoried relict dace within the Johnson Springs system (NDOW, 2006). As noted within the NNHP data and the NDOW 2006 report, their observations entailed the most secure, abundant and diverse habitat of any population within the relict dace's range at the time of the survey. They recorded the highest numbers of dace of any locale sampled (NNHP, 2012; NDOW, 2006). The Johnson Springs system is described as the most complex system of springs, potholes, ponds, and outflows encountered within the relict dace's known distribution (NNHP, 2012) (Figure 3.8-5).

The habitat associated with the project area is described as having 11 populations of relict dace with each population having limited connectivity because of the morphology of the spring systems (NDOW, 2006). Habitat is associated with the springs of the Johnson Springs system including ponded areas along Hardy Creek and at Big Springs.

The relict dace occurs in several valley springs in Ruby and Butte valleys and the drainages of pluvial lakes such as Franklin, Waring, and Gale in Goshute and Steptoe valleys. This dace has

survived in these waters following the drying of Pleistocene Lakes (Sigler and Sigler, 1987). Relict dace seem to prefer aquatic habitats with dense cover and are opportunistic feeders. The relict dace is thought to be relatively tolerant to varying temperatures and alkalinity, though this tolerance is variable depending on the population. They are more sensitive to salinity than others in the Cyprinidae family (Vigg, 1982). Despite evolving over the past million years, the northern end of this species range is more susceptible to increased salinity, and therefore temperatures (Vigg, 1982). Recent genetic testing suggests that the relict dace located in the Johnson Springs system, which includes Big Springs, are a genetically distinct and diverse population (Houston et al., 2012; Houston et al., 2014). The divergence from the other relict dace populations may have occurred over 285,000 years, well within the Pleistocene (Houston et al., 2014).

The Nevada Department of Conservation and Natural Resources attributes the historic decline of this fish to agricultural or other water diversions altering suitable aquatic habitat (NDCNR, 2013). Relict dace are generally considered stable in a spring setting without non-native fish. At the time of the 2006 NDOW survey, the springs were free of non-native fish (NDOW, 2006) and were not affected by agriculture or the limited water diversions for agricultural purposes.

During the DEIS review process, an emergency petition to list the relict dace at Big Springs was submitted on June 27, 2014 by an environmental advocacy group. On August 18, 2014, the USFWS determined that emergency listing was not warranted at this time.

Other aquatic species that have potential habitat in the spring system that were not targeted for surveys include northern leopard frog, California floater, and springsnails. As with relict dace, springsnails are remnant populations from Pleistocene lakes and have existed for thousands of years. These springs can only support the snails if they have continuously flowed since the Pleistocene (Hershler and Sada, 2002). Potential habitat for springsnails is present within the spring systems located on private land within the Plan boundary.

**Power Supply Pipeline**

SWReGAP analysis data indicates habitats along the southern part of the power supply pipeline are primarily Inter-Mountain Basins Big Sagebrush Shrubland with some areas mapped as Great Basin Xeric Mixed Sagebrush Shrubland. The central part of the pipeline alignment north and south of Montello traverses habitats mapped as Inter-Mountain Basins Mixed Salt Desert Scrub. The northern part of the alignment would be constructed in or adjacent to the road running north from Montello in Inter-Mountain Basins Big Sagebrush-dominated and Inter-Mountain Basins Mixed Salt Desert Scrub habitats, though a variety of habitats occur (Table 3.8-5).

JBR conducted general and targeted surveys for wildlife along the 200-foot wide corridor in 2013. GBE conducted golden eagle and other raptor surveys via helicopter applying a one-mile buffer on each side of the corridor in 2013.

**Table 3.8-5 SWReGAP Landcover within the Proposed Power Supply Corridor for Power Supply Pipeline**

| Landcover/Habitat Description | Acres |
|---|---|
| Inter-Mountain Basins Big Sagebrush Shrubland | 474 |
| Inter-Mountain Basins Mixed Salt Desert Scrub | 395 |
| Great Basin Xeric Mixed Sagebrush Shrubland | 108 |
| Inter-Mountain Basins Greasewood Flat | 21 |
| Agriculture | 12 |
| Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland | 7 |
| North American Arid West Emergent Marsh | 3 |
| Developed, Medium to High Density | 3 |
| Great Basin Pinyon-Juniper Woodland | 1 |
| Invasive Annual and Biennial Forbland | 1 |
| Inter-Mountain Basins Semi-Desert Grassland | 1 |
| **Total** | **1,026** |

Note: assuming a 200-foot wide corridor

### Big Game Species

Portions of the same herds and seasonal habitat occur within the pipeline corridor as within the Proposed Action (Figure 3.8-2). Deer, pronghorn antelope, and elk occur within Tecoma Valley.

### Game Birds

The baseline surveys noted mourning dove along the pipeline corridor. Other species of game birds were not detected.

### Mammals

A variety of mammals were noted during the 2013 surveys: black-tailed jackrabbit, mountain cottontail, least chipmunk, ground squirrel (*Spermophilus* sp.), and white-tailed antelope squirrel (*Ammospermophilus leucurus*). The tracks and scat of coyotes were observed throughout the survey area. Wild horse (*Equus caballus*) sign was also observed, and mountain lion scat and tracks were observed at the base of some large rock outcrops (JBR, 2013a).

### Raptors

Raptor species included northern harrier, rough legged hawk, prairie falcon, turkey vulture, and red-tailed hawk (JBR, 2013a; NDOW, 2013b). An adult and two juvenile red-tailed hawks were observed near their nest in a tree near Montello (JBR, 2013a). Figure 3.8-7 depicts all but western burrowing owls documented along the corridor. Western burrowing owls are discussed below under special status species.

**Figure 3.8-6 Golden Eagle and Other Raptor Nest Locations**

**Figure 3.8-7 Special Status Species Power Supply Pipeline**

**Migratory Birds**

Migratory species observed in the survey area included the following: American robin (*Turdus migratorius*), western meadowlark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), cliff swallow (*Petrochelidon pyrrhonota*), barn swallow (*Hirundo rustica*), Brewer's blackbird, Say's phoebe (*Sayornis saya*), black-throated sparrow, sage sparrow, common raven, and white-crowned sparrow (*Zonotrichia leucophrys*). Birds observed at the aquatic environments, including a ranch pond, included yellow-headed blackbird (*Xanthocephalus xanthocephalus*), western kingbird (*Tyrannus verticalis*), killdeer (*Charadrius vociferous*), mallard, white-faced ibis, and black-crowned night heron (*Nycticorax nycticorax*) (JBR, 2013a). Active occupied nests were also noted along the corridor: horned lark, common raven, black-throated sparrow and a few unidentified nests with chicks. The habitat surrounding the corridor is suitable to a diversity of birds (i.e., meadows, ranches, creeks).

**Reptiles and Amphibians**

Reptiles observed in the area included western fence lizards (*Sceloporus occidentalis*), long-nosed leopard lizard (*Gambelia wislizenii*), short-horned lizard (*Phrynosoma douglassi*), gopher snake (*Pituophis catenifer*), and Great Basin rattlesnake (*Crotalus oreganus lutosus*) (JBR, 2013a).

Gamble Spring and Thousand Springs Creek are both crossed by the pipeline corridor; amphibians were not noted, but were not targeted for surveys.

**Special Status Species**

**Greater Sage-Grouse**

Two greater sage-grouse leks are located three miles from the power supply pipeline corridor near the southern and central portions of the alignment. The West Cobre lek is considered active (Figure 3.8-7), with 28 birds counted in 2012 and 43 birds counted in 2014 (Roberts, 2014b). The Murdock lek is infrequently surveyed but seven males were noted during the 2014 lek season (Roberts, 2014b). BLM has mapped greater sage-grouse habitat along the pipeline route; the majority of the pipeline habitat is split between low value habitat and PPH habitat. There is a small amount of PGH (Figure 3.8-8). Brood rearing habitat is thought to occur in the North Pequop Mountains rather than the pastures and meadows of Tecoma Valley (Roberts, 2013b). The corridor is currently maintained by Elko County and this right-of-way (ROW) was mowed (i.e., cut brush with a brush hog) and scraped prior to the JBR surveys (summer of 2013); therefore, it provided little to no habitat value for greater sage-grouse.

**Pygmy Rabbit**

A number of pygmy rabbit burrows and complexes were mapped in areas of dense sagebrush and friable soils, primarily along the southern part of the alignment (Figure 3.8-7). Two complexes were recorded within the centerline of the alignment. Five individual burrows or sign were also recorded. In total, 17 burrows were recorded within the alignment.

**Small Mammals**

As discussed above under mining and processing facilities, this area contains potential habitat for both dark kangaroo mouse and Preble's shrew; however, species specific surveys were not conducted for either species.

**Bats**

A number of bat species could occur along the pipeline route. Suitable foraging habitat occurs where springs and creeks intercept the corridor. Following protocols and locations given by the BLM, JBR placed AnaBat recording units at potential roosting habitat at rock outcrops. Recordings were taken in May and again in August 2013. A total of six bat species were identified during the surveys. One bat species was recorded during the May survey (the western small-footed myotis) and six bat species were recorded during the August surveys. The six species recorded during August included a western small-footed myotis, pallid bat (*Antrozous pallidus*), big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), long-legged myotis (*Myotis volans*), and Brazilian free-tailed bat (*Tadarida brasiliensis*) (Figure 3.8-7).

**Birds**

Other BLM sensitive bird species that were documented along the pipeline corridor were golden eagle, ferruginous hawk, western burrowing owl, sage thrasher, loggerhead shrike, and Brewer's sparrow (GBE, 2013b; JBR, 2013a). Figures 3.8-5 and 3.8-6 depict the special status bird species along the corridor.

GBE observed three ferruginous hawk nests within the juniper-shrubland interface in 2012 and 2013. Two of the nests appeared to have been active in 2012, but during the subsequent 2013 survey in mid-April, the nests were not active. These nests are located north of I-80 and are about 1.25 miles from the alignment (GBE, 2012 and 2013a; NDOW, 2013b) (Figure 3.8-6).

Golden eagle nests were observed at the northern end of the corridor, totaling seven recorded nests. Three were considered active, but it was unclear if these nests contained nestlings or eggs (GBE, 2013a). Three additional stick nests were located by NDOW and GBE, the species for which they belong is unknown.

Four potential western burrowing owl burrows were recorded along the pipeline corridor, with one being active with owls in residence, just north of Montello (Figure 3.8-7). An active loggerhead shrike nest was recorded as well as several sage thrasher nests.

Swainson's hawks have the potential to nest within the trees associated with the ranches in the Tecoma Valley, but were not observed during the surveys.

**<u>Cities' Water Supply</u>**

SWReGAP analysis data indicates habitat within the Cities' water supply area are primarily Inter-Mountain Basins Big Sagebrush Shrubland. Small amounts of other habitat are present within this area as described in Table 3.8-6.

**Figure 3.8-8 Greater Sage-Grouse Habitat Map (PPH & PGH) of Power Supply Pipeline**

Unless specifically discussed below, wildlife use of the Cities' water supply area is the same as that discussed above for the mining and processing facilities area.

**Table 3.8-6 SWReGAP Landcover within the Cities' Water Supply**

| Landcover/Habitat Description | Acres |
|---|---|
| Inter-Mountain Basins Big Sagebrush Shrubland | 631.3 |
| Invasive Annual Grassland | 14.2 |
| Great Basin Xeric Mixed Sagebrush Shrubland | 4.1 |
| Inter-Mountain Basins Mixed Salt Desert Scrub | 2.1 |
| Inter-Mountain Basins Semi-Desert Shrub Steppe | 1.1 |
| **Total** | **652.8** |

**Special Status Species**

Unless specifically discussed below, special status species' use of the Cities' water supply area is the same as for the mining and processing area.

**Greater Sage-Grouse**

The Big Springs lek is located approximately 900 feet from Section 21 in which the Cities' water supply would be developed. Greater sage-grouse habitat within the section is provided in Table 3.8-7. Portions of Section 21 were mapped as burned (Vegetation Section 3.7).

**Table 3.8-7 Acres of Greater Sage-Grouse Habitat Present in the Cities' Water Supply Area**

| Habitat Category | Acres |
|---|---|
| PPH | 72 |
| PGH | 581 |
| **Total** | **653** |

**Pygmy Rabbit**

Surveys were conducted during 2013 for pygmy rabbit within the Cities' water supply area. No suitable habitat for pygmy rabbits was located as soils were shallow and rocky, and vegetative cover was unsuitable for pygmy rabbits (JBR, 2013a).

### 3.8.3.2 North Facilities Alternative

Under the North Facilities Alternative, most mine facilities, including the heap leach facility, tailings storage facility (TSF), and the mine support and mill facilities, would be moved to the north. This alternative is designed to minimize potential conflict with wildlife in the Plan boundary, as well as placing some of the facilities away from the main portions of the Johnson Springs system and Big Springs proper. Under this alternative, the WRSF would be located farther to the east, creating a larger wildlife movement corridor between the pit and the WRSF. The TSF would be constructed within the footprint of the WRSF in the northern part of the Plan boundary. By relocating the TSF, the disturbance acreage would be substantially reduced, and be located farther from the greater sage-grouse leks. Only two borrow sites (located south of

Big Springs and west of Hardy Creek as in the Proposed Action) and wells for the Cities' water supply would be located in the southern part of the Plan boundary.

Since the Proposed Action and the North Facilities Alternative are within the same Plan boundary, the discussions on general wildlife and special status species are essentially the same, the only difference is the locations of the features relative to the known wildlife species (Figures 3.8-6 and 3.8-9).

#### 3.8.3.3 No Action Alternative

Under the No Action Alternative, the Long Canyon Mine would not be developed and Newmont could continue exploration efforts that were already approved, as discussed in Section 2.2.

## 3.9 Range Resources

Livestock grazing and production are major uses of the vegetative resources within the Plan boundary. This section identifies and describes grazing allotments, livestock use, and stocking rates that could be affected by the Proposed Action and alternatives.

### 3.9.1 Areas of Analysis

#### 3.9.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for the mining and processing facilities area occurs within the Plan boundary.

**Power Supply Pipeline**

The area of analysis for the power supply pipeline occurs within the 200-foot corridor for the proposed pipeline.

**Cities' Water Supply**

The area of analysis for the Cities' water supply is in Section 21, T35N, R66E, which is adjacent to the Plan boundary.

#### 3.9.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative occurs within the same area as the Proposed Action.

#### 3.9.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the approved exploration boundary, as described in the *Expanded Long Canyon Exploration Project* (BLM, 2011d).

### 3.9.2 Data Sources and Methodology

#### 3.9.2.1 Proposed Action

**Mining and Processing Facilities**

Range resource information was taken from public sources, specifically from the BLM's *Final Grazing Management Decision and Record of Decision for the Sheep Complex, Big Springs, and Owyhee Allotments* (BLM, 2006a); as well as, from information from the BLM Rangeland Administration System website (BLM, 2012a). Data contained within the GeoCommunicator Interactive Mapping provides reports on grazing allotments, number of Animal Unit Months (AUMs) within allotments, allotment area, season of use, and livestock type.

An AUM is the amount of forage required to maintain a cow/calf pair for one month, and, in the arid west, it typically requires several acres to provide one AUM of forage (BLM, 2013e). Forage is that portion of the vegetation that is harvested by grazing animals. For cows and horses, this generally consists of grasses. The BLM determines the number of AUMs available on each allotment based on ecological site descriptions, forage production studies, and evaluations of rangeland health.

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.9.2.2 North Facilities Alternative

The data sources and methods used to describe the existing range conditions within the area of analysis for the North Facilities Alternative are the same as those for the Proposed Action.

#### 3.9.2.3 No Action Alternative

The data sources and methods used to describe the existing range conditions within the area of analysis for the No Action Alternative are the same as those for the mining and processing facilities area.

### 3.9.3 Existing Conditions

#### 3.9.3.1 Proposed Action

**Mining and Processing Facilities**

The Plan boundary lies within the East Pequop Bench, North of Home, and Payne Basin/Long Canyon/Six Mile pastures of the East Big Springs Allotment (Figure 3.9-1). Grazing use in the East Big Springs Allotment is governed by the *Final Grazing Management Decision and Record of Decision for the Sheep Complex, Big Springs, and Owyhee Allotments* dated October 30, 2006. The East Big Springs Allotment currently has 10,150 active AUMs. Contingent upon completion of range improvements and short-term objectives analyzed and described in the

2006 EIS (BLM, 2006a), this will increase to 12,175 AUMs. Range improvements described in the 2006 EIS include fencing projects and spring developments; short-term management objectives described in the 2006 EIS include meeting utilization objectives. To date, two of the fencing projects described in the 2006 EIS have been completed, and no spring development projects have been completed.

This allotment includes the Big Springs Ranch private lands, which are owned by Elko Land and Livestock Company (ELLC), a subsidiary of Newmont. ELLC Grazing Membership LLC holds the grazing permit for the East Big Springs Allotment. The Plan boundary covers 20,697 acres of the allotment, 8,377 of those acres being private land. Table 3.9-1 summarizes the pastures, livestock type, permitted use dates, and available AUMs within the Plan boundary.

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

The North of Home pasture has a carrying capacity of 116 AUMs. This area is used as a drift pasture as livestock are moved from one pasture to the next.

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

**Table 3.9-1 Pastures within the Plan Boundary**

| Pasture | Carrying Capacity (AUMs) | Livestock Type | Permitted Use Dates |
|---|---|---|---|
| East Pequop Bench | 3,069 | Cattle | March 1 – June 15[1]<br>March 15 – June 15[2] |
| North of Home | 116 | Cattle | Drift Use |
| Payne Basin/Long Canyon/Six Mile | 756 | Cattle | June 16 – August 30[1]<br>June 16 – September 5[2] |

[1] Four-year cycle; Schedule for years one and three.
[2] Four-year cycle; Schedule for years two and four.

Range improvements within the allotment include fences and cattle guards, piping, and water troughs. Some of the existing range improvements were developed on private land that was part of a land exchange in 1999. All these range improvements have not yet been inventoried and cataloged in the BLM system, but include features such as fences and a reservoir within Long Canyon.

**Figure 3.8-9 Special Status Species North Alternative**

**Figure 3.9-1 BLM Grazing Allotments**

A seeding effort was conducted on the Big Springs Fire in 2000. The seeding consisted of grasses and forage kochia, with three different seed mixes used based on elevation. While grass response was limited throughout the seeding, a robust stand of forage kochia successfully established in the burn area. This population of forage kochia has been used for seed collection.

**Power Supply Pipeline**

The power supply pipeline crosses through the East Big Springs, Pilot Valley, Gamble Individual, and Dairy Valley allotments, both on public and private land. Table 3.9-2 summarizes the active AUMs within the grazing allotments, acreage within the pipeline ROW, livestock type, and permitted use dates. These allotments are predominantly used for cattle grazing, although some sheep and horse grazing occurs as well. The BLM has authorized 40,327 AUMs for livestock grazing in these four allotments.

The pipeline passes through 347 acres of private property, primarily on the Winecup-Gamble Ranch.

**Table 3.9-2 Allotments Intersected by the Power Supply Pipeline**

| Grazing Allotment | Category | Active AUMs | Total Allotment Acreage within the Pipeline ROW[1] | Acres Private Land within ROW | Livestock Type | Permitted Use Dates |
|---|---|---|---|---|---|---|
| East Big Springs | Improve | 10,150 | 146.0 | 83.4 | Cattle | March 1 – February 28 |
| Pilot Valley | Custodial | 5,008 | 232.4 | 105.1 | Cattle | March 1 – February 28 |
| Gamble Individual | Improve | 17,938 | 207.2 | 158.5 | Cattle | March 1 – February 28 |
| Dairy Valley | Improve | 7,231 | 0.06 | 0.06 | Cattle | April 1 - October 31 |

[1]Assumes a 200-foot-wide ROW

**Cities' Water Supply**

The existing conditions for the Cities' water supply are the same as those of the mining and processing facilities area, with the wells and pipeline occurring primarily in the East Pequop Bench pasture.

### 3.9.3.2 North Facilities Alternative

The existing conditions for the North Facilities Alternative are the same as those used for the Proposed Action area for mining and processing facilities area. Most of the mine facilities would be moved to the northeastern portion of the Plan boundary, with fewer facilities located in the East Pequop Bench pasture, and more in the North of Home pasture.

### 3.9.3.3 No Action Alternative

The existing conditions for the No Action Alternative include the authorized exploration activities as discussed in Section 2.2.

## 3.10 Wilderness Resources

This section identifies and describes the affected environment in terms of the wilderness resources within the area of analysis for each alternative. Wilderness resources discussed in this section include federally-designated Wilderness Areas, Wilderness Study Areas (WSAs), and lands with wilderness characteristics.

### 3.10.1 Areas of Analysis

#### 3.10.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for wilderness corresponds with the Plan boundary, as shown on Figure 3.10-1.

**Power Supply Pipeline**

The area of analysis for Wilderness corresponds with the area within the 200-foot power supply pipeline corridor north of I-80.

**Cities' Water Supply**

The area of analysis for Wilderness corresponds with Section 21, T35N, R66E, which is adjacent to the Plan boundary and where the municipal wells for the Cities' would be located.

#### 3.10.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as for the Proposed Action, as shown on Figure 3.10-1.

#### 3.10.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the Expanded Long Canyon Exploration Project, Elko County, Nevada, Environmental Assessment (BLM, 2011d).

### 3.10.2 Data Sources and Methodology

**Regulatory Framework**

Wilderness Areas are designated by Congress under the authority of The Wilderness Act of 1964 (P.L 88-577; 16 USC 1131-1136) and comprise the National Wilderness Preservation System. There are two congressionally-designated Wilderness Areas in Elko County within 50 miles of the Plan boundary: the East Humboldt and the Ruby mountains. All of the Wilderness Areas in Elko County are managed by the USFS (PLUAC, 2008).

WSAs are areas that have been inventoried for wilderness designation as described in Federal Land Policy and Management Act of 1976 (FLPMA) and are currently managed under the Interim Management Policy for Lands Under Wilderness Review until such time as Congress makes a determination regarding wilderness designations (BLM, 2013b). Lands that have been identified as having wilderness characteristics are managed by the BLM for multiple-use purposes with consideration of existing wilderness values. The BLM uses a variety of land use

plan decisions to manage these lands such as establishing Visual Resource Management (VRM) class objectives to preserve the existing landscape; attaching conditions to permits, leases, and other authorizations; and establishing limited or closed off-highway vehicle designations.

#### 3.10.2.1 Proposed Action

**Mining and Processing Facilities**

The sources of data and information that were used or consulted in order to describe the existing wilderness conditions within the area of analysis for the Proposed Action included:

- Bureau of Land Management (BLM). 1984. Proposed Wells Resource Management Plan and Final Environmental Impact Statement. November 1983;
- Bureau of Land Management (BLM). 1985. Record of Decision: *Wells Resource Management Plan: Wells Resource Area*. July 1985;
- Bureau of Land Management (BLM). 1987. Wells Wilderness Recommendations: Final Environmental Impact Statement;
- Bureau of Land Management (BLM). 2011d. Expanded Long Canyon Exploration Project, Elko County, Nevada, Environmental Assessment. June 2011;
- Bureau of Land Management (BLM). 2007c. BLM Wilderness Areas Nevada [vector digital data];
- Bureau of Land Management (BLM). 2008d. BLM Wilderness Study Areas Nevada [vector digital data];
- United States Forest Service (USFS). 2010. Humboldt-Toiyabe National Forest: Wilderness [vector digital data]. Unpublished data; and
- ECA Community Planning. 2012a. Long Canyon Project: Baseline Report: Visual Resources, Land Use, and Recreation. Unpublished document.

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.10.2.2 North Facilities Alternative

The sources of data and information that were used or consulted in order to describe the existing wilderness conditions within the area of analysis for the North Facilities Alternative are the same as those described for the mining and processing facilities area under the Proposed Action.

#### 3.10.2.3 No Action Alternative

The sources of data and information that were used or consulted in order to describe the existing wilderness conditions within the area of analysis for the No Action Alternative are the same as those described for the mining and processing facilities area under the Proposed Action.

### 3.10.3 Existing Conditions

#### 3.10.3.1 Proposed Action

**Mining and Processing Facilities**

There are no federally-designated Wilderness Areas within the Plan boundary. The nearest federally-designated Wilderness Area is the East Humboldt Wilderness Area, which is approximately 26.3 miles west of the Plan boundary (USFS, 2010). There are also no WSAs within the Plan boundary (BLM, 1985). The Bluebells WSA is approximately 8.3 miles southeast of the Plan boundary, and is the nearest WSA (BLM, 2008d). WSAs are public lands that have been inventoried for and found to have wilderness characteristics, but for which Congress has not approved or denied for wilderness designation (BLM, 1987). In accordance with the *Proposed Wells Resource Management Plan and Final Environmental Impact Statement* (BLM, 1984), portions of WSAs that are manageable as wilderness and for which wilderness is considered the best use of the land should be managed as such.

Section 201 of FLPMA requires that resource inventories on public lands be maintained, including inventories of lands with wilderness characteristics. Lands with wilderness characteristics are inventoried based on four criteria: 1) size; 2) naturalness; 3) opportunities for solitude or primitive, unconfined recreation; and 4) supplemental values (BLM, 2012c).

In 1999, the BLM acquired approximately 70,000 acres of land in the Pequop Mountains as part of a land exchange, necessitating an inventory of the resource values of the acquired land in accordance with section 201 of FLPMA (ECA Community Planning, 2012a). Approximately 63,235 acres of the acquired land were inventoried for wilderness characteristics in 2011 as a part of the EA for expanded exploration activities (BLM, 2011d). Approximately half of the western Plan boundary was included within the area inventoried in 2011. During the inventory, a total of approximately 27,835 acres were determined to have wilderness characteristics, of which approximately 2,537 acres are located within the Plan boundary (BLM, 2011d) and are shown on Figure 3.10-1.

**Power Supply Pipeline**

There are no WSAs or federally-designated Wilderness Areas within the area of analysis for the power supply pipeline.

**Cities' Water Supply**

There are no WSAs or federally-designated Wilderness Areas within the area of analysis for the Cities' water supply.

**Figure 3.10-1 Wilderness Resources**

#### 3.10.3.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as for the Proposed Action.

#### 3.10.3.3 No Action Alternative

The existing conditions within the No Action Alternative area of analysis are the same as those described for the Proposed Action.

## 3.11 Cultural Resources and Paleontology

### 3.11.1 Areas of Analysis

#### 3.11.1.1 Proposed Action

**Mining and Processing Facilities**

A Programmatic Agreement establishing an Area of Potential Effect (APE) for cultural resources and outlining the methods of identification and treatment of cultural resources was completed for the Long Canyon Project and signed by the BLM and SHPO (Appendix 2E). Under the Programmatic Agreement, the BLM has assumed responsibility for completing Section 106 compliance for cultural resources within the APE. The Programmatic Agreement was amended to include the natural gas pipeline and an indirect effects APE (Appendix 2E). The APE for assessment of effects includes all of the Long Canyon Project components associated with the Proposed Action and action alternatives as described in Chapter 2.

The direct effects APE for this project is defined as the Plan boundary and the natural gas pipeline corridor, the majority of which has been inventoried for cultural resources (Berg, 2008, 2011, and 2012a; Manske and Patsch, 2011; Berg and Memmott, 2009).

The indirect effects APE radiates out from a central point in the open pit with its boundaries being the Pequops summit to the west, then north, east, and south with a distance of 12 miles.

For paleontological resources, the area of analysis is the Plan boundary, the power pipeline supply pipeline corridor, and the Cities' water supply area (Section 21, T35N, R17E).

**Power Supply Pipeline**

The area of analysis is the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

The area of analysis is the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.11.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative occurs within the same area as the Proposed Action.

#### 3.11.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the approved exploration boundary, as described in the Expanded Long Canyon Exploration Project EA (BLM, 2011d).

### 3.11.2 Data Sources and Methodology

**Regulatory Framework**

The National Historic Preservation Act of 1966, as amended (NHPA), the Archaeological Resources Protection Act of 1979 (ARPA), the American Indian Religious Freedom Act (AIRFA), and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) are the primary laws regulating management of cultural resources. Federal regulations obligate federal agencies to protect and manage cultural resource properties.

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. Section 106 of the NHPA, as amended, requires federal agencies to take into account any action that may adversely affect any structure or object that is, or can be, included in the National Register of Historic Places (NRHP). The regulations implementing Section 106, which are codified at 36 CFR 60.4, provide criteria to determine if a site is eligible. Beyond that, the regulations define how those properties or sites are to be managed by federal agencies or other involved parties. These regulations apply to all federal undertakings and all cultural (archaeological, cultural, and historic) resources.

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.”

NAGPRA became law in 1990; the regulations implementing the statute were completed and went into effect in January 1996. This law 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 with which they have a relationship of cultural affiliation. In addition, the law and regulations describe procedures designed to ensure that all Americans can derive educational, historical, and scientific value from the remains and objects covered by the statute through public interpretation, documentation, and study.

In addition to the above, the National Trails System Act (NTSA), P.L. 90-543, became law October 2, 1968. The NTSA and its subsequent amendments authorized a national system of trails to provide additional outdoor recreation opportunities and to promote the preservation of access to the outdoor areas and historic resources of the nation. The four classes of trails include: National Scenic Trails (NST) are those that provide outdoor recreation and the conservation and enjoyment of significant scenic, historic, natural, or cultural qualities; National Historic Trails (NHT) are those that follow travel routes of national historic significance; National Recreation Trails (NRT) are in, or reasonably accessible to, urban areas on federal, state, or private lands; and Connecting or Side Trails provide access to or among the other classes of trails.

The BLM has implemented the 6280 Manual, "Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation (Public)," to direct the implementation of the NTSA on BLM managed lands. Under Manual 6280, the purpose of a National Historic Trail is the identification and protection of the historic route and the historic remnants and artifacts for public use and enjoyment. A National Historic Trail is managed to recognize the nationally significant resources, qualities, values, and associated settings of the areas through which such trails may pass, including the primary use or uses of the trail. Federal Protection Components associated with the National Historic Trail, including high potential historic sites, high potential route segments, and auto tour routes are identified by the National Trail administering agency through the trail-wide Comprehensive Plan. Properties eligible for the NRHP, which may also be Federal Protection Components, may be identified along the National Historic Trail, including segments of the National Historic Trail.

Cultural resources are defined as any definite location of past human activity identifiable through field survey, historical documentation, and/or oral evidence (BLM, 1989). Cultural resources include archaeological or architectural sites, structures, or places, and places of traditional cultural or religious importance to specified groups whether or not represented by physical remains. Cultural resources have many values and provide data regarding past technologies, settlement patterns, subsistence strategies, and many other aspects of history.

A Traditional Cultural Property (TCP) is a property associated with "cultural practices or beliefs of a living community that: (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community (Parker and King, 1998)". This property type may be determined eligible for the NRHP if it meets criteria found in 36 CFR 60.4.
Paleontological resources are the fossilized remains of past life. These remains can include vertebrate animals, invertebrate animals, multi-cellular plants, as well as any imprints made by these organisms. Fossils are considered an important record of ancient life because of their scarcity. They are non-renewable resources and are therefore considered to be sensitive, particularly vertebrate fossils. Federal requirements for protection of paleontological resources include the 1906 Federal Antiquities Act, Historical Sites Act of 1935, FLPMA, and BLM Paleontology Resources Management Manual and Handbook H-8270-1 (revised 1998).

Unauthorized collection or removal of vertebrate, rare invertebrate, and rare plant fossils from federal land is illegal.

#### 3.11.2.1 Proposed Action

**Mining and Processing Facilities**

Record searches of the direct effects APE and the indirect effects APE were conducted through the Nevada SHPO Cultural Resource Information System online database, as well as at the Nevada BLM Elko District Office. Other archival research for the Long Canyon Project included consultation of several historic maps and land ownership information resources. Evidence of historic settlement and development of the area was researched on GLO plats, land patent records, Master Title Plats, and Interagency Land Use Maps, dating back as far as 1880. This information is documented in the associated cultural resource reports (Berg, 2008, 2011, and 2012a; Manske and Patsch, 2011; Berg and Memmott, 2009).

Paleontological resources were investigated through literature searches of available reports and publications. The Potential Fossil Yield Classification (PFYC) system, which has been adopted by the BLM, was implemented per BLM protocol (BLM, 2007c).

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.11.2.2 North Facilities Alternative

The data sources and methods used to describe existing cultural and paleontological resources within the area of analysis for the North Facilities Alternative are the same as those for the Proposed Action.

#### 3.11.2.3 No Action Alternative

The data sources and methods used to describe existing cultural and paleontological resources within the area of analysis for the No Action Alternative are the same as those for the mining and processing facilities area.

### 3.11.3 Existing Conditions

#### 3.11.3.1 Proposed Action

**Cultural Resources**

The Plan boundary is located near the dividing line between what has been described as the eastern and western cultural subareas of the Great Basin (Jennings, 1986). Goshute Valley and the Pequop Range are just over 30 miles west of the Nevada/Utah border, falling just within the Eastern Great Basin subarea as described by Aikens and Madsen (1986).

To date, the prehistory of the APE has been evaluated within the framework of the Eastern Great Basin, as described by Jennings (1986) and Aikens and Madsen (1986). This decision was made based on its location in relation to Jennings' dividing line and the idea that the lifeways and settlement patterns practiced by groups living away from the Humboldt River would have: a) been similar to those espoused by those hunter-gatherer groups occupying the margins of pluvial lakes and marshes during the late Pleistocene/Early Holocene, and b) would show the same exploitation of spring areas and lesser lakes and drainage systems after the recession of the Pleistocene lakes.

The Eastern Great Basin has a long record of human occupation. The archaeological record demonstrates a significant reliance on wetland and lake-edge resources by both hunters and gatherers during the Paleoindian, Archaic, and Late Prehistoric periods and horticulturalists during the Formative period. Several summaries of regional prehistory have been written (Jennings, 1986; Aikens and Madsen, 1986; Grayson, 1993).

While mining has historically been Nevada's leading industry, emigration and ranching also had significant roles in the history and settlement of northeast Nevada. Therefore, the historic period is generally subdivided into four periods or themes: Emigration and Settlement of Northeast Nevada; Early Ranching in Northeast Nevada; Mining and Ranching in the Twentieth Century; and Railroads, Freighting, and the Highway System.

Goshute Valley history follows the same trends as the rest of northeast Nevada. During the early settlement era, trails, such as the California Trail, served as routes for commerce and migration through the area. The Hastings Cutoff diverged from the California Trail at Fort Bridger in Wyoming, passed through the Wasatch Range, across the Great Salt Lake Desert into Nevada, then looped around the Ruby Mountains, and rejoined the California Trail about seven miles west of Elko, Nevada. Some maps indicate that the Hastings Cutoff headed west to Big Springs and then south, through the Plan boundary (NPS, 2013).

The California Trail, including the Hastings Cutoff, is designated as a NHT. To adhere to recent BLM guidance for trails either designated as or under consideration for designation as a NHT or NST, an indirect effects study is underway.

Individual ranching operations developed in the late 1800s after the arrival of the transcontinental Central Pacific Railroad, followed by the development of large ranching operations by the middle of the 20$^{th}$ century (Patterson et al., 1969). Historically, the Big Springs area was an oasis in the desert, affording a significant supply of natural resources and rangeland. By the late 1860s, stockmen were exploiting the area for its lush grasses, springs, and ponds. Snow melt from the Pequop and Toano mountain ranges drained into nearby creeks that fed a sink, and springs provided access to that groundwater. These water sources supplied an expansive meadow ideal for grazing. Big Springs was mentioned in journals as a stop along the Hastings Cutoff of the California emigrant trail during the 1840s and later became one of the first ranches in the valley, when William Mather set up his ranch and blacksmith shop along the Toano freight road around 1880. Big Springs has been the location of a home ranch

since at least 1880, and probably since the 1870s. According to regional history (Hall, 2002), the Big Springs Ranch is a consolidation of the Oasis, Johnson, and Warm Springs ranches.

**Cultural Resource Inventory Results**

Between 2006 and 2013, Class III intensive level cultural resource inventories were conducted on the APE. There are eight cultural resource reports associated with these inventories (Berg, 2008, 2011, and 2012a; Manske and Patsch, 2011; Berg and Memmott, 2009; Berg, 2013; Van Tine and Berg, 2013; Neidig and Orvald, 2013). The inventories recorded a total of 308 sites; 103 of which are recommended as eligible or unevaluated (pending further research) for listing on the NRHP (Table 3.11-1). Unevaluated sites are treated as eligible until further investigation is conducted and an official determination of eligibility can be made.

Two corridors for the Hastings Cutoff are identified on GIS maps. One segment is located in the southern portion of the Plan boundary (APE) and the other segment is located to the east outside of the project's Plan boundary but within the indirect effects APE; however, no visual evidence of the trail could be located during the project-specific cultural resource inventories inside of the Plan boundary's APE (Berg, 2012b).

No TCPs have been identified in the Plan boundary by previous studies.

**Mining and Processing Facilities**

Within the mining and processing facilities APE, 103 sites recommended as eligible or unevaluated for the NRHP were recorded (Table 3.11.1)

**Power Supply Pipeline**

During the inventory of the power supply pipeline APE, 32 newly identified cultural resource sites and 19 previously recorded sites were identified within the power supply pipeline APE (Neidig and Orvald, 2013) for a total of 51 sites. The report associated with the pipeline inventory is currently under review by the Nevada SHPO; therefore, site eligibilities are pending. Thus, these sites were not included in Table 3.11-1.

**Cities' Water Supply**

Two eligible sites were recorded within the disturbance area of the Cities' water supply. The NRHP eligible sites include one historic and one prehistoric site types. These two sites are also within the disturbance footprint of the mining and processing facilities area.

**Table 3.11-1 Cultural Sites in the Mining and Processing Facilities APE**

| Site Number | Site Type | NRHP Evaluation |
|---|---|---|
| CrNV-11-3123 | Historic | Eligible |
| 26EK12998 | Prehistoric | Eligible |
| 26EK13002 | Prehistoric | Eligible |
| 26EK12982 | Multi-Component | Eligible |
| 26EK13003 | Multi-Component | Eligible |

| Site Number | Site Type | NRHP Evaluation |
|---|---|---|
| 26EK13005 | Prehistoric | Eligible |
| 26EK13006 | Multi-Component | Eligible |
| 26EK13008 | Prehistoric | Eligible |
| 26EK13009 | Prehistoric | Eligible |
| 26EK13010 | Prehistoric | Eligible |
| 26EK13011 | Prehistoric | Eligible |
| 26EK12991 | Multi-Component | Eligible |
| 26EK13013 | Prehistoric | Eligible |
| 26EK13017 | Multi-Component | Eligible |
| 26EK10897 | Prehistoric | Eligible |
| 26EK13019 | Prehistoric | Eligible |
| 26EK13022 | Prehistoric | Eligible |
| 26EK13023 | Prehistoric | Eligible |
| 26EK13024 | Multi-Component | Eligible |
| 26EK13027 | Prehistoric | Eligible |
| 26EK8027 | Historic | Eligible |
| 26EK12989 | Prehistoric | Eligible |
| 26EK12994 | Multi-Component | Eligible |
| 26EK12996 | Prehistoric | Eligible |
| 26EK8012 | Prehistoric | Eligible |
| 26EK11332 | Prehistoric | Eligible |
| 26EK11348 | Prehistoric | Eligible |
| 26EK10843 | Historic | Eligible |
| 26EK10844 | Prehistoric | Eligible |
| 26EK10846 | Prehistoric | Eligible |
| 26EK10849 | Prehistoric | Eligible |
| 26EK10853 | Multi-Component | Eligible |
| 26EK10857 | Multi-Component | Eligible |
| 26EK10867 | Multi-Component | Eligible |
| 26EK10882 | Prehistoric | Eligible |
| 26EK10885 | Prehistoric | Eligible |
| 26EK10886 | Prehistoric | Eligible |
| 26EK10887 | Prehistoric | Eligible |
| 26EK10890 | Prehistoric | Eligible |
| 26EK10893 | Multi-Component | Eligible |
| 26EK11343 | Prehistoric | Eligible |
| 26EK11351 | Prehistoric | Eligible |
| 26EK11654 | Prehistoric | Eligible |
| 26EK11655 | Prehistoric | Eligible |
| 26EK11515 | Historic | Eligible |
| 26EK11516 | Prehistoric | Eligible |
| 26EK11523 | Prehistoric | Eligible |

| Site Number | Site Type | NRHP Evaluation |
|---|---|---|
| 26EK11524 | Prehistoric | Eligible |
| 26EK11540 | Multi-Component | Eligible |
| 26EK11537 | Multi-Component | Eligible |
| 26EK11517 | Multi-Component | Eligible |
| 26EK7914 | Multi-Component | Eligible |
| 26EK10880 | Multi-Component | Eligible |
| 26EK11335 | Multi-Component | Eligible |
| 26EK11334 | Prehistoric | Eligible |
| 26EK10847 | Prehistoric | Eligible |
| 26EK10873 | Prehistoric | Eligible |
| 26EK10871 | Prehistoric | Eligible |
| 26EK10877 | Prehistoric | Eligible |
| 26EK11330 | Multi-Component | Eligible |
| 26EK10881 | Prehistoric | Eligible |
| 26EK10883 | Prehistoric | Eligible |
| 26EK11340 | Prehistoric | Eligible |
| 26EK10863 | Prehistoric | Eligible |
| 26EK10859 | Prehistoric | Eligible |
| 26EK11326 | Prehistoric | Unevaluated |
| 26EK10835 | Prehistoric | Unevaluated |
| 26EK10891 | Multi-Component | Unevaluated |
| 26EK11657 | Prehistoric | Unevaluated |
| 26EK11522 | Multi-Component | Unevaluated |
| 26EK11322 | Multi-Component | Unevaluated |
| 26EK11346 | Multi-Component | Unevaluated |
| 26EK11324 | Multi-Component | Unevaluated |
| 26EK10839 | Prehistoric | Unevaluated |
| 26EK10838 | Prehistoric | Unevaluated |
| 26EK10842 | Prehistoric | Unevaluated |
| 26EK10872 | Prehistoric | Unevaluated |
| 26EK10876 | Prehistoric | Unevaluated |
| 26EK10860 | Prehistoric | Unevaluated |
| 26EK10861 | Prehistoric | Unevaluated |
| 26EK10852 | Prehistoric | Unevaluated |
| 26EK14471 | Historic | Eligible |
| 26EK14472 | Prehistoric | Eligible |
| 26EK14473 | Multi-Component | Eligible |
| 26EK14474 | Multi-Component | Eligible |
| 26EK14481 | Prehistoric | Eligible |
| 26EK14483 | Multi-Component | Eligible |
| 26EK14485 | Prehistoric | Eligible |
| 26EK14505 | Prehistoric | Eligible |

| Site Number | Site Type | NRHP Evaluation |
|---|---|---|
| 26EK14506 | Multi-Component | Eligible |
| 26EK14508 | Prehistoric | Eligible |
| 26EK14510 | Prehistoric | Eligible |
| 26EK14512 | Prehistoric | Eligible |
| 26EK14513 | Prehistoric | Eligible |
| 26EK14518 | Prehistoric | Eligible |
| 26EK14519 | Prehistoric | Eligible |
| 26EK14520 | Prehistoric | Eligible |
| 26EK14521 | Prehistoric | Eligible |
| 26EK14522 | Prehistoric | Eligible |
| 26EK14523 | Prehistoric | Eligible |
| 26EK14524 | Prehistoric | Eligible |
| 26EK14525 | Prehistoric | Eligible |
| 26EK14527 | Prehistoric | Eligible |
| 26EK3710 | Historic | Eligible |
| 26EK2828 | Prehistoric | Eligible |
| 26EK2834 | Historic | Eligible |
| 26EK14413 | Prehistoric | Eligible |
| 26EK14429 | Prehistoric | Eligible |

**Paleontology**

**Mining and Processing Facilities**

There are geologic formations in and surrounding the Plan boundary that are known to, or have the potential to, contain fossils. Recently, the BLM has adopted the PFYC system to identify and classify fossil resources on federal lands (BLM, 2007c). Paleontological resources are closely tied to the geologic units (i.e. formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted by the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for occurrence of paleontological resources.

By implementing the PFYC, geologic units can be classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts. The higher the class number assigned to the geologic unit, the higher potential for occurrence and impact. Although significant localities may occasionally occur in a geological unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system provides baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions. This system is intended to be used as a guideline as opposed to

rigorous definitions. Descriptions of the potential fossil yield classes are summarized in Table 3.11-2.

**Table 3.11-2 Potential Fossil Yield Classification**

| Class | Occurrence | Comments | Probability of Encounter |
|---|---|---|---|
| 1 | • Igneous and metamorphic, excluding reworked volcanic ash units.<br>• Units that are Precambrian in age or older | • Management concern for paleontological resources in Class 1 units is usually negligible or not applicable.<br>• Assessment or mitigation is usually unnecessary except in very rare or isolated circumstances. | Very Low |
| 2 | • Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant invertebrate fossils.<br>• Units that are generally younger than 10,000 years before present.<br>• Recent aeolian deposits.<br>• Sediments that exhibit significant physical and chemical changes (i.e. diagenetic alteration). | • Management concern for paleontological resources is generally low.<br>• Assessment or mitigation is usually unnecessary except in rare or isolated circumstances. | Low |
| 3a | • Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence.<br>• Often marine in origin with sporadic known occurrences of vertebrate fossils.<br>• Units are known to contain vertebrate fossils or scientifically significant invertebrate fossils, but these occurrences are widely scattered. | • Management concern for paleontological resources is moderate; or cannot be determined from existing data.<br>• Potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils. | Moderate |
| 3b | • Poorly studied and/or poorly documented geologic units.<br>• Potential yield cannot be assigned without ground reconnaissance.<br>• Units exhibit geologic features and conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. | • The unknown potential of the units in this Class should be carefully considered when developing any mitigation or management actions.<br>• Surface-disturbing activities may require field assessment to determine appropriate course of action. | Unknown |
| 4a | • Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant | • Paleontological resources may be susceptible to adverse impacts from surface disturbing actions. Illegal collecting activities may impact | High |

| Class | Occurrence | Comments | Probability of Encounter |
|---|---|---|---|
| | invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability.<br>• Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. | some areas.<br>• Management concern for paleontological resources is moderate to high, depending on the Proposed Action.<br>• A field survey by a qualified paleontologist is often needed to assess local conditions.<br>• Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered. | |
| 4b | • These are areas underlain by geologic units with high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances.<br>• Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.<br>• Areas of exposed outcrop are smaller than two contiguous acres.<br>• Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.<br>• Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources. | • Paleontological resources may be susceptible to adverse impacts from surface disturbing actions. Illegal collecting activities may impact some areas.<br>• Management concern for paleontological resources is moderate to high, depending on the Proposed Action.<br>• A field survey by a qualified paleontologist is often needed to assess local conditions.<br>• Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered. | High |
| 5a | • Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.<br>• Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two contiguous acres.<br>• Paleontological resources are highly susceptible to adverse impacts from surface disturbing actions. | • Unit is frequently the focus of illegal collecting activities.<br>• A field survey by a qualified paleontologist is usually necessary prior to surface disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions. Official designation of areas of avoidance, special interest, and concern may be appropriate. | Very High |

| Class | Occurrence | Comments | Probability of Encounter |
|---|---|---|---|
| 5b | • These are areas underlain by geologic units with very high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances.<br>• Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.<br>• Areas of exposed outcrop are smaller than two contiguous acres.<br>• Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.<br>• The characteristics are present that lower the vulnerability of both known and unidentified paleontological resources. | • Unit is frequently the focus of illegal collecting activities.<br>• A field survey by a qualified paleontologist is usually necessary prior to surface disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions.<br>• Official designation of areas of avoidance, special interest, and concern may be appropriate. | Very High |

Source: BLM, 2007c

There are geologic formations in and surrounding the Plan boundary that are known to or have the potential to contain fossils. Formations identified in the Plan boundary are shown on Figure 3.4-2 and include (from oldest to youngest):

Ordovician/Cambrian Calcite marble & Dolomite marble - No known fossils occur in this formation.

Ordovician/Cambrian Notch Peak - The Notch Peak Formation can be broken into two members: the upper dolostone member, and the lower limestone member. The Notch Peak Dolostone is composed of massive beds with bioturbation (trace fossils), (Hellbusch et al., 2010). The Notch Peak Formation would probably be rated as Class 1 in the PFYC system due to the age and lack of occurrence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Ordovician/Cambrian Pogonip - The units commonly recognized in western Utah and eastern Elko County as parts of the Pogonip Group are, in ascending order: the Garden City Formation, the Kanosh Shale, the Lehman Formation, the Swan Peak Quartzite, and the Crystal Peak Dolomite.

The Lehman Formation, which consists of blue-gray, crystalline, fine-grained, thin- to medium-bedded, yellowish-orange-weathering arillaceous limestone, is highly fossiliferous and contains planispiral gastropods and the ostracode Leperditia (Coats, 1987). The Lehman Formation

would be rated as Class 3 in the PFYC system due to the relatively high abundance of common fossils.

Ordovician Eureka Quartzite - The formation is almost everywhere completely unfossiliferous except where it contains limestone or other similar rock types (Coats, 1987). The Eureka Quartzite would be rated as Class 1 in the PFYC system due to high metamorphism and lack of fossils.

Silurian/Ordovician Dolomite - This formation consists mostly of fine- and coarse-grained dolomite. The units included in this formation are, in ascending order: the Fish Haven Dolomite and Laketown Dolomite.

The Fish Haven is cliff forming medium- to dark-gray dolomite, very fine grained to sublithographic, massive, with thin lighter gray streaks and fossil-hash beds. Some silicified fossils have been observed, as well as some crinoids-brachiopod hash and a few cup corals. This formation would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

No fossils were mentioned to occur within the Laketown Dolomite.

Devonian Sevy, Simonson & Nevada Formations - The Devonian sequence includes three well-known formations: the Sevy Dolomite, the Simonson Dolomite, and the Nevada Formation. The Sevy Dolomite is homogeneous; well-bedded, light gray fine- to medium-grained dolomite. No known fossils occur in the Sevy Formation.

The Sevy grades into the overlying Simonson Dolomite, which consists of alternating light and dark beds of laminated dolomite. Middle Devonian fossils have been observed in the Simonson Dolomite. This formation would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

The Nevada formation is mainly limestone and dolomite, with intercalated beds of shale and quartzite. Some coral-stromatoporoid reefs have been noted in the upper part of this formation (Coats, 1987). This formation would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Devonian Guilmette & Devils Gate Formation - The Guilmette Formation is a light- to dark-bluish-gray, generally medium-gray, thin- to thick-bedded, cliff-forming, dense, medium-grained dolomite and limestone.

The Devils Gate Formation consists of thin- to thick-bedded interbedded limestone and dolomite. Stromatoporid that resembles spaghetti is common throughout this formation (Coats, 1987). The Devils Gate Formation would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Mississippian/Devonian Joanna Limestone & Pilot Shale - The Pilot Shale is dark-gray to black, thin-bedded and platy, shaley and sandy limestone that weathers to a distinctive tan or yellowish-gray color. The limestone is interlayered with thin, black carbonaceous shale beds.

The Joanna Limestone is a cliff-forming unit composed of thin, alternating beds of medium- to dark-gray bioclastic (in some areas) limestone and dark-gray to nearly black chert. Horn corals, brachiopods, and snails have been observed within this formation (Coats, 1987). The Joanna Limestone Formation would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Pennsylvanian Ely Limestone - This formation can be divided into five informally designated members, the lowest of which being Member 1, and the uppermost being Member 5. Of these five sections, Members 1, 3, and 4 contain fossils. Member 1 consists of interbedded bioclastic, argillaceous, silty-sandy, and siliceous-cherty limestone, with subordinate units of chert-small-pebble conglomerate and conglomeratic limestone. The second member is not fossil-bearing, consisting of a conglomeratic sequence. Member 3 also contains bioclastic limestone, with minor interbeds of shaly siltstone to orthoquartzite throughout. Member 4 is composed of micritic limestone, dolomitic limestone, calcareous dolomite, gypsiferous limestone, fossiliferous limestone, silt, and fine-sand detritus. Member 5, the upper-most member, is a cliff-forming medium- to thick-bedded, very fine- to fine-grained limestone, argillaceous limestone, and silty to fine-sandy limestone. The five members of the Ely Formation total 1,510 feet in thickness (Coats, 1987). The Ely Limestone Formation would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Mississippian Diamond Peak & Chainman Shale Formations, Undivided - The Chainman Shale and Diamond Peak Formation, undivided, are composed of five distinct rock units, which include: 1) a lower clastic unit; 2) a carbonate unit with areas of prolific gastropod fauna, such as in the Leppy Range; 3) a predominantly shale unit; 4) a second carbonate unit; and 5) an angular to subrounded chert and quartzite ½- to 2-inch pebble conglomeratic unit ranging in color from orange, green, light gray, red, and black (Coats, 1987). This formation would probably be rated as Class 2 or Class 3 in the PFYC system due to the noted presence of abundant common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Permian Pequop Formation - The Pequop Formation can be divided into two members: an upper limestone member and a lower interbedded limestone and siltstone member. The lower member is composed of medium-to thick-bedded, medium-gray, fine-grained limestone interbedded with platy siltstone. Fusulinid and crinoids columnals are present in this member. The upper member is composed of thick-bedded to massive, medium- to fine-grained limestone containing abundant pentagonal to circular crinoids columnals, many gastropods, and rare fusulinids (Coats, 1987). This formation would probably be rated as Class 3 in the PFYC system due to the noted presence of rare fusulinids.

Permian Grandeur Formation - The Grandeur Formation is a carbonate to cherty carbonate-rich rock with areas of carbonate-rich sandstone and siltstone. The upper part of this formation is composed of nodular limestone and chert-granule conglomerate. The lower part of this formation is composed of interbedded bioclastic limestone containing bryozoans, algae, crinoids stems, and brachiopods (Coats, 1987). The Grandeur Formation would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Tertiary Sedimentary rocks - Tertiary Sedimentary rocks include cherty limestone, limestone, conglomerate, sandstone, claystone, siltstone, shale, tuff, and the Elko Formation. The sedimentary rocks of this unit are restricted to include rocks that, where clastic, are relatively fine-grained and have a relatively small pyroclastic content. In some areas, the limestone members are commonly ostracodal.

This unit also includes three unnamed Eocene formations in which there are several fossil-leaf localities (Coats, 1987). The Tertiary Sedimentary rocks found in this Plan boundary would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Tertiary Tuffaceous Rocks - No known fossils occur in this formation.

Quaternary Pluvial lake deposits - The extreme west margin of Lake Bonneville extends into Elko County. The deposits laid down during the highest stand of Lake Bonneville were divided into two members, a lower member consisting of white marl and an upper member consisting of sand and gravel. The lower member is largely composed of ostracode shells and remains of calcareous algae.

The deposits in the bottom of most of the pluvial lakes in this area have not been dissected and are so poorly exposed that very little can be said about them (Coats, 1987). The Pluvial lake deposits found in this Plan boundary would probably be rated as Class 2 in the PFYC system due to the noted presence of common fossils, and absence of vertebrate fossils or scientifically significant invertebrate or plant fossils.

Quaternary Alluvium - No known fossils occur in this formation.

Although invertebrate fossils are plentiful in many of the formations found on or surrounding the Plan boundary, the same formations are widespread and the contained fossils are not restricted to the Plan boundary.

No important vertebrate fossil species were found in or around the Plan boundary.

**Power Supply Pipeline**

Existing resources are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Existing resources are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.11.3.2 North Facilities Alternative

Within the mining and processing facilities APE for cultural resources, 103 sites recommended as eligible or unevaluated for the NRHP were recorded. Cultural resources within the power supply pipeline APE are the same as those described under the Proposed Action.

For paleontological resources, the existing conditions for the North Facilities Alternative are the same as those for the Proposed Action.

#### 3.11.3.3 No Action Alternative

Within the mining and processing facilities APE for cultural resources, 103 sites recommended as unevaluated or eligible for the NRHP were recorded.

For paleontological resources, the existing conditions for the No Action Alternative include the authorized exploration activities as discussed in Section 2.2.

## 3.12 Native American Religious and Traditional Values

### 3.12.1 Areas of Analysis

#### 3.12.1.1 Proposed Action

**Mining and Processing Facilities**

For the purposes of the Native American religious and traditional values analysis, the area of analysis is the Plan boundary, the power supply pipeline, and the Cities' water supply area.

**Power Supply Pipeline**

The area of analysis is the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

The area of analysis is the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.12.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative occurs within the same area as the Proposed Action.

#### 3.12.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the approved exploration boundary, as described in the Expanded Long Canyon Exploration Project EA (BLM, 2011d).

### 3.12.2 Data Sources and Methodology

**Regulatory Framework**

Federal agencies are required by law (including the NHPA and ARPA) to consult with Native Americans on actions that may affect their traditions or uses of public lands. The agency must provide tribes a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of adverse effects.

Ethnographic resources include sites or areas of concern to Native American groups for heritage or religious reasons. The BLM followed general procedures and guidance for Native American Consultation as outlined in BLM Manual H-8120-1 (BLM, 2004). The goal is to "assure that tribal governments, Native American communities, and individuals whose interests might be affected have a sufficient opportunity for productive participation in BLM planning and resource management decision making" (BLM, 2004).

As discussed in Section 3.11.2, a TCP is a property associated with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community (Parker and King, 1998).

Several applicable laws, regulations, and other requirements pertaining specifically to Native American concerns were considered, including:

- AIRFA (42 USC 1996) – AIRFA reaffirms American Indian religious freedom under the First Amendment and sets policy to protect and preserve the inherent right of American Indians to believe, express, and exercise their traditional religions. Further, AIRFA requires Federal actions to avoid interfering with access to sacred locations and traditional resources that are integral to the practice of religions.

- NAGPRA (25 USC 2001 et seq.) – NAGPRA became law in 1990; the regulations implementing the statute were completed and went into effect in January 1996. This law 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 with which they have a relationship of cultural affiliation. NAGPRA gives even stronger custody rights to lineal descendents when such a close relationship can be documented. In addition, the law and regulations describe procedures designed to ensure that all Americans can derive educational, historical, and scientific value from the remains and objects covered by the statute through public interpretation, documentation, and study.

- Executive Order (EO) 13007, Indian Sacred Sites (May 24, 1996) – This EO directs federal land-managing agencies to accommodate Native Americans' use of sacred sites for religious purposes and to avoid adversely affecting the physical integrity of sacred sites. Federal agencies managing lands must implement procedures to ensure reasonable notice where an agency's action may restrict ceremonial use of a sacred site or adversely affect its physical integrity.

- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (November 6, 2000) – This EO establishes regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes. This order revokes the preceding EO 13084 – Consultation and Coordination with Indian Tribal Governments.

- Secretarial Order 3206 – American Indian Tribal Rights, Federal Tribal Trust Responsibilities, and the Endangered Species Act – This Order clarifies the responsibilities of federal agencies when actions taken under authority of the ESA and associated implementing regulations affect, or may affect, Indian lands, tribal trust resources, or the exercise of American Indian tribal rights. It acknowledges the trust responsibility and treaty obligations of the United States toward Indian tribes and tribal members. Accordingly, federal agencies will carry out their responsibilities under the ESA in a manner that harmonizes the federal trust responsibility to tribes, tribal sovereignty, and statutory missions and strive to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species.

#### 3.12.2.1 Proposed Action

**Mining and Processing Facilities**

Data regarding Native American Concerns relied on the BLM tribal liaison's knowledge of and familiarity with places and resources of Native American interest and concern within their district. Further, data was gathered and supplemented by reviewing available ethnographic and ethnohistoric reports produced for previous federal undertakings near the Plan boundary (Bengston, 2003).

Project-specific concerns were requested through information sharing meetings between the BLM and the Tribes.

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.12.2.2 North Facilities Alternative

The data sources and methods used to describe Native American Religious and Traditional Values within the area of analysis for the North Facilities Alternative are the same as those for the Proposed Action.

#### 3.12.2.3 No Action Alternative

The data sources and methods used to describe Native American Religious and Traditional Values within the area of analysis for the No Action Alternative are the same as those for the mining and processing facilities area.

### 3.12.3 Existing Conditions

#### 3.12.3.1 Proposed Action

**Mining and Processing Facilities**

The BLM is consulting with federally-recognized Indian tribes that have a cultural affiliation based on traditional use, ancestral ties, and/or oral histories associated with the area. The following tribes were contacted:

- South Fork Band Council;
- Wells Band Council;
- Shoshone Paiute Tribes of the Duck Valley Indian Reservation;
- Confederate Tribes of the Goshute Indian Reservation;
- Te-Moak Tribe of Western Shoshone;
- Battle Mountain Band Council;
- Yomba Shoshone Tribe;
- Duckwater Shoshone Tribe;
- Elko Band Council; and
- Ely Shoshone Tribe.

In addition, the following non-governmental organizations were contacted:

- Bureau of Indian Affairs;
- Western Shoshone Defense Project;
- Western Shoshone Descendants of Big Smoky; and
- Western Shoshone Committee.

On July 19, 2012, letters soliciting information from Native American Tribes and inviting the Tribes to enter into consultation for the proposed project were sent by the BLM to the 14 Tribal governments and non-governmental organizations listed above. Those that are non-government organizations were not provided a consultation letter but rather an information letter. The BLM regularly holds Native American coordination meetings with local tribes. Comments were received from the Confederate Tribes of the Goshute Reservation on

September 2, 2014. BLM initiated additional coordination and responded to the comment via letter on October 21, 2014.

The Plan boundary is within the boundaries of the 1863 Treaty of Ruby Valley. This treaty between the United States and the Western Shoshone Nation called for a cessation of hostilities with Whites, the unobstructed use of travel routes, the unhindered construction of military forts, telegraph lines, stage lines, railroads, mines, mills and ranches throughout the region, and an agreement by the Indians to give up their lifeway and become settled ranchers and farmers on reservations. To compensate the loss of game and natural vegetation, the Indians were to be paid $5,000 annually for the next 20 years. This agreement was the only official treaty that Nevada Indians ever signed.

Indian trust resources are natural resources protected by a fiduciary obligation on the part of the United States. Indian trust resources located on Indian reservation lands are managed and protected by the Tribes. Indian trust resources located on lands administered by the BLM are managed and protected by the BLM; no Indian trust resources have been identified on BLM-administered lands within the Plan boundary.

Cultural resource sites are manifestations of past human activities. Prehistoric and ethnographic overviews are provided in Section 3.11, as are the known cultural resource sites in the Plan boundary. The prehistoric and historic sites indicate continuous use of the area for thousands of years by various groups.

The aboriginal groups in the Plan boundary were primarily the Western Shoshone (Vlasich, 1981). The arid Great Basin climate was possibly a limiting population factor; in the fertile portions of eastern Nevada, there may have been one person per five square miles, while in the desert regions, the carrying capacity of the area may have required a substantially larger area to support a population. Under such conditions, the natives relied predominately on hunting and gathering techniques to secure their food supply (Vlasich, 1981). Rather than living in a single location with a large population, aboriginal groups tended to move seasonally in small units through the north-south mountain ranges making up eastern Nevada (Steward, 1947 in Vlasich, 1981).

The Plan boundary is within the aboriginal territory of the Western Shoshone. Several nearby areas have been identified as traditional use areas by the Western Shoshone (Bengston, 2003). The Pequop Mountains have been utilized for pine nut collection and festivals (Steward, 1997 in Bengston, 2003). The Toano Mountains to the east have also been used for pine nut collection. The Goshute Valley, in which the Plan boundary is situated, has been identified as an area utilized for rabbit drives (Steward, 1997 in Bengston, 2003).

To date, no TCPs or EO 13007 (Indian Sacred Sites) sites have been identified within the Proposed Action area.

In accordance with the NHPA (P.L. 89-665), the NEPA, FLPMA, AIRFA, NAGPRA, and EO 13007, the BLM must provide affected tribes an opportunity to comment and consult on the proposed project. BLM must attempt to identify locations having traditional, cultural, or spiritual importance and limit, reduce, or possibly eliminate any negative impacts to identified traditional, cultural, spiritual sites, activities, and resources. Consultation is an on-going process and will continue through the NEPA process.

**Power Supply Pipeline**

Existing resources are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Existing resources are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.12.3.2 North Facilities Alternative

Existing Resources are the same for the North Facilities Alternative as for the Proposed Action.

#### 3.12.3.3 No Action Alternative

Existing resources are the same for the No Action Alternative and for the Proposed Action.

## 3.13 Land Use, Access, and Transportation

This section identifies and describes current land ownership patterns, land use plans, public access, and major land uses that may be affected by the Proposed Action and alternatives.

### 3.13.1 Areas of Analysis

#### 3.13.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for the mining and processing facilities area occurs within 50 miles of the Plan boundary.

**Power Supply Pipeline**

The area of analysis for the power supply pipeline is the 200-foot ROW corridor.

**Cities' Water Supply**

The area for the Cities' water supply is Section 21, T35N, R66E, which is adjacent to the Plan boundary.

#### 3.13.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as for the Proposed Action.

#### 3.13.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the approved exploration boundary, as described in the Expanded Long Canyon Exploration Project (BLM, 2011d).

### 3.13.2 Data Sources and Methodology

#### 3.13.2.1 Proposed Action

**Mining and Processing Facilities**

Land use information, policies, and current management practices were taken from public sources, specifically from the BLM Wells RMP; Elko County land use plans; and the Nevada Department of Transportation (NDOT) transportation plan for Elko County. Land use authorizations and land tenure information were gathered from the BLM Wells RMP as well as current data contained within BLM's LR2000 that provides reports on BLM land and mineral use authorizations for oil, gas, and geothermal leasing, ROWs, mineral development, land and mineral title, mining claims, withdrawals, classifications, and federal mineral estate information. These data were used to characterize land use within and surrounding the Plan boundary for the purpose of determining potential changes in public and private land use ownership, BLM land use authorizations, and land disposal.

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.13.2.2 North Facilities Alternative

The data sources and methods used to describe the existing land use and access conditions within the area of analysis for the North Facilities Alternative are the same as those for the Proposed Action.

#### 3.13.2.3 No Action Alternative

The data sources and methods used to describe the existing land use and access conditions within the area of analysis for the No Action Alternative are the same as those for the mining and processing facilities area.

### 3.13.3 Existing Conditions

#### 3.13.3.1 Proposed Action

**Mining and Processing Facilities**

The project is located in Elko County, Nevada approximately 28 miles east of Wells, Nevada and approximately 32 miles west of West Wendover, Nevada. The Plan boundary consists of a combination of public and private lands, with some split estate lands. The portion of the Plan boundary on public lands is administered by the BLM Elko District Wells Field Office, and is administered according to the Wells RMP.

**Land Use Plans and Policies**

BLM Wells RMP

The Wells RMP Record of Decision was approved on July 16, 1985. The RMP has since been amended for fire, elk, and wild horse management. The RMP provides programmatic and implementable direction for management of approximately 4.25 million acres of public land within the Wells Resource Area of northeastern Nevada (BLM, 1985).

The RMP provides specific applicable management decisions for each resource addressed within the RMP. The following provides a brief summary of the management objectives specific to land use, geology and mineral resources, wildlife, livestock grazing, recreation, wild horse habitat, and access. Some of the objectives are as follows:

- Allow disposals, land tenure adjustments, and land use authorization based on long-range goals. These goals are to identify lands to be disposed or retained and administered for multiple uses. These identifications are based on land manageability and quality of resource values (BLM, 1985).
- The public lands would be managed in a manner that recognizes the Nation's needs for domestic sources of minerals (BLM, 1985).
- Public rangelands would be managed to enhance the productivity of the rangelands by preventing overgrazing and soil deterioration; stabilize the livestock industry dependent on public range; provide for inventory and categorization based on conditions and trends; and provide orderly use, improvement and development (BLM, 1985).
- To provide a wide range of recreation opportunities (BLM, 1985).
- Continue management of the six existing wild horse herds consistent with other resource uses (BLM, 1985).
- Acquire legal access for routes, which would enhance opportunities to use public land resources (BLM, 1985).
- Conserve and/or enhance wildlife habitat to the maximum extent possible while eliminating all of the fencing hazards in crucial big game habitat, most of the fencing hazards in non-crucial big game habitat, and all of the high and medium priority terrestrial riparian habitat conflicts in coordination with other resource uses (BLM, 1985).

Elko County Public Lands Policy Plan

The Elko County Public Lands Policy Plan was developed between 1983 and 1984 in coordination with the Nevada State Land Use Planning Agency (PLUAC, 2008). The 2008 plan represents a review of existing and emerging public lands issues that are of importance to Elko County as it works with federal agencies under NEPA, FLPMA, and other public processes (PLUAC, 2008). The Elko County Public Lands Policy Plan provides a coordinated land use planning effort among Elko County, BLM, and USFS. The policies are intended to further agriculture, mining and recreation as principal economic bases of Elko County (PLUAC, 2008). In general, the public land policies encourage environmentally responsible mineral exploration; opportunities for livestock grazing and other agricultural uses; recreational use in Elko County;

energy production; and the concept of Multiple Use Management as an overriding philosophy for management of the public lands based on multiple use and sustainable yield concepts.

Specific policies relating to development of mineral resources are included in the plan. Policies specific to mineral resources include: promoting the retention of existing mining areas and promoting the expansion of mining operations in areas not specifically withdrawn; promoting existing reclamation standards to ensure there is no undue degradation of public lands; and encouraging mine site and exploration reclamation standards to be consistent with the best possible post-mine use for each specific area (PLUAC, 2008).

Elko County General Plan and Open Space Plan

The current Elko County General Plan was developed and adopted in 1971. The plan introduces various ideas and proposals for the future development of the area, and was intended to maintain agricultural areas as well as to promote residential, commercial, and industrial development (Elko County, 2003). The General Plan supports ranching and diversified uses, and briefly touches on recreation, mining and conservation goals. The Elko County General Open Space Plan was created to maintain and promote traditional multiple use and conservation of open space lands, whether privately or publicly owned, and publicly managed lands within Elko County (Elko County, 2003).

**Land Use, Ownership, and Land Tenure**

Land Use

The primary land uses within and adjacent to the Plan boundary include mining and mineral exploration; oil and gas exploration; livestock grazing; woodland products harvesting; recreation; and wildlife habitat. At the Oasis turn-off (Exit 378), directly north and east of the Plan boundary there is land which was master planned for commercial and residential land uses in 2001; only limited residential development has occurred in the (Elko County, 2001). In the Pilot Creek Valley, approximately 20 miles east-northeast of the Plan boundary, there is residential and commercial master planned land uses, but only limited residential development in the area (Elko County, 1999). According to the Elko County Master Zoning Map there were several parcels created in the 1960s to the 1970s, which were generally 10- to 40-acre parcels, and are located between T34N through T41N and R66E through R70E (Elko County, 1981) (the pit is in T36N, R66E). This area is known as the Gamble District. There is scattered residential development within the Gamble District, but a majority of the parcels lack legal access since they were created prior to subdivision law (Kingwell, 2013).

The federal government is a significant landowner in Elko County with scattered private land ownership adjacent to the Plan boundary. The BLM has divided range lands in the region into grazing allotments to facilitate the management of the land for public livestock grazing. The Plan boundary is within the East Big Springs Allotment. The majority of public lands in Nevada are managed by the BLM for range uses. Much of the private and state lands are also open range. Figure 3.13-1 shows land ownership within and adjacent to the Plan boundary.

**Figure 3.13-1 Land Ownership & Special Designations**

The proposed mining and milling operations would be located within the East Pequop Bench and Payne Basin/Long Canyon/Six Mile pastures of the East Big Springs Allotment, which contains an estimated 305,736 acres (Newmont, 2011). The East Big Springs Allotment is governed by the "Final Grazing Management Decision and Record of Decision for the Sheep Complex, Big Springs, and Owyhee Allotments" dated October 30, 2006. The East Pequop Bench Pasture is grazed on a four-year cycle. Two out of four years, livestock use starts on March 1, with use starting on March 15 in the other two years. Livestock are removed from this pasture on June 15 in all four years (Newmont, 2011). The Payne Basin/Long Canyon/Six Mile pasture is also grazed on a four-year cycle, with livestock present from June 16 through August 30 in two years and June 16 through September 5 in the other two years.

Agricultural lands in Nevada are sparse and dispersed, typically located near perennial streams and rivers. There are no prime farmlands within the Plan boundary (NRCS, 2013a). However, the Blimo-Threesee Association (Map Unit 1213) is located on the northern portion of the Plan boundary, and is considered Farmland of Statewide Importance. Farmland of Statewide Importance is not prime farmland, but includes areas that nearly meet the criteria for prime farmland and that may economically produce high yields of crops when treated and managed by acceptable farming methods (NRCS, 2013a and 2013b).

Mining is an important land use in Nevada, and there are numerous mining claims near the Plan boundary. Not including the active mining claims held by Newmont, there are approximately nine additional active mining claim lead files within the same Township and Range of the Plan boundary (BLM, 2013d). All mining claims within the Plan boundary are owned or controlled by Newmont (Newmont, 2011).

The BLM administrative land use authorizations within the same Township and Range of the project are shown in Table 3.13-1.

**Table 3.13-1 Administrative Land Use Authorization within the Plan Boundary**

| Serial Number | Description/Holder |
|---|---|
| T36N and T35N, R66E | |
| NVCC 0017548 | Beehive Telephone Co. Inc./Wells to Silverzone Overhead Telephone Line |
| NVCC 0021089 | Nevada Bell/ ROW for Buried Fiber Optic Line |
| NVCC 0022414 | NDOT/Highway ROW |
| NVE 0001655 | Beehive Telephone Co. Inc./ ROW for Overhead Telephone Line |
| NVN 000958 | NDOT/Material Site |
| NVN 001004 | NDOT/Material Site |
| NVN 002115 | Wells Rural Electric/ ROW for Overhead Distribution Line |
| NVN 046998 | Elko County/ Road ROW |
| NVN 047793 | Beehive Telephone Co. Inc./ ROW for Buried Telephone/Fiber Optic Cable |
| NVN 065550 | Wiltel Communications/ROW for Communication Facilities |
| NVN 076708 | Beehive Telephone Co. Inc./ ROW for Underground Telephone Line |
| NVN 082445 | Fronteer Development/Long Canyon Exploration Drilling |

| Serial Number | Description/Holder |
|---|---|
| NVN 085578 | Agnico-Eagle USA LTD and Columbus Gold US Corp/Exploration Drilling |
| NVN 0001474 | NDOT/ Highway ROW |
| NVN 0054317 | NDOT/Highway ROW |
| NVN 0058475 | Wells Rural Electric/ROW for Overhead Power Line |
| NVN 0061445 | NDOT/Highway ROW |

Source: BLM, 2013a

Ownership

Elko County is bordered by Idaho to the north, Utah to the east, White Pine County to the south, and Humboldt County, Eureka County and Lander County to the west. The federal government is a significant landowner in Elko County, with 72.7 percent of Elko County Land administrated by the federal government (PLUAC, 2008).

**Table 3.13-2 Elko County Land Status Acreage**

| Land Area | Acres | Land Area in Percent |
|---|---|---|
| BLM | 6,882,161 | 62.6 |
| Forest Service | 1,073,143 | 9.8 |
| Fish and Wildlife Service | 26,872 | 0.2 |
| Department of Defense | 15,163 | 0.1 |
| Tribal | 160,823 | 1.5 |
| State | 15,241 | 0.1 |
| Local Government/Private | 2,822,437 | 25.7 |
| Total Acres | 10,995,840 | 100.0 |

Source: PLUAC, 2008

Land Tenure

There are no public lands within the Plan boundary identified for current disposal (Wirthlin, 2013). The Wells RMP short- and long-term management action is to dispose of 90,000 acres within the Wells Resource Area, including community expansion lands, primarily through public sale. The areas identified for disposal by the Wells RMP include 69,095 acres in Pilot/Crittenden (with 360 acres for community expansion of Montello) (BLM, 1983); public lands in Wells, approximately 28 miles west of the Plan boundary; public lands in West Wendover, approximately 32 miles east of the Plan boundary; public lands in Jackpot, approximately 60 miles north of the Plan boundary; and public lands adjacent to U.S. Highway 93 in Clover Valley, approximately 25 miles southwest of the Plan boundary.

**Access/Transportation**

Access to the Plan boundary from Wells to the west and West Wendover to the east would be from I-80 at Exit 378, also known as the Oasis/Montello Exit. From Ely to the south, the Plan boundary would be accessed via U.S. Highway 93 north to West Wendover, then west on I-80 to the Oasis/Montello Exit. From Jackpot to the north, the Plan boundary would be accessed via U.S. Highway 93 south to Wells, then east on I-80 to the Oasis/Montello Exit. Newmont would be transporting ore and loaded carbon from the Long Canyon Project site to its Gold

Quarry facilities near Carlin, 115 miles west on I-80. Reactivated carbon would also be trucked back from Gold Quarry to the Long Canyon Project. The Federal Highway Administration administers I-80 and U.S. Highway 93, and NDOT maintains them. I-80 generally runs east to west traversing the northern portion of the state and U.S. Highway 93 generally runs north to south across the eastern portion of the state. Table 3.13-3 from the 2011 NDOT Annual Traffic Report provides the Annual Average Daily Traffic (AADT) from traffic monitoring stations closest to the Plan boundary, as well as the Central Carlin Exit since loaded carbon from the Long Canyon Project would be transported to Newmont's Gold Quarry facilities, and reactivated carbon would be trucked back from Gold Quarry to Long Canyon (NDOT, 2012).

**Table 3.13-3 Annual Average Daily Traffic**

| Station I.D. | Location | AADT 2009 | AADT 2010 | AADT 2011 | AADT 2012 |
|---|---|---|---|---|---|
| 0070007 | I-80, east of the East Carlin Interchange 'Exit 282' at mile point288 | 11,000 | 10,000* | 10,000 | 11,000* |
| 0070099 | I-80, 2.6 miles east of the Elburz Interchange "Exit 317' | 6,600 | 7,300 | 7,100* | 7,300* |
| 0070112 | I-80, 0.5 miles east of the River Ranch Interchange 'Exit 328' | 6,400 | 6,800* | 6,700 | 7,000* |
| 0070144 | I-80, 0.3 miles west of the Oasis/Montello Interchange 'Exit 378' | 4,900 | 5,100 | 5,300 | 5,000 |
| 0070145 | SR 233, Montello Road, 0.1 miles north of I-80 | 290 | 300 | 300* | 300 |
| 0070150 | SR-233, Montello Road, 0.2 miles north of County road to Crittenden Reservoir/Wine Cup Ranch Road | 270 | 290 | 320 | 250 |
| 0070161 | I-80, 0.35 miles west of the East Elko Interchange 'Exit 303' | 11,000 | 12,000* | 11,000 | 12,000 |
| 0070163 | I-80, 6.25 miles east of the East Elko Interchange 'Exit 303' | 8,500 | 12,000* | 8,600* | 9,000 |
| 0070165 | I-80, 0.3 miles west of Summit Interchange 'Exit 373' | 5,200 | 5,200* | 5,100* | 5,000* |
| 0070171 | I-80, 0.2 miles east of the Summit Interchange 'Exit 373' | 4,900 | 5,200 | 5,200 | 5,000* |
| 0070177 | I-80, E/B off-ramp of the Oasis Interchange 'Exit 378' | 100 | 100* | 100* | 100* |
| 0070179 | I-80, E/B on-ramp of the Oasis Interchange 'Exit 378' | 70 | 70* | 60* | 60* |
| 0070181 | I-80, W/B on-ramp of the Oasis Interchange 'Exit 378' | 110 | 110* | 110* | 100* |
| 0070182 | I-80, W/B off-ramp of the oasis Interchange 'Exit 378' | 70 | 70* | 60* | 60* |
| 0070185 | I-80, 0.5 miles east of the Oasis Interchange 'Exit 378' | 4,900 | 5,000 | 5,000 | 4,900* |
| 0070254 | I-80, E/B on-ramp of the Central Carlin Interchange 'Exit 280' | 2,000 | 2,000* | 2,200 | 2,300 |
| 0070256 | I-80, W/B off-ramp of the Central Carlin Interchange 'Exit 280' | 2,000 | 2,100 | 2,100 | 2,200* |
| 0070258 | I-80, 0.7 miles east of the Central Carlin Interchange 'Exit 280' | 11,000 | 11,000* | 9,600 | 11,000* |
| 0070261 | I-80, between the Hunter Interchange 'Exit 292' and the west Elko Interchange 'Exit 298' | 11,000* | 10,000* | 10,000 | 11,000* |

| Station I.D. | Location | AADT 2009 | AADT 2010 | AADT 2011 | AADT 2012 |
|---|---|---|---|---|---|
| 0070268 | I-80, between the West Elko Interchange 'Exist 298" and the Elko Downtown Interchange 'Exit 301' | 9,300 | 9,620* | 9,500 | 9,800 |
| 0070283 | I-80, 2.5 miles east of the Halleck Interchange 'Exit 321' | 6,400 | 6,900* | 6,900 | 7,100* |
| 0070284 | I-80, 0.2 miles west of the Beverly Hills Interchange 'Exit 348' | 6,700 | 6,600 | 6,700 | 6,800 |
| 0070292 | I-80, 0.3 miles west of the West Wells Interchange 'Exit 351' | 6,700 | 6,600 | 6,700 | 6,800 |
| 0070303 | I-80, 0.15 miles east of the West Wells Interchange "Exit 351' | 6,700 | 6,600 | 6,700* | 6,700 |
| 0070349 | I-80, 0.747 miles east of the Rydon Interchange 'Exit 314' | 6,700 | 7,500 | 7,200* | 7,500 |
| 0070350 | I-80, between the Deeth Interchange 'Exit 333' and the Welcome-Starr Interchange "Exit 343'. | 6,300 | 6,700* | 6,600 | 6,900* |
| 0070351 | I-80, 0.3 miles east of the Moor Interchange 'Exit 360' | 5,200 | 5,200 | 5,100 | 5,000 |
| 0070362 | Wine Cup Ranch Road, 100 feet north of SR-233 (Montello Road) | 30 | 30* | 30* | 30* |
| 0070364 | Wine Cup Ranch Road, 0.3 miles north of SR-233 (Montello Road) | 10 | 10* | 10* | 10* |

Source: NDOT, 2012
* Data Adjusted or Estimated

**Special Designations**

This section describes specially designated resources located within 50 miles of the Plan boundary. This 50-mile buffer is an appropriate analysis area to determine special designation areas in proximity to the mining and processing facilities area including the power supply pipeline and the Cities' water supply. Special designations include Wilderness Areas, WSAs, Areas of Critical Environmental Concern (ACEC), Research Natural Areas (RNA), various units of the National Park Service, NDOW Management Areas, and National Wildlife Refuges (Figure 3.13-1).

The regulatory basis and management of designated Wilderness Areas, WSAs, and lands with wilderness characteristics are described in Section 3.10. There are three WSAs within 50 miles of the Plan boundary (Figure 3.13-1). The Bluebell WSA, Goshute Peak WSA, and South Pequop WSA. The Bluebell WSA is approximately 10 miles southeast of the Plan boundary; the Goshute WSA is approximately 18 miles southeast of the Plan boundary; and the South Pequop WSA is located approximately 13 miles south of the Plan boundary (BLM, 2013b).

There are two congressionally-designated Wilderness Areas in Elko County within 50 miles of the Plan boundary: the East Humboldt and the Ruby mountains. All of the Wilderness Areas in Elko County are managed by the USFS (PLUAC, 2008). The East Humboldt Wilderness is approximately 25 miles west of the Plan boundary and the Ruby Mountains Wilderness is approximately 35 miles southwest of the Plan boundary.

Section 201 of FLPMA requires that resource inventories on public lands be maintained, including inventories of lands with wilderness characteristics. Section 3.10.3.1 provides additional regulatory detail on these lands. In 1999, the BLM acquired approximately 70,000 acres of land in the Pequop Mountains as part of a land exchange, necessitating an inventory of the resource values of the acquired land in accordance with Section 201 of FLPMA. As part of the 2011 Environmental Assessment for the Long Canyon expanded exploration activities, approximately 63,235 acres of the acquired land were inventoried for wilderness characteristics. The western half of the Plan boundary was included within the area inventoried in 2011. A total of approximately 27,835 acres were determined to have wilderness characteristics, of which approximately 2,537 acres are located within the Plan boundary (BLM, 2011d). The lands with wilderness characteristics identified within the Plan boundary are shown on Figure 3.10-1.

ACECs are the principal BLM designation for public lands where special management is required to protect important natural, cultural, and scenic resources, or to identify natural hazards (BLM, 2013c). There are no ACECs within the Plan boundary; however, there are three ACECs within 50 miles of the Plan boundary: the 6,200-acre Salt Lake ACEC in Nevada, which is located approximately 40 miles to the southeast of the Plan boundary; the Donner Creek/Bettridge Creek ACEC, which is located approximately 20 miles east of the Plan boundary in Box Elder County, Utah; and the Bonneville Salt Flats ACEC, which is located approximately 30 miles east of the Plan boundary in Tooele County, Utah.

There is one RNA within 50 miles of the Plan boundary. The Hole in the Mountain RNA in the Humboldt National Forest is approximately 25 miles to the west of the Plan boundary.

**Power Supply Pipeline**

The existing conditions for the power supply pipeline are the same as those of the mining and processing facilities area, except the power supply pipeline follows State Route 233 to Montello, then north following County Road 765 to the existing Ruby Natural Gas Pipeline. The proposed pipeline is approximately 42 miles in length (Figure 3.13-1). The proposed power supply pipeline would go through both federal and private land. Three additional grazing allotments would be affected: the Gamble Individual Allotment, the Pilot Valley Allotment and a small portion of the Dairy Allotment. The Gamble Individual Allotment has one active permit for cattle from March 1 to September 30 and from November 25 to February 28; the Pilot Valley Allotment has three active permits for cattle from March 1 to September 21 and from October 1 to February 28; and the Dairy Allotment has one active permit for cattle from April 1 to October 31 (BLM, 2013e). The power supply pipeline does cross several soil classifications considered farmland of statewide importance, but it does not cross any prime farmland.

**Cities' Water Supply**

The existing conditions for the Cities' water supply are the same as those of the mining and processing facilities area.

#### 3.13.3.2 North Facilities Alternative

The existing conditions for the North Facilities Alternative are the same as those for the mining and processing facilities area, except most of the mine facilities would be moved to the northeastern quadrant of the Plan boundary.

#### 3.13.3.3 No Action Alternative

The existing conditions for the No Action Alternative include the authorized exploration activities as discussed in Section 2.2.

## 3.14 Visual Resources

This section identifies and describes the existing conditions of the visual resources within the area of analysis for each alternative.

### 3.14.1 Areas of Analysis

#### 3.14.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for the mining and processing facilities area effects consists of those areas within approximately 10 miles of the Plan boundary with potential visibility of the proposed project facilities (Figure 3.14-1). The area is bound to the west by the ridgeline of the Pequop Mountains and the east by the Toano Range. The area of analysis extends approximately 10 miles north of the Plan boundary and 10 miles south of the Plan boundary. It includes the I-80 corridor, from Silver Zone Pass to Pequop Summit, the southwestern portion of State Highway 233, and County Road 790, an unpaved road stretching along the base of the Pequop Mountains from I-80 to the Big Springs Ranch. There are also a number of unimproved roads and jeep trails found throughout the mountains and along the valley floor.

**Power Supply Pipeline**

The area of analysis for the power supply pipeline consists of the area within 0.1 mile of the proposed pipeline.

**Cities' Water Supply**

The area of analysis for the Cities' water supply is entirely within the area of analysis for the mining and processing facilities area.

#### 3.14.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as the area of analysis described for the Proposed Action.

#### 3.14.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the authorized exploration Plan boundary, as described in the *Expanded Long Canyon Exploration Project, Elko County, Nevada, Environmental Assessment* (BLM, 2011d).

**Figure 3.14-1 Visual Resource Management Classes and KOP Location**

### 3.14.2 Data Sources and Methodology

#### 3.14.2.1 Proposed Action

**Mining and Processing Facilities**

The primary sources of data and information that were used or consulted in order to describe the existing conditions of the visual resources and the characteristic landscape included:

- Bureau of Land Management (BLM). 1984. Proposed Wells Resource Management Plan and Final Environmental Impact Statement. November 1983;
- ECA Community Planning. 2012a. Long Canyon Project: Baseline Report: Visual Resources, Land Use, and Recreation. Unpublished document;
- Bureau of Land Management (BLM). 2011d. Expanded Long Canyon Exploration Project, Elko County, Nevada, Environmental Assessment. June 2011;
- Bureau of Land Management (BLM). 2002. Elko County Visual Resource Management Areas [vector digital data]; and
- Observations made during field visits to the Plan boundary.

The BLM VRM system provided the basis of the methods used to assess and characterize the existing aesthetic conditions and visual sensitivity within the area of analysis. BLM uses the VRM system to manage visual resources on BLM-administered public lands. The VRM system provides the BLM with an objective means of measuring the scenic value of the visual resources in an area. BLM can also use the VRM system to analyze potential impacts an action would have on visual resources of an area and apply visual design techniques to minimize impacts. The primary objective of VRM is to maintain the existing visual quality of BLM-administered public lands and to protect unique and fragile visual resources.

The VRM system consists of two stages: the inventory stage and the analysis stage. During the inventory stage, the visual resources of an area are identified and assessed, and then assigned to inventory classes using the process described in BLM Manual H-8410-1: Visual Resource Inventory (BLM, 1986a). The process involves rating the visual appeal of an area, measuring public sensitivity and concern for scenic quality, and determining whether the area is visible from representative or selected key travel routes and/or locations. Based on the results of the inventory stage, the area is assigned a visual resource inventory class. Inventory classes are informational in nature and provide the basis for considering visual values during the development process for a RMP (BLM, 1986a).

According to BLM Manual H-8410-1: Visual Resource Inventory (BLM, 1986a), VRM classes are a management tool that portrays the visual management objectives of an area. Classes are assigned through RMPs. The assignment of VRM classes is based on the management decisions that are made in resource management plans, and visual values must be considered throughout the planning process. Management decisions in the RMP must reflect the value of visual resources. An area may be assigned to one of four VRM classes: Class I, II, III, and IV. Management objectives are established for each class (BLM, 1986a). Table 3.14-1 presents

the objectives for VRM Class I, II, III, and IV, based on the description provided in BLM Manual H-8410-1: Visual Resource Inventory (BLM, 1986a).

**Table 3.14-1 BLM Visual Resource Management Class Objectives**

| VRM Class | Objectives |
|---|---|
| Class I | The existing character of the landscape should be preserved. Class I provides room for natural ecological changes, but also does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. |
| Class II | The existing character of the landscape should be retained. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. |
| Class III | The existing character of the landscape should be partially retained. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. |
| Class IV | Class IV provides for management activities, which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. |

Source: BLM, 1986a

The analysis stage of the VRM system involves determining whether the potential visual impacts from proposed surface-disturbing activities or actions would meet the management objectives established for the area, or whether design adjustments would be required (BLM, 2012b). A visual contrast rating process is used for this analysis, which involves comparing the project features with the major features in the existing landscape using the basic design elements of form, line, color, and texture (BLM, 1986b). The contrast rating is typically performed from a representative Key Observation Point (KOP).

A KOP is a specific place on a travel route or within an existing or potential use area where the view of a management activity or project would be most revealing for purposes of the contrast rating. The selection of KOPs is based on existing land use, frequency of visibility, duration of visibility, and anticipated activities of the observer. Typically, KOPs are selected along highways, well-used roadways and trails and near communities, and scenic overlooks, as these are areas where the greatest number of people are likely to occur, and often occur for the longest periods. Per BLM Manual H-8431: Visual Resource Contrast Rating (BLM, 1986b), the criteria that should be considered when selecting KOPs are: angle of observation, number of viewers, length of time the project is in view, relative project size, season of use, and light conditions.

Once KOPs have been determined, a description of the landscape visible from each KOP is prepared. Per BLM guidance (BLM, 1986a), the landscape visible from each KOP is divided into three distance zones based on relative visibility from the respective KOP. The three distance zones are the foreground-middleground, background, and seldom-seen zones. The foreground-middleground zone includes the areas that are less than three to five miles away from the KOP. Areas viewed beyond the foreground-middleground zone, but usually less than 15 miles away from the KOP, comprise the background zone. The seldom-seen zone consists of the areas within the foreground-middleground and background zones that are typically hidden from view. The landscape description is prepared by describing the dominant land and water features, vegetation cover, and structures that comprise each distance zone of the landscape. These landscape components are described in terms of the basic design elements of form, line, color, and texture (BLM, 1986b).

The BLM Form 8400-4 (Visual Contrast Rating Worksheet) is used to record the various design elements that characterize the land and water features, vegetation cover, and structures that comprise each KOP landscape. The purpose of describing and characterizing the landscape is to establish the existing baseline conditions of the scenic values and aesthetic quality of an area. Typically, the existing conditions of the landscape are documented on BLM Form 8400-4 using photographs. The photographs and information recorded on BLM Form 8400-4 are then used to prepare the landscape description, often in conjunction with field observations made at the time the photographs were taken. The precise geographic locations of the KOPs are recorded using a GPS, and any relevant field notes are recorded at that time.

For the purpose of applying BLM VRM guidelines, BLM Manual H-8410-1 Visual Resource Inventory (BLM, 1986a) was used for the assessment of the existing aesthetic conditions and evaluation of visual sensitivity. In addition, BLM Manual H-8431: Visual Resource Contrast Rating (BLM, 1986b) was used to determine the degree to which the alternative would conform to BLM-identified guidelines, and the objectives of the applicable VRM classes. The VRM objectives and policies in the *Proposed Wells Resource Management Plan and Final Environmental Impact Statement* (BLM, 1984) and associated Record of Decision (BLM, 1985) were also consulted.

**Power Supply Pipeline**

The sources of data and methodology for the power supply pipeline are the same as those described for the mining and processing facilities area.

**Cities' Water Supply**

The sources of data and methodology for Cities' water supply are the same as those described for the mining and processing facilities area.

#### 3.14.2.2 North Facilities Alternative

The sources of data and methodology for the North Facilities Alternative are the same as those described for the Proposed Action; however, a different KOP (KOP-2) was used.

#### 3.14.2.3 No Action Alternative

The sources of data and methodology for the No Action Alternative are the same as those described for the Proposed Action.

### 3.14.3 Existing Conditions

#### 3.14.3.1 Proposed Action

**Mining and Processing Facilities**

According to the BLM Visual Resource Management Areas GIS data (BLM, 2002), the area of analysis contains BLM-administered public lands that have been assigned to VRM Class I, II, III, and IV. However, the Plan boundary has been designated as BLM VRM Class III and IV. The majority of the Plan boundary has been designated as VRM Class IV. The portion of the Plan boundary designated as BLM VRM Class III consists of the westernmost area that contains the Pequop Mountains (Figure 3.14-1).

In addition, the Record of Decision: Wells Resource Management Plan: Wells Resource Area (BLM, 1985) identifies the I-80 corridor as a three-mile-wide "Low Visibility Corridor". The northeastern portion of the Plan boundary overlaps this corridor. Objectives for the Low Visibility Corridor are to minimize visual impacts within 1.5 miles of each side of the interstate, using VRM Class II objectives. The objectives of BLM VRM Class II, III, and IV are presented in Table 3.14-1.

**Characteristic Landscape**

The area of analysis is located within the Basin and Range physiographic province (USGS, 2000). According to the USGS (2000), the Basin and Range province is characterized by broad, sediment-filled valleys alternating with north-south-trending, faulted mountains. The mountains tend to possess relatively high scenic values (BLM, 1983), and are dominated by pinyon pine and Utah juniper vegetation. Valley floors in the basin and range province tend to be monotypic and possess lower scenic values (BLM, 1983). The valleys are generally expansive, open valleys dominated by the sagebrush, rabbitbrush, and other xeric shrub species (ECA Community Planning, 2012a). The north-south trending mountains within the area of analysis include the Pequop Mountains at the western boundary and the Toano Range at the eastern boundary. The Goshute Valley separates the two ranges. The climate within the area of analysis and surrounding region is arid to semi-arid high desert, which is typical in much of the basin and range province of Nevada. Most days are characterized by clear skies or few clouds with bright sunshine.

Predominant man-made features in the area of analysis include railroad tracks, I-80, State Highway 233, minor unpaved and paved roads, and Oasis. Oasis includes commercial and residential structures and associated clearings for vehicle parking next to the interstate. Most of the structures appear uninhabited, but remain intact and seemingly structurally sound. The exterior of the structures are generally white or other very pale colors closely resembling white. The roofs of structures, when visible from eye level, are gray in color and finely textured. One structure includes a sign on the roof that is red with white lettering that reads "OASIS". A tall

sign is located in front of the structure. The sign post is silver and has a metallic texture. The sign face has been removed from the top of the sign post. A residential development containing numerous structures is located north of the commercial structures in Oasis, further from the interstate. These structures are surrounded by trees that obstruct their view from the Plan boundary.

Southwest of I-80 at the base of the Pequop Mountains is the Big Springs Ranch, which consists of a cluster of buildings and outbuildings with deciduous trees and unpaved roads.

The Plan boundary is located on the interface between the eastern slope of the Pequop Mountains and the western edge of Goshute Valley. While elevations in the area of analysis exceed 9,000 feet AMSL, elevations within the Plan boundary are between approximately 5,600 to 7,700 feet AMSL. Vegetation within the Plan boundary varies from pinyon pine and Utah juniper forest in the mountainous areas, to open, xeric shrubland in Goshute Valley. From most vantage points, the texture looks smooth and consistent with dark green and black coloring. Man-made features in the Plan boundary include existing mine disturbance in the form of roads, drill pads, and related machinery. There are also fences, range improvements, telephone lines, and power lines present within the area (BLM, 2011d).

**Key Observation Points**

In order to select appropriate locations for KOPs, the viewshed of the area of analysis was evaluated by BLM resource specialists to determine the areas that possess high visual quality and visual sensitivity. The area of analysis is located in a sparsely populated region of Nevada, and most readily viewed by motorists travelling at highway speeds from I-80. There are no rest areas, scenic overlooks, or other attractions in the vicinity that would create important viewing locations for large numbers of travelers. Accordingly, a single KOP, “KOP-1”, was selected for the Proposed Action.

As Figure 3.14-1 shows, KOP-1 is located on the south shoulder of the eastbound travel lane of I-80 at an existing overpass crossing of an abandoned railroad track, just west of the project boundary. The overpass is slightly elevated in relation to the surrounding length of the interstate, and thus allows for the most unobstructed view of the Plan boundary (ECA Community Planning, 2012a). The angle of view from KOP-1 is southwest across Goshute Valley, toward the Plan boundary and the east slope of the Pequop Mountains.

As the sun begins to move from the eastern sky to the western sky during the late afternoon hours, the Pequop Mountains begin to block direct sunlight and cast a shadow over the viewshed. Later in the day and into the evening hours the shadow darkens and expands further east into the viewshed because the sun continues to move towards the western horizon, gradually becoming less visible over the crest of the mountains. Consequently, the appearance of the viewshed can vary dramatically from KOP-1 depending on the time of day it is viewed. To account for this variation, the existing baseline conditions of the scenic values and aesthetic quality of the area of analysis and viewshed from the KOP are described for both morning and late-afternoon hours. The photographs that were used to describe and document the existing

conditions at KOP-1 are provided in Appendix 3E. Copies of the BLM Form 8400-4 that were completed for KOP-1 in order to document the existing landscape in terms of its form, line, color, and texture elements are also provided in Appendix 3E.

Morning Hours

The foreground-middleground zone of the landscape consists of Goshute Valley, which has a wide, flat form and no distinct line elements. Nearly the entire valley floor within view of KOP-1 is vegetated. Vegetation cover consists mostly of low shrubs and is fairly uniform because there is very little species diversity. In the immediate foreground-middleground zone area closest to KOP-1 shrubs are sparsely distributed and can be distinguished from one another. When viewed individually, each shrub has a small, generally globular form. The foliage give each shrub the appearance of a coarse dense texture and is generally a muted color consisting mostly of gray and very pale green. The gray and light tan colors of valley soils are more prominent than the vegetation colors in the area where shrubs are sparsely distributed.

Shrubs cannot be distinguished from one another in the other areas foreground-middleground zone more distant from the KOP. Instead, the shrubs appear as a collective mass of vegetation cover that has a large flat block-shaped form spanning the width of the viewshed. The color of the vegetation ranges from pale green to olive, and slight variations in the color patterns create subtle horizontal lines that weakly separate the block form into flat strips. The texture appears uniform and finely stippled due to contrast between the foliage and the shadows created by the foliage.

There are no buildings or other structures visible in the foreground-middleground zone of the viewshed. Fence posts are the only constructed addition visible in the viewshed. The fences posts are brownish-orange in color, several feet tall, and located in relatively close proximity to KOP-1. Each post has very thin, vertical form and line elements that appear bold because they contrast with globular form of the vegetation cover in the surrounding area. Although KOP-1 is located on the south shoulder of I-80, the road does not appear in the photograph because the view from the KOP is toward the southwest, away from I-80. With I-80 located only several feet from the KOP, it is easily the most prominent constructed addition in the foreground-middleground zone. The surface of the road has a bold and flat form with a distinct finely-stippled surface that is flat gray in color. The edge of the pavement on either side of the road surface creates strong curvilinear lines in the foreground-middleground zone. Road striping would also be visible, creating continuous curvilinear lines that are yellow and white in color. The curvilinear lines associated with I-80 would continue into the background zone, but become less strong as distance from the KOP increases. Road signs and mile markers may also be visible along the shoulders of I-80.

The background zone of the landscape is comprised of the east slope of the Pequop Mountains. The rugged peaks and ridges along the crest of the mountains create a jagged and irregular form and a strong irregular silhouette line against the backdrop of sky. Weak triangular-shaped forms are also created from ridgelines extending from the crest down to the floor of Goshute Valley. Vegetation in the background zone consists primarily of coniferous forest but is too far

from KOP-1 for individual trees to be distinguishable. Instead, vegetation appears as large irregular-shaped forms on the side slopes of the mountains. The vegetation is generally dark green or dark olive, but the vegetation cover in the most distant regions of the background zone appears as an ash gray color. The ash gray color is an effect of increased viewing distance from the KOP. The chroma of a color, which is essentially the purity of a color, generally decreases as the distance from which it is viewed increases. Low chroma colors appear dull and grayish while high chroma colors appear vibrant and intense. Vegetation cover is absent on some of the highest peaks and the slate gray color of the soils and rocks are visible, and is also low chroma.

There are no buildings or other structures visible in the background zone. Several trees are barely distinguishable at the border between the foreground-middleground and background zones, indicating the location of the Big Springs Ranch. However, none of the existing structures at the ranch are distinguishable from KOP-1. Existing unpaved roads are visible at several locations along the base and on the slopes of the Pequop Mountains. The existing roads at the base of the mountains are barely distinguishable, and appear only as thin horizontal lines that are light tan in color. Roads on the slopes of the Pequop Mountains include numerous switchbacks and have zigzagging to irregular shaped forms and thin, non-directional. These lines and forms are relatively distinguishable because they are unlike the other forms and line elements in the background zone.

The seldom-seen zone consists of the areas within the foreground-middleground and background zones that are typically hidden from view. Because the KOP is located on the floor of a wide, open valley, there are not any areas typically hidden from view in the foreground-middleground zone. In the background zone, there are some canyon areas in the Pequop Mountains, such as Long Canyon, that are hidden from view of KOP-1. Existing unpaved roads are located in some canyon areas. Canyon areas and any roads that may be within them would appear very similar to the mountains and existing unpaved roads that occur in the background zone. The west slope of the Pequop Mountains is also hidden from view of KOP-1, and therefore part of the seldom-seen zone. The west slope of the Pequop Mountains would appear very similar to the east slope, which is visible from the KOP. During summer months, the west slope would have direct sunlight for many more hours than the east slope.

Late-Afternoon Hours

Although the time of day can have dramatic effects on the appearance of the overall viewshed, it has no effect on the flat, wide form element of Goshute Valley, the dominant land feature in the foreground-middleground zone. In the few places where the color of the valley soils is visible, the color appears to be light tan but slightly darker than during morning hours. Ridgelines rising from the valley floor to the crest of the Pequop Mountains are not visible in the shadows of the late-afternoon hours. Accordingly, the weak triangular-shaped forms associated with these ridgelines are not visible like they are during the morning hours. The strong irregular silhouette line formed from the rugged crest of the Pequop Mountains against the backdrop of sky is visible and appears the same as during morning hours. Where visible, the color of the land features in the background zone is dark gray and low chroma. In some areas, the gray is

so dark and low chroma that is nearly indistinguishable from the color of the surrounding vegetation cover.

The appearance of the vegetation in the foreground-middleground zone would not be meaningfully different during the late-afternoon hours than as described for the morning hours. Vegetation in the background zone remains indistinguishable during the late afternoon hours and continues to appear as irregular-shaped forms on the east slope of the Pequop Mountains. However, the color of the vegetation appears as varying shades of dark gray across the entire background zone due to reduced chroma as a result of less direct sunlight during the late afternoon hours.

As described above, there are no buildings or other structures visible in the foreground-middleground or background zones of the viewshed. The section of wire fence visible in the immediate foreground-middleground zone appears the same in the late-afternoon hours as described for the morning hours. Although I-80 is not visible in the KOP photograph, the flat gray color and finely-stippled texture of the road surface would not be expected to appear any different during the late-afternoon hours than described for the morning hours.

The trees that mark the location of the Big Springs Ranch are not distinguishable during the late-afternoon hours. The existing structures at the ranch are also not visible during the late-afternoon hours. Existing unpaved roads in the background zone are visible but contrast less with the surrounding vegetation cover on the Pequop Mountains than during the morning hours. This is due to the color of the road and the vegetation being of lower chroma during the late-afternoon hours.

**Power Supply Pipeline**

According to the BLM Visual Resource Management Areas GIS data (BLM, 2002), the majority of the BLM-administered public lands within the area of analysis have been assigned to VRM Class IV. However, the pipeline would cross BLM-administered public lands that have been designated as VRM Class II and Class III at several isolated locations, as shown on Figure 3.14-1. Additionally, the segment of the proposed pipeline within approximately 1.5 miles of each side of I-80 is located within the "Low Visibility Corridor. Within the Low Visibility Corridor, visual resources are managed using VRM Class II objectives. The VRM Class designations within the area of analysis and the Low Visibility Corridor are shown on Figure 3.14-1. The objectives of these VRM classes are presented in Table 3.14-1.

**Characteristic Landscape**

The segment of the proposed pipeline south of I-80 and the first approximately 14 miles of the pipeline north of I-80 are located within the area of analysis for the mining and processing facilities area. Thus, the characteristic landscape within this area is the same as described for the mining and processing facilities area. North of this area, the pipeline would be located next to State Highway 233 until reaching Montello. The paved road surface of State Highway 233 would dominate the landscape within this portion of the area of analysis. The edge of pavement would create a continuous line that varies from straight to curvilinear. The color of the road

surface is gray, and the texture is finely stippled. Vegetation next to the road would be expected to consist of xeric shrub and grass vegetation that is very similar to vegetation within the area of analysis for the mining and processing facilities area. Segments of an existing railroad track and sections of existing overhead utility lines would also be visible from this portion of the area of analysis. State Highway 233 would continue to be a dominant feature in the landscape of the area of analysis in Montello; however, commercial and residential structures in the town would also dominate the landscape. Vehicles and signage associated with the structures in Montello would also be visible, as would sections of the existing railroad tracks and other secondary streets and roads in the area.

The characteristic landscape between Montello and the northern end of the area of analysis would appear similar to characteristic landscape south of Montello. An existing unpaved road, County Road 765, would dominate the landscape within the majority of this portion of the area of analysis. The southern portion of this area, closest to Montello, would be located in a valley with mountains visible in the distance. The northern end would be located in mountains until ending at the existing Ruby Pipeline.

**Cities' Water Supply**

As Figure 3.14-1 shows, the area of analysis for the Cities' water supply wells contains BLM-administered public lands that have been designated to VRM Class III and IV (BLM, 2002). The area where the water supply would actually be constructed and located during operations has been designated as VRM Class III. The objectives of the BLM VRM Class III and IV are listed in Table 3.14-1.

**Characteristic Landscape**

The characteristic landscape within the area of analysis is the same as the characteristic landscape described for the Proposed Action.

### 3.14.3.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as the area of analysis described for the Proposed Action. Accordingly, the BLM VRM Classes assigned the area of analysis for the Proposed Action, as previously described, are also applicable to the North Facilities Alternative. These VRM Classes are shown on Figure 3.14-1. Because the area of analysis for this alternative and the Proposed Action are the same, the characteristic landscape described for the Proposed Action is also the characteristic landscape for the North Facilities Alternative.

**Key Observation Points**

Because the area of analysis for the North Facilities Alternative is the same as the area of analysis for the Proposed Action, it is also most readily viewed by motorists travelling at highway speeds on I-80. With no rest areas, scenic overlooks, or other attractions in the vicinity that would create important viewing locations for large numbers of travelers, a single KOP, "KOP-2", was selected for the North Facilities Alternative. Like KOP-1, KOP-2 is also located on

the south shoulder of the eastbound travel lane of I-80, but is positioned at mile post 381, approximately one mile east of KOP-1 (Figure 3.14-1). Located farther east of the area of analysis than KOP-1 also places KOP-2 farther south and this causes the angle of view towards the Plan boundary to be more westerly than southwest. A viewing angle closer to west than southwest allows for northern portions of the Plan boundary to be included in the viewshed of the KOP. This is appropriate for the North Facilities Alternative because several of the proposed project components would be located farther north, nearer to I-80 than under the Proposed Action.

To account for variation in the appearance of the viewshed from KOP-2, the existing baseline conditions of the scenic values and aesthetic quality of the area of analysis and viewshed are described for both morning and late-afternoon hours. The photographs that were used to describe and document the existing conditions at KOP-2 are provided in Appendix 3E. Copies of the BLM Form 8400-4 that were completed for KOP-2 in order to document the existing landscape are also provided in Appendix 3E.

Morning Hours

The foreground-middleground zone consists of Goshute Valley. In the immediate foreground-middleground zone area closest to KOP-2, a gently rolling hill rises slightly above the surrounding valley floor. The hill contributes a faint and rounded form to foreground-middleground zone, which is otherwise characterized by wide horizontal form of the flat valley. The color and texture elements that dominate the foreground-middleground zone are associated vegetation cover consisting of dense low shrubs. The vegetation cover is fairly uniform because there is very little species diversity. However, shrubs along the shoulder of I-80, directly adjacent to KOP-2 are taller and each shrub has an apparent form that is generally globular in shape. These shrubs are pale green and green in color due to their foliage, which also gives each the appearance of a coarse dense texture.

Shrubs cannot be distinguished from one another as the distance from the KOP increases and the view transitions into more distant areas of the foreground-middleground zone. Instead, the shrubs appear as a collective mass that has a large wide block-shaped form that spans the width of the viewshed. The color of the vegetation in this area is generally either light gray, gray, or tan. Slight variations in the distribution of these colors create subtle horizontal lines that weakly separate the block form into flat strips. The texture appears finely stippled due to contrast between the foliage and the shadows created by the foliage.

There are no buildings or other structures in the foreground-middleground zone that are visible from KOP-2. Fence posts are the only constructed addition to the landscape visible in this zone. The fences posts are brownish-orange in color, several feet tall, and located in relatively close proximity to KOP-2. Each post has very thin, vertical form and line elements that appear bold because they contrast with globular form of the vegetation cover in the surrounding area. While KOP-2 is located on the south shoulder of I-80, the road does not appear in the photograph because the view from the KOP is toward the southwest, away from I-80. With I-80

located only several feet from the KOP, it is easily the most prominent constructed addition in the foreground-middleground zone. The form, line, color, and texture elements associated with I-80 are the same as described for KOP-1 under the Proposed Action.

The background zone is comprised of the east slope of the Pequop Mountains. The crest of the mountains is marked by rugged peaks and ridges, which create a jagged and irregular form and a strong irregular silhouette line against the backdrop of the sky. Ridgelines between peaks and the floor of Goshute Valley result in weak triangular-shaped forms. A strong horizontal line is formed where the flat valley flood and base of the mountains meet.

Individual trees comprising the coniferous vegetation that covers most of the Pequop Mountains cannot be distinguished from KOP-2. Instead, vegetation appears as large irregular-shaped forms that are generally dark green or dark olive in color. In the most distant areas of the background zone, vegetation cover appears as an ash gray color due to reduced chroma. Where vegetation cover is absent on some of the highest peaks of the mountains, the tan and slate gray color of soils and rocks are visible, and also appear to have low chroma.

There are no buildings or other structures visible in the background zone of the viewshed. The existing unpaved roads that are visible along the base and slopes of the Pequop Mountains from KOP-1 are also visible from KOP-2. The form, line, color, and texture elements of the roads appear the same from KOP-2 as described for KOP-1 under the Proposed Action. The seldom-seen zone of KOP-2 consists of the west slope of the Pequop Mountains and canyon areas on the east slope. Thus, the appearance of the seldom-seen zone of KOP-2 would be the same as the seldom-seen zone described for KOP-1 under the Proposed Action.

Late-Afternoon Hours

The time of day and amount of direct sunlight have no effect on the form elements of the foreground-middleground zone. The weak triangular forms in the background zone are not visible in the late-afternoon hours because individual ridgelines rising up from the valley floor are not distinguishable. The strong irregular silhouette line formed from the rugged crest of the Pequop Mountains against the backdrop of sky is visible and appears the same as during morning hours, only stronger. The smoky haze in the atmosphere, due to wildland fires at the time the photograph was taken, prevents any colors in the background zone from being visible from KOP-2. However, under normal conditions the slate gray and tan color of the Pequop Mountains would become darker during late-afternoon hours.

The form, line, and texture elements of the vegetation cover in the foreground-middleground zone is not be meaningfully different during the late-afternoon hours than as described for the morning hours. The gray and tan color of the vegetation cover during morning hours is generally either brown and olive during the late-afternoon. Vegetation in the background zone is not visible in the photograph from KOP-2 during the late-afternoon hours due to wildfire smoke. Without wildfire smoke, it is reasonable to assume that vegetation cover would appear

much the same as described for KOP-1, which was photographed when there was no smoke in Goshute Valley.

As described above, there are no buildings or other structures visible in the foreground-middleground or background zones of the viewshed. The section of wire fence visible in the immediate foreground-middleground zone appears the same in the late-afternoon hours as described for the morning hours. Although I-80 is not visible in the KOP photograph, the surface of the road would not be expected to appear any different during the late-afternoon hours than described for the morning hours except that it would be a darker shade of gray. The existing unpaved roads in the background zone are not visible in the KOP photograph because of wildfire smoke. Under normal conditions, smoke is not present in Goshute Valley, the color of the roads would be darker during late-afternoon hours and the chroma would be reduced.

#### 3.14.3.3 No Action Alternative

The area of analysis for the No Action Alternative is contained completely within the Plan boundary, and thus the boundary of the area of analysis described for the mining and processing facilities area under the Proposed Action. Accordingly, the VRM Classes and characteristic landscape described for the mining and processing facilities area under the Proposed Action are also applicable to the No Action Alternative. However, unlike the Proposed Action, the No Action Alternative area of analysis does not include any portion of the "Low Visibility Corridor" associated with I-80.

## 3.15 Recreation

This section identifies and describes the affected environment in terms of the recreation resources within the area of analysis for each alternative.

### 3.15.1 Areas of Analysis

#### 3.15.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for the Proposed Action corresponds to the boundaries of NDOW hunt unit 78 and the power supply pipeline corridor north of I-80 (Figure 3.15-1). Hunt unit 78 is bound on the north by I-80, on the east and south by existing Union Pacific Railroad tracks, and to the west by the West Independence Valley Road (NDOW, 2012b).

**Power Supply Pipeline**

The area of analysis is the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

The area of analysis is the same for the Cities' water supply as for the mining and processing facilities area.

**Figure 3.15-1 Area of Analysis, Recreation**

#### 3.15.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as the area of analysis for the Proposed Action.

#### 3.15.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the authorized Plan boundary and proposed Plan expansion boundary in the Expanded Long Canyon Exploration Project EA, Elko County, Nevada, Environmental Assessment (BLM, 2011d).

### 3.15.2 Data Sources and Methodology

#### 3.15.2.1 Proposed Action

**Mining and Processing Facilities**

The sources of data and information used to characterize and describe the existing conditions of the recreation resources within the area of analysis include the:

- Bureau of Land Management (BLM). 1984. Proposed Wells Resource Management Plan and Final Environmental Impact Statement. November 1983;
- Bureau of Land Management (BLM). 1985. Record of Decision: Wells Resource Management Plan: Wells Resource Area. July 1985;
- Bureau of Land Management (BLM). 2011d. Expanded Long Canyon Exploration Project, Elko County, Nevada, Environmental Assessment. June 2011; and
- ECA Community Planning. 2012a. Long Canyon Project: Baseline Report: Visual Resources, Land Use, and Recreation. Unpublished document.

Other sources that were used include BLM GIS data and the map of NDOW hunt unit boundaries (NDOW, 2012b). Information and data obtained from these sources is available to the public.

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.15.2.2 North Facilities Alternative

The sources of data and information that were used for the Proposed Action were also used to characterize and describe the existing conditions of the recreation resources within the area of analysis for the North Facilities Alternative.

#### 3.15.2.3 No Action Alternative

The sources of data and information that were used for the Proposed Action were also used to characterize and describe the existing conditions of the recreation resources within the area of analysis for the No Action Alternative.

### 3.15.3 Existing Conditions

#### 3.15.3.1 Proposed Action

**Mining and Processing Facilities**

Recreation on the BLM-administered public lands within the area of analysis is managed in accordance with the Proposed Wells RMP and Final Environmental Impact Statement (BLM, 1984) and the associated Record of Decision (BLM, 1985). Management objectives in the Record of Decision direct the BLM to "provide for a wide range of recreation opportunities" within the Wells planning area. Management actions specify that BLM-administered public lands should be managed for dispersed recreation except for select areas that have been designated as a Special Recreation Management Area or Recreation Area of Management Concern (BLM, 1985).

Management of recreation within the area of analysis is also guided by the State Comprehensive Outdoor Recreation Plan (SCORP) (Nevada Division of State Parks, 2010), and the Elko County General Open Space Plan (Elko County, 2003). The SCORP provides a review and assessment of the outdoor recreation opportunities present in Nevada, and provides a framework for improving and expanding these opportunities. The primary purpose of the SCORP is to enhance the outdoor recreation opportunities in Nevada by maintaining existing recreation resources, expanding outdoor recreation resources, ensuring a high-quality experience for outdoor recreation participants, and encouraging greater participation in outdoor recreation (Nevada Division of State Parks, 2010). The Elko County General Open Space Plan (Elko County, 2003) promotes dispersed recreation opportunities on public lands and improved access across private land to reach public recreation resources. One goal of the plan is to develop working agreements with federal land management agencies to preserve, maintain, and promote existing and future mining. The identification and designation of areas of existing mining activity and potential areas of future mining activity is included as a recommendation in the plan (Elko County, 2003). According to the Elko County General Open Space Plan (Elko County, 2003), dispersed recreational use of BLM-administered public lands in the county is increasing, while use of developed recreational sites is decreasing.

There are no developed recreational facilities or sites located within the Plan boundary. There are also no BLM-designated Special Recreation Management Areas or Recreation Areas of Management Concern within the Plan boundary. Due to the absence of developed recreation sites and BLM-designated areas, recreational use of the public lands within the area of analysis is dispersed in nature. Recreational activities occurring within the area of analysis include hunting, off-highway vehicle (OHV) and motorcycle use, mountain biking, sightseeing, hiking, camping, snowshoeing, skiing, snowmobiling, gathering shed antlers, and cutting Christmas trees. Most of these activities occur in association with the numerous trails and unimproved roads that are found throughout the area of analysis, particularly within the Pequop Mountains

(ECA Community Planning, 2012a). According to the Record of Decision: Wells Resource Management Plan: Wells Resource Area (BLM, 1985), lands within the area of analysis are considered open for OHV use.

The BLM Recreation Setting Characteristic Matrix is used to define the recreation setting of an area, and thus that area's capability and suitability for providing a particular range of recreational experiences. The recreation setting is determined based on three components or parameters: physical, social, and operational. The level of visitor services, management controls, and evidence of use within the Plan boundary and the area of analysis would best be classified as a Back Country Setting according to the BLM Recreation Setting Characteristics Matrix. However, motorized use of the existing roads and trails in the area, and minor modifications to the characteristic landscape of the area would be consistent with the Middle Country Recreation Setting of the matrix (BLM, 2010b). Encounters among users typically range between seven to 15 per day on roads, but less than three off the main travel ways (BLM, 2011a). Most recreation users are from the Elko and Wells communities or own private land in the Pequop area (BLM, 2011a).

The dispersed nature of recreation activities within the Plan boundary precludes availability of any specific user data for individual recreation activities except for hunting. Hunting for big game and other species has historically been a major recreational activity in the Plan boundary (ECA Community Planning, 2012a). Mule deer, pronghorn antelope, and elk are the predominant big game species sought by hunters. Big game harvests vary from season to season depending on the game population, number of hunters, and other environmental factors that may affect hunting, such as extended periods of inclement weather during a hunting season. However, according to the Long Canyon Project: Baseline Report: Visual Resources, Land Use, and Recreation (ECA Community Planning, 2012a), an average of 23 tags was sold and 11 deer were harvested in hunt unit 78 per year between 2004 and 2010. This is equivalent to an approximately 48 percent hunter success rate. During this same period, an average of six pronghorn antelope and three elk were harvested annually within the area of analysis (ECA Community Planning, 2012a). The area of analysis is also reported to be used by hunters targeting upland game species, such as chukar and dusky grouse, and furbearers, such as mountain lion, and coyote (ECA Community Planning, 2012a). County Road 790, which provides the primary access to the Plan boundary from I-80, is often used by hunters (BLM, 2011d).

Although specific user data is unavailable for other activities, mountain biking is known to be a particularly popular recreation activity associated with the existing roads and trails found throughout the area of analysis. A series of mountain bike races were held in the area of analysis during the early 2000s. Some of the existing roads and trails within and near the Plan boundary, such as the roads in Long Canyon and Six Mile Canyon, were part of established race courses (ECA Community Planning, 2012a). Despite organized races not being held in more recent years, individual cyclists and mountain bike clubs continue to use the area. Motorcycle races have also occurred on the existing roads and trails in the area of analysis,

including South Ridgeline Road and the trail following the ridgeline of the Pequop Mountains (ECA Community Planning, 2012a).

Christmas-tree cutting is a popular recreational activity within the area of analysis during the months of November and December. Participants are required to obtain a permit from the USFS in order to harvest Christmas trees on the National Forest or from the BLM in order to harvest trees on BLM-administered public lands. The BLM permit allows Christmas trees to be harvested from any BLM-administered public lands other than WSAs; however, the BLM provides maps with recommended tree cutting areas (BLM, 2012a). There are approximately 6,146 acres of recommended Christmas tree cutting areas within the boundary of the Plan boundary due to the quality of the trees and their proximity to roads (ECA Community Planning, 2012a).

**Power Supply Pipeline**

Recreation management within the area of analysis for the power supply pipeline is governed by the same plans and regulations described for the mining and processing facilities area. However, the area of analysis for the power supply pipeline is linear and relatively narrow, which limits its potential for recreational use. There are numerous existing roads and trails that cross the area that may be used for OHV and motorcycle use, or for access to public lands located outside of the area of analysis.

**Cities' Water Supply**

Recreation management is the same for the Cities' water supply analysis area as for the mining and processing facilities area.

#### 3.15.3.2 North Facilities Alternative

Recreation management and the existing conditions of the recreation resources within the area of analysis for the North Facilities Alternative are the same as those described for the Proposed Action.

#### 3.15.3.3 No Action Alternative

Recreation management within the area of analysis for the No Action Alternative is governed by the same plans and regulations described for the Proposed Action. Recreational use within the area of analysis is dispersed in nature and consists mainly of hunting, OHV and motorcycle use, mountain biking, and cutting Christmas trees. There are no developed recreational sites located within or near the area of analysis; however, there are established mountain bike and motorcycle race course routes within and adjacent to the area. Most recreational users are from the local communities of Elko and Wells or own private lands in the Pequop Mountains. The physical and social setting of the area is generally backcountry with a naturally appearing landscape, no obvious major roads, and between seven to 15 encounters per day on roads but three or fewer encounters off of the main travel ways (BLM, 2011a).

## 3.16 Socioeconomics

### 3.16.1 Area of Analysis

#### 3.16.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis is the area within which the socioeconomic impacts are expected to be most directly realized. Based on the location of the Plan boundary, likely location of employees, project-related commercial transactions, and shared resources such as water, the following key municipalities have been identified as potentially affected communities.

- Elko, Nevada;
- Wells, Nevada;
- West Wendover, Nevada; and
- Wendover, Utah.

Others in the adjacent area include:

- The Wells Colony, a federally-recognized reservation of the Wells Band located west of Wells;
- The Elko Colony, the reservation of the Elko Band adjacent to Elko; and
- Smaller neighboring communities (specifically Oasis and Montello) and ranches with grazing allotments in unincorporated portions of Elko County.

Accordingly, the area of analysis for social and economic values is defined as the I-80 corridor from Elko through Wendover, Utah, including the project site (Figure 1.3-1). The suburban communities (e.g., Spring Creek) of the key municipalities identified here are considered within the Elko County statistics.

While Wendover is in Tooele County, Utah, it is located more than 100 miles from Tooele (the nearest significant population center in the county) and is immediately adjacent to, and more closely tied economically with West Wendover, Nevada. The socioeconomic analysis generally compares Wendover's demographic and other social baseline data against Elko County, Nevada and the state of Nevada as a whole rather than Tooele County and the state of Utah. Exceptions to this approach include school capacity and public safety.

**Power Supply Pipeline**

The area of analysis is the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

The area of analysis is the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.16.1.2 North Facilities Alternative

The area of analysis under the North Facilities Alternative is the same as that for the Proposed Action.

#### 3.16.1.3 No Action Alternative

The area of analysis under the No Action Alternative is the same as that for the Proposed Action.

### 3.16.2 Data Sources and Methodology

#### 3.16.2.1 Proposed Action

**Mining and Processing Facilities**

The baseline indicators used to describe existing socioeconomic conditions in the area of analysis include population, housing, demographics, economic conditions, community facilities and services, and fiscal conditions. The indicators are derived from publicly-available data gathered and disseminated by federal, state, and local agencies as well as key informant interviews, as noted in this section, and a report titled *Economic Impacts Analysis: Long Canyon Project*, prepared for Newmont by ERM (2013).

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.16.2.2 North Facilities Alternative

The data sources and methodologies for the North Facilities Alterative are the same as for the Proposed Action.

#### 3.16.2.3 No Action Alternative

The data sources and methodologies for the No Action Alternative are the same as for the Proposed Action.

### 3.16.3 Existing Conditions

#### 3.16.3.1 Proposed Action

**Mining and Processing Facilities**

**Social and Economic Setting**

Elko County was established in 1869. With a 2010 population of 48,818, Elko is the fifth most populated county in Nevada (USCB, 2010a). Based on area, Elko is the fourth largest county in the contiguous United States. Elko is the county seat and largest community in the county. Wells is located east of Elko. West Wendover sits on the eastern border of Nevada, contiguous

with Wendover, Utah. The Elko Band Colony is located in northeastern Nevada adjacent to Elko. The Wells Band Colony is located in northeastern Nevada just west of Wells.

Elko County lies in the Great Basin of northeastern Nevada. This basin is home to large ranches that are part of the American cattle industry. In 2007, there were 456 active farms and ranches in Elko with 2.0 million acres under management. The county is the biggest producer of cattle and calves in the state, with 29.3 percent of total state production (Nevada Agriculture, 2013).

Elko was founded in 1868, one year before Elko County was formally established. Soon after its founding, the city became a critical distribution point for the Central Pacific Railroad and quickly established itself as a central business hub for Elko County. Mining operations played a significant role in the expanding economy. From 1879 through 1896, the county produced $1,017,051 in lode gold. In addition, considerable amounts of placer gold were mined at Tuscarora and surrounding areas (Koschmann and Bergendahl, 1968).

In the early 1900s, the city boomed, largely the result of simultaneous construction of the Western Pacific Railroad and the development of nearby towns such as Jarbidge, Gold Creek, and Midas. Surging prices for commodities (beef and wool) fortified the ranching industry. Elko flourished until 1932 when the Great Depression hurt the local economy. While the economy gradually recovered as a result of livestock production and depression stimulus programs, the city's real recovery began in 1945 with the passage of a bill by the state legislature that enforced rules governing gaming. Portions of gaming revenues were channeled to infrastructure, contributing to the economy of Elko as well as to the rest of the state (ONE, 2013a).

Elko's economy has remained relatively healthy, as the town still serves as the business hub for much of northeastern Nevada. While shipping, livestock, gaming, and mining are central to the city's economy, Elko benefits from a substantial mining industry that employ thousands of people (ONE, 2013a).

Wells began as a place called Humboldt Wells along the trail to California. In 1873, the town officially shortened its name to Wells. When the Central Pacific Railroad arrived in 1869, it found Wells to be a useful stopping point. Wells enjoyed moderate success between 1872 and 1876 as local businesses served miners, settlers, ranchers, and railroad employees. Two major fires, one in 1877 and the other in 1881, delivered a blow to the city's economy, compounded by the boom and busts in the mining town of Cherry Creek to the south (ONE, 2013b).

The economic revival that began with arrival of the Western Pacific Railroad in 1908 and the Oregon Short Line in 1926 was short-lived. By 1940, diesel locomotives replaced steam engines and Wells lost its status as a helper station. In the 1970s, the Oregon Short Line ceased operations, ending railroading as an important component in the Wells economy (ONE, 2013b). Wells sits at the cross roads of I-80 and U.S. Highway 93 and is therefore currently very active with transportation services and vehicular traffic. Many seasonal travelers frequent the area to travel from the north to south in the spring and south to north in the fall. Because of

this dependency on traffic, when the interstate bypassed the downtown in the early 1980s, there was a significant negative impact on the area.

In 2008, an earthquake with a magnitude measuring 6.0 occurred northeast of Wells, devastating the town's historic Front Street and damaging more than half of the town's non-residential structures (ONE, 2013b). As part of the ongoing rebuilding efforts, the city has developed a 160-acre Industrial Park located adjacent to the municipal airport in order to foster new business relocation and economic development (Wells Chamber of Commerce, 2013).

Wendover, Utah, was established by officials of the Western Pacific Railroad as a watering station in 1907. Although it was first established in Utah, the town quickly spread into Nevada. Distinguishing West Wendover from its eastern counterpart in Utah became important in the 1930s with the introduction of legalized gambling in Nevada. In 1932, business partners William Smith and Herman Eckstein expanded their hotel and restaurant to include gaming, starting a trend that established the future development of West Wendover (ONE, 2013c).

Until the Great Recession of 2007, West Wendover was a flourishing gaming community with casinos catering to cross-country travelers as well as to residents in neighboring Utah, which account for 85 percent of the city's tourism. According to information reported by the Northeastern Nevada Regional Development Authority, West Wendover receives upwards of 25,000 visitors per weekend (NNRDA, 2013). The recession dampened the gaming industry in West Wendover and resulted in both job losses and population declines, but by 2011, the gaming industry had started to rebound, spurred by Utah's economic recovery.

The Elko and Wells colonies are two of four separate colonies that comprise the Te-Moak Tribe of Western Shoshone Indians. Shoshone Tribes have lived in the area for more than 10,000 years.

The Elko Colony was established by an EO in March 1918, which reserved 160 acres for Shoshone and Paiute Indians living near Elko. Today, the reservation encompasses 192.8 non-contiguous acres adjacent to Elko.

When the Central Pacific Railroad founded Elko in 1868, many Shoshone families began camping nearby working at mining and railroad jobs. For almost half a century, they lived in a series of camps in the Elko area, but moved to the reservation in 1931. Since Elko is the largest city in northeastern Nevada, many Shoshones have continued to be employed there for railroad and mining work. Many tribal members also work at seasonal agricultural and ranching jobs throughout the region (TTWS, 2013).

The Wells Band of Western Shoshone resides on an 80-acre reservation established in October 1977. Members of the Wells Band (Newe) are descendants of several Newe bands that hunted and gathered throughout the valleys near present day Wells. The arrival of Euro-Americans in the middle 19th century ended the Newe's semi-nomadic lifestyle (TTWS, 2013).

Newe people lived and worked in Wells from its beginning as a railroad station. For many years, the Wells-area Newe languished due to an insufficient land base, low wages, and poor living conditions. Since then, the Te-Moak and Wells bands have worked to improve conditions at the Wells Colony by supplementing the land base with acreage from BLM and improving on-reservation facilities (TTWS, 2013).

The economy of the Plan boundary is the sum of its communities. As demonstrated by the foregoing, Elko County has a diversified economy built on mining, transportation, ranching, and tourism and a rich cultural heritage. Residents of Elko have chosen to live in the region because they enjoy the quality of life, aesthetics, and recreational opportunities (City of Elko, 2011a).

Population

Table 3.16-1 summarizes population data for Plan boundary communities. From 2000 to 2010, three municipalities within the area of analysis lost population (Wells, West Wendover, and Wendover) as did the Elko Colony. The largest declines occurred in West Wendover and Wendover. These declines coincided with the beginning of the Great Recession, which hit West Wendover's gaming industry. Casinos in West Wendover started cutting their workforces in 2007, which contributed to the 6.6 percent decline in population reported for the period 2000-2010. West Wendover's economic woes were also experienced by Wendover, Utah, which suffered a population decline of almost nine percent from 2000 to 2010.

Despite these losses, the county-wide population increase during this period was 7.8 percent, driven by population growth in Elko. In 2010, Elko County's population was 48,818, of which more than one-third lived in Elko. The stability in the Elko population base is the result of high gold prices, mining activities, and a relatively diversified economy.

**Table 3.16-1 Population Characteristic of the Area of Analysis**

| Area | Population 2000[1] | Population 2010[2] | Average Annual Percent Change 2000-2010 | Projected Population 2020[3] | Average Annual Percent Change 2010-2020 |
|---|---|---|---|---|---|
| Elko | 16,708 | 18,297 | 0.9 | n/a | n/a |
| Elko Colony | 729 | 653 | -1.0 | n/a | n/a |
| Wells | 1,346 | 1,292 | -0.4 | n/a | n/a |
| Wells Colony | 54 | 70 | 2.3 | n/a | n/a |
| West Wendover | 4,721 | 4,410 | -0.6 | n/a | n/a |
| Wendover, UT | 1,537 | 1,400 | -0.9 | n/a | n/a |
| Elko County | 45,291 | 48,818 | 0.8 | 63,952 | 3.1% |
| State of Nevada | 1,998,257 | 2,700,551 | 3.5 | 3,024,624 | 1.2% |

[1]Sources: USCB, 2000
[2]Source: USCB, 2010a
[3]Population projections for the state of Nevada and Elko County were calculated using projected growth rates developed by the Nevada State Demographer's Office (NSDO). NSDO develops population projections at the state and county level so no estimates are available for municipalities and colonies within the area of analysis.

NSDO projects that Elko County's population is projected to grow by approximately 3.1 percent by 2020, reaching 63,952. This is higher than the 1.2 percent population growth anticipated throughout Nevada (NSDO, 2011).[1]

Housing

Table 3-16.2 summarizes key housing data for the area of analysis communities. At the time of the 2010 census, Elko had the largest stock of housing units in the area of analysis (7,221), but a very low vacancy rate and a relatively small supply of rental housing units. In 2010, 40.5 percent of all housing units in Elko were occupied by renters, with an additional 203 units vacant and available for rent. At 6.9 percent, rental vacancies in Elko are the lowest in the area of analysis. This reflects the housing demands generated by existing business and mining activities to the west of Elko.

During 2012 and 2013 additional housing was constructed in Elko, including single family and multifamily residential units. Four single-family subdivisions, and one large, multifamily residential unit are also currently under construction and plans for additional subdivisions, multifamily residential projects and a hotel have been approved for construction (City of Elko, 2014).

Rental vacancy rates in the area of analysis varied geographically, ranging from a low of 6.9 percent in Elko to a high of 18.3 percent in Wendover, Utah, a rate significantly higher than the rate for Elko County and the state as a whole. Wells also had a rental vacancy rate that exceeded those of both the county and the state.

The low non-seasonal vacancy rates in Elko and Elko County correspond to the strength of the mining industry in northern Nevada. As the only large city in the region, Elko is a desirable location for workers in the mining industry and industries affiliated with mining.

Most existing significant gold mines are to the west of Elko, so communities such as Wells and the Wendover area have not garnered the same level of industry-related demand. As shown in Table 3.16-2, Wells, Wendover, and West Wendover have some available housing stock. Wells has identified additional lands for future residential development, and has also extended (or developed lands to extend) utilities to these properties. In some cases, these new housing areas are outside of Wells' municipal boundaries; the city will require annexation as a condition of utility (water and sewer) connection (Supp, J., 2011 in ERM, 2012).

Elko County has a slightly higher share of owner-occupied housing units (68% versus 58.8%) and a much lower vacancy rate than the state (7.6% versus 11.5%). Rental vacancies are also lower in Elko County than the state (10.2% versus 13.0%).

[1] The NSDO projections used baseline (2010) populations that substantially exceed the U.S. Census totals. Thus, the NSDO growth rates have been applied to 2010 Census totals to obtain the projections described in this section.

More than half of the units in West Wendover, Nevada and Wendover, Utah are renter-occupied, compared to the 36.1 percent in Wells and 32 percent for the county overall.

The homeowner vacancy rates in the area of analysis ranged from a high of 3.6 percent in West Wendover to a low of 0.9 percent in Elko. The rate for of Nevada was 5.2 percent. This suggests a tight housing market for owner-occupied units.

Contract rents are highest in Elko ($739 per month) and lowest in Elko Colony ($309), but are generally lower across the area of analysis than in Nevada as a whole. Similarly, the median value of owner-occupied housing is lower in the area of analysis than in the state as a whole. Median housing values are highest in Elko ($196,300) and lowest in Elko Colony ($72,700), indicating a higher demand for housing in Elko than in other cities within the area of analysis.

Short-term housing opportunities are available in the area of analysis. Elko has 31 motels, hotels, and casinos (1,890 rooms), several mobile home parks and seven recreational vehicle (RV) parks (518 spaces) (City of Elko, 2014). There are also several campgrounds in the area. Wells has six motels and four RV parks. Wendover and West Wendover have 13 casinos and hotels, which host more than 2,000 rooms (NCT, 2013; Trip Advisor, 2013).

**Economic Conditions**

Employment and Wages

Table 3-16.3 shows employment by place of work in Elko County broken down by major industry and compares employment in the county with statewide employment in the same sectors.[2] These employment numbers are based on place of work, not place of residence.

In 2011, employment in Elko County was concentrated in leisure and hospitality (which includes the county's substantial casino and hospitality industry). Trade, transportation and utilities (primarily retail trade), and mining (primarily metal mining and supporting activities for metal mining) are the other large industry sectors as defined by employment (NDETR, 2013).

Mining employment averaged 2,537, comprising 11.4 percent of all non-agricultural employment in the county in 2011 and 18 percent of total state employment in that industry sector. Large mining companies in Elko include Newmont Mining Corporation and Barrick Gold Corporation.

As measured by wages, the Elko economy is far more dependent on mining than any other industry sector. Although the leisure and hospitality industry in the county accounts for about 26 percent of all employment in the county, it provides just 13 percent of total wages (Table 3-16.4). In contrast, mining comprises 21.8 percent of all non-agricultural wages in the county.

[2] Employment data from the Bureau of Labor Statistics are available for counties and states. Therefore, only county-level data are used in this section of the baseline analysis. Because most of the population in the study area is concentrated in Elko County, the analysis of employment in Elko County is an appropriate representation of employment in the study area. Tooele County's data are available, but are not included in this analysis.

**Table 3.16-2 Area of Analysis Area Housing Characteristics: 2010**

| Housing Characteristics | Elko | Elko Colony | Wells | Wells Colony | West Wendover | Wendover | Elko County | Nevada |
|---|---|---|---|---|---|---|---|---|
| Housing Units | 7,221 | 260 | 641 | 27 | 1,504 | 589 | 19,566 | 1,173,814 |
| Occupied Housing Units | 6,743 | 260 | 545 | 27 | 1,354 | 486 | 17,442 | 1,006,250 |
| Percent of Total Units | 93.4% | 100% | 85.0% | 100% | 90.0% | 82.5% | 89.1% | 85.7% |
| | | | | | | | | |
| Occupied Housing Units | **6,743** | **260** | **641** | **27** | **1,354** | **589** | **11,857** | **1,006,250** |
| Owner-occupied Units | 4,012 | 207 | 348 | 14 | 668 | 134 | 11,857 | 591,480 |
| Owner-occupied Rate | 59.5% | 79.6% | 63.9% | 51.9% | 49.3% | 27.6% | 68.0% | 58.8% |
| Renter-occupied Units | 2,731 | 53 | 197 | 13 | 686 | 352 | 5,585 | 414,700 |
| Renter-occupied Rate | 40.5% | 20.4% | 36.1% | 48.1% | 50.7% | 72.4% | 32.0% | 41.2% |
| | | | | | | | | |
| Vacant Housing Units | **478** | **0** | **96** | **0** | **150** | **103** | **2,124** | **167,564** |
| For rent | 203 | 0 | 34 | 0 | 99 | 79 | 639 | 61,985 |
| For sale only | 36 | 0 | 7 | 0 | 25 | 0 | 163 | 32,949 |
| For seasonal, recreational and occasional use | 55 | 0 | 8 | 0 | 13 | 2 | 630 | 32,703 |
| All other vacant | 184 | 0 | 47 | 0 | 13 | 22 | 692 | 39,927 |
| Vacancy Rate, excluding seasonal and migrant use | 5.9% | 0% | 13.7% | 0% | 9.1% | 17.2% | 7.6% | 11.5% |
| | | | | | | | | |
| Median Contract Rent | $739 | $309 | $504 | $463 | $515 | $426 | $686 | $858 |
| Median Value of Owner Occupied Units | $196,300 | $72,700 | $156,700 | n/a | $96,200 | $110,600 | $180,700 | $225,400 |
| | | | | | | | | |
| Homeowner Vacancy Rate | 0.9% | n/a | 2.0% | n/a | 3.6% | 0% | 1.3% | 5.2% |
| Rental Vacancy Rate | 6.9% | n/a | 14.5% | n/a | 12.6% | 18.3% | 10.2% | 13.0% |
| Average Household Size | 2.66 | 2.83 | 2.37 | 2.59 | 3.26 | 2.88 | 2.77 | 2.65 |

Sources: Housing Unit: USCB, 2010; Contract rent and Median Values: USCB, 2007-2011

**Table 3.16-3 Non-Agricultural Wage and Salary Employment: 2011**

| Employment Sector | Elko County | | State of Nevada | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Natural Resources (excludes mining) | 247 | 1.1 | 2,276 | 0.2 |
| Mining | 2,537 | 11.4 | 13,901 | 1.2 |
| Construction | 1,861 | 8.4 | 52,040 | 4.7 |
| Manufacturing | 240 | 1.1 | 38,154 | 3.4 |
| Trade, Transportation and Utilities | 3,870 | 17.4 | 211,913 | 19.0 |
| Information | 140 | 0.6 | 12,507 | 1.1 |
| Financial Services | 457 | 2.1 | 51,695 | 4.6 |
| Professional and Business Services | 1,395 | 6.3 | 139,483 | 12.5 |
| Education and Health Services | 1,342 | 6.0 | 103,487 | 9.3 |
| Leisure and Hospitality | 5,848 | 26.4 | 315,480 | 28.3 |
| Other Services | 589 | 2.7 | 27,854 | 2.5 |
| Federal Government | 389 | 1.8 | 17,528 | 1.6 |
| State Government | 883 | 4.0 | 32,631 | 2.9 |
| Local Government | 2,375 | 10.7 | 94,925 | 8.5 |
| Unclassified[1] | 10 | 0 | 767 | 0.1 |
| **Total** | **22,183** | **100.0** | **1,177,304,458** | **100.0** |

Source: NDETR, 2013
[1]"Unclassified" includes aggregated data not released by industry for reasons of confidentiality.

**Table 3.16-4 Non-Agricultural Wages and Salaries by Sector: 2011**

| Industry Sector | Elko County | | State of Nevada | |
|---|---|---|---|---|
| | Amount | % | Amount | % |
| Natural Resources (excludes mining) | $5,936,923 | 0.6 | $73,511,724 | 0.2 |
| Mining | $222,742,193 | 21.8 | $1,177,304,458 | 2.5 |
| Construction | $128,070,547 | 12.5 | $2,764,243,633 | 5.8 |
| Manufacturing | $11,104,203 | 1.1 | $1,973,332,057 | 4.1 |
| Trade, Transportation and Utilities | $164,269,524 | 16.1 | $7,991,975,080 | 16.6 |
| Information | $5,324,951 | 0.5 | $712,608,646 | 1.5 |
| Financial Services | $17,942,850 | 1.8 | $2,654,724,894 | 5.5 |
| Professional and Business Services | $86,990,141 | 8.5 | $7,447,141,722 | 15.5 |
| Education and Health Services | $58,148,032 | 5.7 | $5,028,255,332 | 10.5 |
| Leisure and Hospitality | $134,595,979 | 13.2 | $9,624,770,566 | 20.0 |
| Other Services | $25,954,582 | 2.5 | $895,696,535 | 1.9 |
| Federal Government | $23,789,826 | 2.3 | $1,136,439,360 | 2.4 |
| State Government | $37,445,298 | 3.7 | $1,599,010,035 | 3.3 |
| Local Government | $100,284,966 | 9.8 | $4,919,705,669 | 10.2 |
| Unclassified[1] | $477,332 | 0.0 | $48,131,006 | 0.1 |
| | | | | |
| **Total** | **$1,023,077,347** | **100.0** | **$48,046,850,717** | **100.0** |

Source: NDETR, 2013
[1]"Unclassified" includes aggregated data not released by industry for reasons of confidentiality.

Mining jobs tend to be high paying. In Elko County, the average annual wage paid to mine workers in 2011 was $87,797; which is 90 percent higher than the all-industries average of $46,120 and more than triple the average annual wage paid to workers in the leisure and hospitality industry ($23,016). Other important industry sectors in the county, as measured by average annual wage, are construction ($68,818) and professional and business services ($62,359) (Table 3.16-5).

**Table 3.16-5 Non-Agricultural Average Annual Wages by Sector: 2011**

| Industry Sector | Elko County | State of Nevada |
|---|---|---|
| Natural Resources (excludes mining) | $24,036 | $32,299 |
| Mining | $87,797 | $84,692 |
| Construction | $68,818 | $53,118 |
| Manufacturing | $46,268 | $51,720 |
| Trade, Transportation and Utilities | $42,447 | $37,713 |
| Information | $38,035 | $56,977 |
| Financial Services | $39,262 | $51,354 |
| Professional and Business Services | $62,359 | $53,391 |
| Education and Health Services | $43,329 | $48,588 |
| Leisure and Hospitality | $23,016 | $30,508 |
| Other Services | $44,066 | $32,157 |
| Federal Government | $61,156 | $64,836 |
| State Government | $42,407 | $49,003 |
| Local Government | $42,225 | $51,827 |
| Unclassified[1] | $47,733 | $62,752 |
| **Average Annual Wage All Industries** | **$46,120** | **$43,105** |

Source: NDETR, 2013
[1] "Unclassified" includes aggregated data not released by industry for reasons of confidentiality.

Labor Force

The labor force in Elko County is currently estimated at 30,422 individuals, approximately 28,560 of whom are employed. The remaining 1,861 unemployed individuals represent a 6.1 percent unemployment rate (Table 3.16-6). This level is significantly lower than the 11.6 percent statewide unemployment rate. The pattern of unemployment in the county has been consistently below the state average for several years.

**Table 3.16-6 Labor Force, Employment and Unemployment: 2012**

| Indicator | Elko County | | | State of Nevada | | |
|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
| Labor Force | 29,013 | 30,318 | 30,422 | 1,385,729 | 1,385,872 | 1,364,854 |
| Employment | 26,877 | 28,173 | 28,560 | 1,195,309 | 1,198,140 | 0,207,140 |
| Unemployment | 2,136 | 2,145 | 1,861 | 190,420 | 187,732 | 157,714 |
| Unemployment Rate (%) | 7.4 | 7.1 | 6.1 | 13.7 | 13.5 | 11.6 |

Source: NDETR, 2013
Note: 2012 data are preliminary estimates as of December 2012

Signs of a tightening labor market are reflected in Elko County's unemployment trends. The unemployment rate in the county dropped from 7.4 percent in 2010 to 6.1 percent as of December 2012. At the same time, the labor force continued to grow, suggesting that the drop in unemployment was the result of economic expansion and not outmigration. During the same period, the statewide unemployment rate dropped as did the number of people in the labor force (1.39 million in 2010 to 1.36 million in 2012) suggesting that people are leaving the state, have stopped looking for jobs in Nevada, or both.

Labor force data for small areas are not available from NDETR but employment information for small areas is collected in the decennial census and can be used to estimate labor force participation. The estimates are not comparable with those produced by NDETR, but they do provide context about unemployment in small areas within the county.

Table 3.16-7 shows 2010 labor force participation rates for the municipalities in the area of analysis. With the exception of the Elko Colony, the unemployment rate in Elko County municipalities was low compared to 13.7 percent for Nevada as a whole and 10.8 percent nationally at the time.

**Table 3.16-7 Labor Force Participation for Municipalities: 2010**

| Indicator | Elko | Elko Colony | Wells | Wells Colony | West Wendover | Wendover, Utah |
|---|---|---|---|---|---|---|
| Working Age Population | 13,393 | 591 | 1,132 | 9 | 2,905 | 896 |
| In Civilian Labor Force | 9,714 | 404 | 883 | 3 | 2,397 | 643 |
| Employed | 9,257 | 319 | 819 | 3 | 2,297 | 609 |
| Unemployed | 457 | 85 | 64 | 0 | 100 | 34 |
| Unemployment Rate (%) | 4.7 | 21.0 | 7.2 | n/a | 4.2 | 5.3 |

Source: USCB, 2010

**Community Facilities and Services**

Education

Public elementary and secondary schools in Elko, Wells, and West Wendover are run by the Elko County School District (ECSD) with administrative offices in Elko. The district serves the entire county. Wendover schools are run by the Tooele County School District.

ECSD has 30 public schools; 16 elementary schools, seven middle and junior high schools, and seven high schools. Approximately 9,530 students were enrolled in Elko County public schools in the fiscal year (FY) 2011, a slight increase over FY 2010 (ECSD, 2011). Over the past five years, district enrollments have fluctuated from a high of 9,907 in FY 2007 to a low of 9,474 in FY 2009. Public school enrollment in schools located in Wendover, Utah totaled 462 in FY 2011, an increase of 10.5 percent over FY 2010 (Table 3.16-8).

**Table 3.16-8 Public School Enrollment: FY 2008-FY 2011**

| Year | Elko School District (Nevada) | Gain/Loss Over Prior Year (%) | Wendover Schools (Utah) | Gain/Loss Over Prior Year (%) |
|---|---|---|---|---|
| 2007-2008 | 9,811 | -1.0 | 419 | 2.4 |
| 2008-2009 | 9,669 | -1.4 | 392 | -6.4 |
| 2009-2010 | 9,474 | -2.0 | 418 | 6.6 |
| 2010-2011 | 9,530 | 0.6 | 462 | 10.5 |

Sources: ECSD, 2011; Utah State Office of Education, 2011

Students from the Elko and Wells colonies attend Elko District schools. There is also a Head Start Program at the Elko Colony for children three to five years old. Three private schools in Elko County had a FY 2011 enrollment of approximately 275 students (Private School Review, 2011).

Wells, West Wendover, and Wendover each have an elementary school and a combined junior/senior high school. Elko has four elementary, two junior high, and one high school.

The capacity to handle additional growth varies by school. With the exception of Southside Elementary School, schools in Elko generally have capacity for growth. Southside Elementary is at full capacity; however, the school has space to add a modular unit, which would increase capacity by about 44 students (Bowers, 2013).

Schools in Wells can handle additional growth, particularly in the junior and senior high schools. The Wells elementary school has less capacity; however, the ECSD owns land adjacent to the old City Hall and would consider utilizing temporary classrooms during any necessary construction (Webster and Ballard, 2011 in ERM 2012).

West Wendover schools have room for growth. The school district is moving forward with expansion of the current facilities with design nearing completion and construction expected in spring of 2015 on a new elementary school followed by the remodel of the existing elementary into a middle school. The school district is planning to expand capacity by purchasing land for a new elementary school, enabling the junior high school to move into the old elementary school space (Condie, 2011 in ERM, 2012).

Wendover schools have some capacity, but have also seen an increase in students due to employment opportunities at the local casinos. In the past year, junior and senior high school enrollment in Wendover grew by 14 students, while elementary school enrollment grew by 27 students (Castagno and Castagno, 2011).

Table 3.16-9 shows the class of 2010 graduation rates for schools within the area of analysis. Graduation rates for each school were higher than those of Nevada as a whole. Wells High School had the lowest graduation rate at 73 percent, while Wendover High School had the highest at 91 percent.

Elko High School had the highest enrollment in 2010 and Wells had the lowest. The average student/teacher ratio is 27:1 in Elko County and 18:1 in Tooele County (ECSD, 2011; Utah State Office of Education, 2011) compared to 22:1 in the state of Nevada and 21:8 in Utah (ECSD, 2012; Utah State Office of Education, 2011).

**Table 3.16-9 Graduation Rates in the Study Area, Class of 2010**

| Geography | Total Students | Graduation Rate (%) | Dropout Rate (%) |
|---|---|---|---|
| Nevada | 437,057 | 70 | 4 |
| Elko County School District | 9,530 | 87 | 1 |
| Tooele County School District | 13,439 | 83 | 3 |
| Elko High School | 1,317 | 82 | 2 |
| Wells High School | 126 | 73 | n/a |
| West Wendover High School | 327 | 88 | 1 |
| Wendover High School | 177 | 91 | 3 |

Sources: ECSD, 2011; Utah State Office of Education, 2011
n/a = not available

Elko is home to Great Basin College (GBC), a public community college that offers two-year and four-year degrees, along with satellite programs in many outlying communities. GBC currently offers bachelor degrees in elementary education, nursing, applied sciences and integrative studies as well as a number of associate degree programs in fields relevant to the mining industry (e.g., diesel technology, industrial millwright technology, electrical technology). West Wendover has extension offices for both GBC and Utah State University. Wells also has an extension office for GBC.

**Public Safety**

Law Enforcement

Elko and West Wendover each have their own police departments that are responsible for incorporated area jurisdictions. Law enforcement for the unincorporated areas in Elko County is provided by the County Sheriff. The City of Wells contracts with Elko County Sheriff's Office for law enforcement but unlike the unincorporated areas has dedicated staff. The Elko and Wells bands and Te-Moak Tribe (Elko) are served by tribal police departments. Other law enforcement agencies with jurisdiction in the Plan boundary of analysis include BLM, NDOW, and USFS police. The Nevada Highway Patrol provides law enforcement on the state highway system.

Wendover and West Wendover have Interlocal police and Fire Agreements, which are approved by the respective Attorneys General offices in each state. These aid agreements allow police and fire units to respond outside their jurisdictions if such assistance is specifically requested.

The Elko City Police Department is budgeted for 40 sworn police officers, including the Police Chief and command staff (FY 2013/2014). West Wendover lacks a holding facility for arrestees (Supp, R., 2011 in ERM, 2012).

Fire Protection

Elko, Wells, and West Wendover each have their own fire department. The Elko City Fire Department is the largest of the agencies with three staff positions, 18 career firefighters, and more than 30 volunteers. The department has 10 major pieces of equipment, including regular fire trucks and smaller specialty trucks.

The Elko and West Wendover fire departments are staffed by a combination of paid and volunteer firefighters, while the Wells and Wendover fire departments are staffed entirely by volunteers. Volunteerism has declined in recent years. At the same time, call volume has increased significantly, especially during summer months (Griego, 2011 in ERM, 2012; Supp, J., 2011 in ERM, 2012).

The Pilot Valley and Montello Volunteer Fire Departments are the closest public fire departments to the project site. The Pilot Valley Fire Station is part of the Nevada Division of Forestry and uses county-supplied fire apparatus. BLM Range Fire resources are available for brush fires near the project site.

Emergency Response Resources

As of 2010, Elko County had 407 Emergency Medical Technicians (EMTs), of whom nine were Advanced EMTs (or Paramedics). Elko County Ambulance Service has Advanced Life Support Certified Service with Paramedics, EMTs, and volunteers across the county.

Ambulance units are stationed in Elko, Wells, Wendover, and Jackpot; and operate 24 hours a day, seven days a week. All calls for Elko County ambulance services are dispatched through Central Dispatch (Elko County, 2013). Wendover dispatches their own EMS and Law Enforcement. Summit Air Ambulance provides medevac services for Elko County, transporting patients to Northeastern Nevada Regional Hospital (NNRH). Life Flight and Air Med provide medevac services from the Wendover area, transporting patients to hospitals in Salt Lake City, a 45-minute flight (NV Energy, 2011a in ERM, 2012).

The Northeast Nevada Community Emergency Response Team program has been in operation since mid-2010 (Ready.gov, 2011). It was formed to help communities train for hazards.

Health Care

In the area of analysis, most health care services are concentrated in Elko, including NNRH, the Elko Clinic, Elko Family Medical and Dental Center, Elko Mental Health Clinic, Golden Health Medical Center (which exclusively serves employees from both Newmont and Barrick as well as their families), Great Basin Surgical Center, physical therapy clinics, and the Indian Health Service's Southern Bands Health Clinic.

NNRH is the county's only hospital and the principal health care facility for all of northeastern Nevada. It provides 24-hour emergency service and has 75 acute care beds, but no long-term care beds. It provides extensive diagnostic, specialized medical services, and mental health services in addition to family practice. NNRH's primary service area is Elko, Spring Creek, and

Carlin, but the hospital also receives many patients from Wells, West Wendover, and Battle Mountain. While residents from Wendover and West Wendover use local clinics, they primarily use hospital and health facilities in the Salt Lake City market for care.

Elko County ranks 13 out of 15 counties in Nevada with the most limited access to and quality of clinical care (County Health Rankings, 2011). Indicators include distance to health facilities and services, availability and composition of providers, health prevention programs and capacity challenges.

Due to the distance from hospitals and associated medical services, Wells, West Wendover, and Wendover have greater challenges in accessing adequate healthcare services, particularly specialized medical care, mental health and social welfare services, and 24-hour medical emergency services.

Wells Rural Health Clinic, managed by NNRH, is open four days per week. The Wendover Community Health Center serves the West Wendover/Wendover area and is open Monday through Friday. Operated by Nevada Health Centers, Inc., it is a Federally Qualified Health Center. The clinics offer basic health services such as testing, routine screenings, urgent care, sexually transmitted infection testing, and drug screening, but do not offer pharmacy services. Neither clinic offers 24-hour medical service.

Residents of the Elko and Wells Band colonies have access to free health services, primarily at the Indian Health Service's Southern Bands Health Center in Elko. Its service area covers Elko, Eureka, and Lander counties in Nevada and Tooele County, Utah, encompassing 5,000 band members.

Social Services

Like 11 other counties in Nevada, Elko County is designated a Mental Health Professional Shortage Area. As of 2010, there were just two licensed psychologists and no psychiatrists in Elko County (Nevada Office of Rural Health, 2011).

Most of the region's mental health and social welfare services are located in Elko. The West Wendover/Wendover area hosts a visiting, licensed mental health counselor from Valley Mental Health two days per week. Residents can receive private counseling for issues, such as alcohol/substance addiction and domestic violence, and are charged on a sliding scale. Appointments are typically booked far in advance (Anderson, 2011).

**Public Utilities**

Water and Sewer

All of the area of analysis communities named in this chapter have public water and wastewater systems, with varying amounts of available capacity (Table 3.16-10). Unincorporated areas of Elko County rely on private wells and septic systems. Potable water for municipal systems comes from either groundwater or surface water (typically springs). The City of Elko treats sewage at the Water Reclamation Facility and disposes of the effluent through reuse and/or

rapid infiltration basins. Water supply and wastewater capacity in municipal systems are sufficient to accommodate existing and projected future demand (i.e., the baseline projections shown in Table 3.16-1).

**Table 3.16-10 Utilities in the Area of Analysis**

| Community | Water and Sewer | Solid Waste | Electricity/Gas |
|---|---|---|---|
| Elko County | Groundwater (Individual or small municipal systems) typically within the Humboldt River system | Private waste haulers | • NV Energy<br>• Southwest Gas Corporation<br>• Geothermal sources available |
| City of Elko | City of Elko Utilities Dept. (Water, Sewer, and Water Reclamation Facility) | City of Elko Public Works Department | • NV Energy<br>• Southwest Gas Corporation<br>• Geothermal sources available |
| Wells City | City of Wells | Elko Sanitation | • Wells Rural Electric<br>• Wells Propane<br>• Geothermal sources available |
| West Wendover | West Wendover Public Works Department (operates a water reclamation facility) | West Wendover Public Works Department (operates a new landfill and compost facility) | • Wells Rural Electric<br>• Wendover Gas Company (liquid propane) |
| Wells Band Western Shoshone | City of Wells | No information available | • Wells Rural Electric. The band pays half of the electric bill for the 25 homes located on reservation land |
| Elko Band Western Shoshone | City of Elko Public Works Department | No information available | • Same as the City of Elko |
| Wendover, Utah | Wendover Public Works Department | City of Wendover[1] | • Wells Rural Electric Company<br>• Wendover Gas Company |

[1]The City of Wendover collects their refuse but contracts with West Wendover for disposal and landfill.
Sources: NV Energy, 2011b; Supp, J., 2011 in ERM, 2012; Salazar and McDonald, 2011 in ERM, 2012

The Johnson Springs water transmission system manages municipal water from the Big Springs/Shafter well field system, and the water treatment facility. West Wendover receives all of its water from this source. The primary water supply for the Wendover comes from outside of the Goshute Valley; Wendover purchases additional water from the Johnson Springs water transmission system, as needed.

Solid Waste

Solid waste service is provided by a combination of municipal and private haulers as shown in Table 3.16-10. The City of Elko operates a regional solid waste landfill. At current use rates, it has a capacity in excess of 75 years.

Electricity and Gas

Electricity in Elko County, Elko, and for the Elko Colony is provided by NV Energy. Wells Rural Electric provides electricity to Wells, West Wendover, and Wendover, Utah. The Wells Band of Western Shoshone pays half the electricity bill for the 25 houses located on reservation land (Salazar and McDonald, 2011 in ERM, 2012).

Natural gas for Elko County, Elko, and Wells is provided by Southwest Gas Corporation. Wendover and West Wendover are serviced by Wendover Gas Company. Wells does not have any natural gas at this time. Liquid Propane Gas is provided primarily by two companies.

**Public Finance and Fiscal Conditions**

Public Finance

The three governmental entities influencing the area of analysis are Elko County, Elko, and West Wendover. Elko County has a professional county manager and a five-member Board of Commissioners who oversee the operations of the county. The City of Elko employs a council-manager governmental structure with a professional city manager and policy-making city council. West Wendover has a council/mayor form of government with a professional city manager.

Elko County and the Nevada cities of Elko, West Wendover, and Wells, approved deficit budgets for FY 2013-14, with plans to tap proprietary fund reserves and other financing sources to cover the revenue shortfalls. Elko County anticipated revenues of $43.0 million against planned expenditures of $66.4 million. The City of Elko anticipated $23.9 million in revenues and expenditures of $29.0 million. The City of West Wendover anticipated revenue of $9.6 million against spending of almost $10.3 million (Table 3.16-11). In all cases, fund balances are sufficient to cover the budgeted shortfalls, although in the case of Elko County and the City of Elko, the reserve funds would be substantially reduced.

The largest sources of revenue for both Elko County and the City of Elko are Ad Valorem Taxes and Intergovernmental Resources. The largest current revenue sources for West Wendover are Other Taxes (which include room tax) and Intergovernmental Resources.

The primary components of the Ad Valorem tax are: (1) taxes on real and personal property, (2) net proceeds of minerals and (3) tax on centrally-assessed properties. The largest component of Intergovernmental Resources is consolidated taxes, which include sales and use taxes. The primary component of Other Taxes is room tax.

**Table 3.16-11 Final Budgets for Elko County, Elko City, West Wendover, Wendover, and Wells City Budgets**

| | Government Fund Trust Types and Expendable Trust Fund ($) | | | | |
|---|---|---|---|---|---|
| | **Elko County** | **Elko City** | **West Wendover** | **Wells** | **Wendover** |
| **Revenues** | | | | | |
| Ad Valorem Taxes | 14,384,040 | 3,866,590 | 1,172,8100 | 227,000 | 505,644[2] |
| Other taxes | 14,000 | 3,903,953 | 2,802,000 | 173,200 | See note 1 |
| Licenses and permits | 855,000, | 1,772,2410 | 877,300 | 56,700 | 32,711 |
| Intergovernmental Resources | 21,902,997 | 12,995,563 | 4,588,000 | 1,371,686 | 135,264 |
| Charges for Services | 3,430,181 | 1,081,345 | 51,800 | 222,350 | 43,204 |
| Fines and Forfeits | 1,207,700 | 185,480 | 141,000 | 20,400 | 22,357 |
| Investment Earnings/Miscellaneous | 1,207,800 | 136,205 | 50,360 | 88,150 | 107,468 |
| **Total Revenues** | 43,001,718 | 23,941,346 | 9,683,260 | 2,159,486 | 846,648 |
| **Expenditures-Expenses** | | | | | |
| General Government | 15,308,247 | 2,481,053 | 1,834,900 | 200,300 | 231,688 |
| Judicial | 12,423,946 | 497,827 | 313,900 | 26,925 | -- |
| Public Safety | 15,122,101 | 12,085,490 | 3,167,900 | 450,134 | 478,432 |
| Public Works | 10,287,402 | 7,086,169 | 577,370 | 669,535 | -- |
| Highways and Public Improvements | -- | -- | -- | -- | 199,424 |
| Health[1] | 823,138 | 711,150 | 95,600 | 7,600 | -- |
| Welfare[1] | 2,851,042 | -- | -- | 0 | -- |
| Culture and Recreation | 2,254,584 | 4,935,497 | 2,818,200 | 566,226 | -- |
| Miscellaneous Services | -- | -- | -- | -- | 26,918 |
| Intergovernmental Expenditures | 5,858,880 | -- | -- | -- | -- |
| Community Support and Development | 902,007 | 60,000 | 550,600 | 28,750 | -- |
| Contingencies | 530,000 | 270,978 | -- | 20,000 | -- |
| Utility Enterprises | -- | -- | -- | -- | -- |
| Fire | -- | -- | -- | 53,950 | -- |
| Airports | -- | -- | -- | -- | -- |
| Other Enterprises | -- | -- | -- | 241,951 | -- |
| Debt Service: | | | | | |
| Principal Retirement | 45,000 | 495,000 | 610,000 | 11,779 | 48,203 |
| Interest Cost | 2,700 | 399,924 | 317,900 | 3,089 | 14,950 |
| **Total Expenditures** | 66,409,047 | 29,023,088 | 10,286,470 | 2,280,239 | 999,615 |
| **Excess of Revenue over (under) Expenditures-Expenses** | **(23,407,329)** | (5,081,742) | (603,210) | **(120,753)** | **(152,967)** |

Sources: Elko County, 2012a; City of Elko, 2011b; Ambrose, 2013; Supp, 2013.

Notes: [1]The City of Elko combines Health and Welfare into one line item.

[2]Taxes shown for Wendover include all tax revenue. Ad valorem taxes are not shown separately. Financial information for Elko County, Elko City, West Wendover and Wells is fiscal year 2013/2014. The most recent data for Wendover is fiscal year 2011-2012.

In FY 2013-14, roughly $14.4 million (33 percent) of Elko County's revenue came from Ad Valorem Taxes. The remaining $28.6 million was provided through intergovernmental resources and by taxes on properties located in Elko County and taxes on centrally-assessed properties (Elko County, 2013).

The single largest source of current revenue for the cities of Elko, West Wendover, and Wells is Intergovernmental Revenues, which includes consolidated sales taxes. Consolidated sales tax represents 54.2 percent of the City of Elko 2014 general fund budget (City of Elko, 2013). Ad Valorem taxes are an important source of revenue for Elko, less than $1,000 of which comes from net proceeds tax. In contrast, room taxes are an important source of revenue for West Wendover, underscoring the importance of the gaming industry to the city's economy.

Fiscal Conditions

Local government finance in Nevada is a mixture of locally-derived and state-shared revenues. Local tax revenues are primarily Ad Valorem property taxes on real and personal property and the net proceeds of minerals tax in the local jurisdiction. State-shared revenues include sales, motor vehicle, fuel, gaming taxes, and net proceeds of minerals tax. Taxes that most directly affect mining operations are discussed here.

Net Proceeds of Minerals Tax

Mine operators in Nevada pay a Net Proceeds of Minerals Tax (NPOM) to the State of Nevada, and to the county (including taxing entities and tax rate funds) where the ore originates. NPOM tax payments can be significant for rural counties in Nevada especially those that are already heavily dependent on mining for their tax base.

In 2011, mines in Elko County generated approximately $7.98 million in local NPOM taxes and another $8.17 million in state NPOM taxes on $829.3 million of gross proceeds (Nevada Department of Taxation, 2012). Of the $7.98 million in local NPOM tax revenue, half goes to school districts and the balance is distributed to tax rate funds and taxing entities located throughout the county (Armuth, 2013). The state's NPOM tax receipts go to the state's General Fund and are distributed essentially on a per capita basis throughout the state.

Sales and Use Taxes

The sales tax rate in Elko County is 6.85 percent. Of this, two percent goes to the state general fund and 2.6 percent to school districts. The county where the tax is generated receives 0.5 percent (in this case, Elko County) and the remaining 1.75 percent is distributed to all counties under a statutory formula (Armuth, 2013).

Hunting expenditures (from both residents and non-residents) made in Nevada and Elko County are economically important because annual hunting expenditures within Nevada include monetary expenditures on food, lodging, transportation, and equipment (i.e. guns, ammunition, etc.), licenses and tags, permit costs, etc. These purchases inside Elko County are subject to Elko County sales tax, as well as other state taxes. The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation estimated hunting participation and expenditures in

Nevada for the 2011 hunting season. In 2011, hunting participation was estimated at 43,000 participants with an estimated 30,000 big game hunting participants, approximately 69 percent of the total hunting participants (USFWS, 2011a). Hunting expenditures in Nevada from both Nevada residents and nonresidents was estimated at $204 million in 2011 (USFWS, 2011a). Hunting trip and equipment expenditures for big game hunting in Nevada was estimated at $117 million in 2011 which is approximately 57 percent of the estimated total 2011 hunting expenditures (USFWS, 2011a). The estimated big game expenditures include hunting expenses for all types of big game hunting including mule deer, antelope, elk and big horn sheep.

NDOW data provides information on the number of mule deer tags sold for specific hunting years. NDOW data used for this analysis included 2011 and 2013 mule deer draw and hunt results. In 2011, 12,113 mule deer tags were sold to both Nevada residents and nonresidents, and 2,807 mule deer tags were sold for the junior mule deer draw. Total mule deer tags sold in 2011 were 14,920. In 2013, 19,606 mule deer tags were sold to both Nevada residents and nonresidents, and 3,386 mule deer tags were sold for the junior mule deer draw. Total mule deer tags sold in 2013 were 22,992, which is approximately a 54 percent increase from 2011 (NDOW, 2014a). The Project Area is located within and adjacent to mule deer Area 7 (Hunt Units 071-079, 091). Approximately 1,461 mule deer tags were sold within mule deer Area 7 for 2011. Approximately 1,811 mule deer tags were sold within mule deer Area 7 for 2013, which is a 24 percent increase from 2011 (NDOW, 2014a). Mule deer tags sold for mule deer Area 7 in 2011 were approximately 10 percent of the total number of mule deer tags sold in Nevada. Mule deer tags sold for mule deer Area 7 in 2013 were approximately eight percent of the total number of mule deer tags sold in Nevada.

According to the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, data from that survey are not entirely comparable with outside sources. As a result, the NDOW mule deer draw and hunt results data cannot be accurately correlated to the hunting participant estimates in the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. However, these two data sets were compared in order to provide a general idea of mule deer hunting participation as a proportion of the 2011 big game hunting estimates detailed in the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. According to NDOW mule deer draw and hunt results, the number of 2011 mule deer tags sold was 14,920. Of the estimated 30,000 big game hunting participants in 2011, it could be assumed that 14,920 of these participants hunted mule deer, and 15,080 participants hunted some other type of big game.

In an attempt to provide some correlation between the two data sets, a univariate inferential test was used to compare the two proportions, and a 95 percent confidence interval was used for the analysis. After running the confidence interval test for comparing two proportions, it was determined that the analysis showed a 95 percent confidence level that the mean difference between the two proportions (i.e. mule deer hunting participation results from the NDOW tag draw results and other big game hunting participation results from the 2011 National Survey of

Fishing, Hunting, and Wildlife-Associated Recreation) was between ± 0.2 percent and 1.4 percent (Voelker et al., 2001).

For big game hunting, an annual average of $1,662 per spender was estimated (USFWS, 2011a). Assuming that 14,920 participants in the total 30,000 sample population for big game hunting actually hunted mule deer, and that the $1,662 per spender can be correlated accurately to the NDOW mule deer draw and hunt results, approximately $24,797,040 could be estimated for 2011 mule deer hunting expenditures, which is approximately 21.2 percent of estimated 2011 big game hunting expenditures. This estimate is based on a per mule deer tag estimate, and does not factor in hunters that may not have drawn a mule deer tag, but helped someone else during the hunt. As a result, the $24,797,040 may be underestimated. 1,461 mule deer tags were sold in 2011 for mule deer Area 7. Using the above estimate of $1,662 per spender in 2011, approximately $2,428,182 could be estimated for 2011 mule deer hunting expenditures within mule deer Area 7, which is approximately 9.8 percent of the estimated 2011 mule deer hunting expenditures for the entire state.

Total 2011 revenues for Elko County, including governmental activities and business-type activities) was $46,543,116 (Elko County, 2012b). The $2,428,182 in estimated expenditures for 2011 Area 7 mule deer hunting would have been 5.2 percent of Elko County's 2011 revenues. However, not all the monies expended on mule deer Area 7 hunting would be spent within Elko County, because some of the expenditures include licensing, tags and permit costs which would likely not directly go to Elko County revenues. As a result, the estimated revenues would be lower than the $2,428,182 Area 7 mule deer hunting expenditures. However, as stated above, these numbers do not include expenditures of people in a hunting party that do not have deer tags, nor does it take into consideration the monetary value of shed hunting, wildlife viewing experiences, or the recent increase in the number of Area 7 mule deer tags.

Big game, including mule deer hunting, is an important economic resource for not only Nevada, but to Elko County and the other counties where hunting occurs.

Project-related purchases made in Elko County would be subject to the 6.85 percent sales tax. Any purchases made in Utah (e.g., by employees or contractors who live in Wendover) would be subject to Utah sales tax of 5.95 percent. The capital expenditures of a mine development project are subject to the sales and use tax, regardless of where the project-related purchases were made, generating large revenues to the state and local government during the development of a project.

Ad Valorem (Property) Taxes

Property taxes paid on mining property, plant and equipment stay almost exclusively in the county and special taxing district where mines are located; a small portion of the property tax is dedicated to state debt repayment.

The property tax rate in Elko County in FY 2011-12 was $0.8386 per $100 of assessed value. The total assessed valuation that year was $1.49 billion. As with sales and use taxes, property taxes are an important share of local budgets. Property taxes accounted for approximately 26 percent of actual revenues for Elko County in 2011 and almost 18 percent of all actual revenue for the City of Elko.

Other State Taxes

Every employer subject to Nevada Unemployment Compensation Law (NRS 612) is also subject to the Modified Business Tax on total gross wages less employee health care benefits paid by the employer. This tax generates a small amount of state revenue compared to the Net Proceeds, Sale and Use and Property Taxes paid by mines.

**Power Supply Pipeline**

Existing resources are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Existing resources are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.16.3.2 North Facilities Alternative

Existing conditions are the same for the North Facilities Alternative as for the mining and processing facilities area.

#### 3.16.3.3 No Action Alternative

Existing conditions are the same for the No Action Alternative as for the mining and processing facilities area.

## 3.17 Environmental Justice

This section identifies and describes the existing conditions related to environmental justice within the area of analysis for each alternative.

### 3.17.1 Areas of Analysis

#### 3.17.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for the Proposed Action consists of Elko County, Nevada, and the Census Designated Place of Wendover, Utah.

**Power Supply Pipeline**

The area of analysis is the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

The area of analysis is the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.17.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same area described for the Proposed Action, which is the area consisting of Elko County and Wendover.

#### 3.17.1.3 No Action Alternative

The area of analysis for the No Action Alternative is the same area described for the Proposed Action, which is the area consisting of Elko County and Wendover.

### 3.17.2 Data Sources and Methodology

#### 3.17.2.1 Proposed Action

**Mining and Processing Facilities**

Environmental justice is defined by the EPA (2011) as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies". The term "fair treatment" means that no group of people bears a disproportionate burden of negative environmental risks and consequences of industrial, governmental, and commercial operations or programs and policies (EPA, 2011). The EPA has expanded the concept of fair treatment to include not only the consideration of how burdens are distributed across all populations but also how benefits are distributed. The term "meaningful involvement" is interpreted by EPA (2011) to mean that members of potentially affected communities have an appropriate opportunity for participating in decisions about proposed activities that will affect their environment or health. The public's contribution can influence the regulatory agency's decision, and the concerns of all participants involved must be considered in the decision-making process.

On February 11, 1994, President William Clinton issued EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The EO requires federal agencies to analyze the effects of their actions to determine if their implementation will result in disproportionate effects to minority or low-income populations. In an accompanying Presidential memorandum, the President emphasized existing laws, including NEPA, should provide opportunities for federal agencies to address environmental hazards in minority communities and low-income communities.

In April 1998, the EPA released the document titled *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses*. The document served as a successor to several other documents and plans that were released by the EPA addressing environmental justice and NEPA compliance. The purpose of the final guidance is to assist in properly and adequately addressing environmental justice issues and concerns in NEPA compliance documentation, including EISs and EAs (EPA, 1998).

Procedures for identifying minority and low-income populations and addressing disproportionately high and adverse effects are provided in the EPA final guidance. Per the guidance (EPA, 1998), minority populations should be identified when the minority population of the affected area either:

- Exceeds 50 percent; or
- Is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Pursuant with Council on Environmental Quality (CEQ) guidance, the EPA final guidance (1998) recommends that low-income populations in an affected area should be identified using the annual statistical poverty thresholds from the U.S. Census Bureau Current Population Reports. The annual statistical poverty thresholds are the dollar amounts that the U.S. Census Bureau uses to determine the poverty status of a family or person (USCB, 2012a). If the gross income of a family or a person is below the dollar amount of their corresponding poverty threshold, then that family or person is considered to be in poverty. In conjunction with U.S. Census data, state and regional low-income and poverty definitions should also be considered, as appropriate (EPA, 1998). In identifying low-income populations, agencies may consider as a community a group of individuals living in geographic proximity to one another or set of individuals where either type of group experiences common conditions of environmental exposure.

The minority and ethnic composition of the communities and populations within the area of analysis was characterized in order to identify whether minority populations were present based on the identifying criteria provided in the EPA final guidance (1998). In order to identify whether low-income populations were present within the area of analysis, the income and poverty status of these communities and populations was also characterized. The communities and populations that were considered in detail consisted of those identified as potentially affected by the proposed project, based on the likely location of project employees, contractors, and suppliers, and shared resources such as water. These communities and populations included the following:

- City of Elko, Nevada;
- Town of Wells, Nevada;
- City of West Wendover, Nevada;
- City of Wendover, Utah;
- The Wells Colony; and
- The Elko Colony.

In order to provide baseline data for comparison, the minority and ethnic composition and the income and poverty status of the general populations of Elko County and the state of Nevada were also characterized. Although Wendover is located in Tooele County, Utah, it is more than 100 miles from the nearest significant population center in Utah. However, it is located immediately adjacent to West Wendover, Nevada. Accordingly, in order to determine if minority

or low-income populations were present in Wendover, demographic and income data for the city's population was compared against the general population of Elko County and Nevada as opposed to Tooele County and Utah. Data related to smaller communities throughout unincorporated areas of Elko County, such as Oasis and Montello were included in the population statistics provided for the general population of the entire county.

The 2010 Census Summary File 1 for Nevada (USCB, 2011a) and for Utah (USCB, 2011b) were used to characterize the minority and ethnic composition of the communities and populations within the area or analysis. The 2010 Census Summary File 1 contains population characteristics collected from all people during the 2010 census, including counts for many detailed race and Hispanic or Latino categories. The data is provided for the entire United States, as well as for each of the 50 states and the District of Columbia, down to census tract level for some data (USCB, 2012b).

Data from the 2007-2011 American Community Survey for Nevada (USCB, 2012c) and for Utah (2012d) was used to characterize the income and poverty status of the communities and populations. In order to facilitate the characterization of income and poverty status within the area of analysis, American Community Survey data was also displayed graphically as a map using the EPA's EJView (EPA, 2012). According to the USCB (2008), the American Community Survey is designed to provide communities with reliable and timely demographic social, economic, and housing data every year. Data collected from the American Community Survey is released in the form of both single-year and multi-year estimates. Because the data is reported as estimates, all data is published with a margin of error that corresponds to a 90-percent confidence level (USCB, 2008). Among the data reported is the percentage of persons below the poverty level. The value is computed by dividing the sum of persons living below the poverty level by the number of persons for whom poverty status is determined (USCB, 2012a). Poverty status is determined by comparing the income of persons in an area to their corresponding poverty threshold, as described above.

Other sources that were consulted include a report prepared by Environmental Resources Management in 2012, titled *Newmont Mining Corporation: Socioeconomic Baseline Conditions: Long Canyon Project*, and U.S. Census Bureau GIS data (2012e).

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.17.2.2 North Facilities Alternative

The sources of data and the methods used for the North Facilities Alternative are the same as those used for the Proposed Action.

#### 3.17.2.3 No Action Alternative

The sources of data and the methods used for the No Action Alternative are the same as those used for the Proposed Action.

### 3.17.3 Existing Conditions

#### 3.17.3.1 Proposed Action

**Mining and Processing Facilities**

**Minority Population**

The 2010 Census Summary File 1 for data Nevada (USCB, 2011a) and Utah (2011b) pertaining to the minority and ethnic composition of the potentially affected populations and communities within the area of analysis is summarized in Table 3.17-1. Data for Elko County and the state of Nevada is also summarized in the table.

**Table 3.17-1 Environmental Justice Indicators: Minority Populations**

| Population Indicator (2010 Census) | Percentage of Population | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Elko | Wells | West Wendover | Wendover | Elko Colony | Wells Colony | Elko County | Nevada |
| White Persons | 78.9 | 78.3 | 60.3 | 66.3 | 6.3 | 18.6 | 79.4 | 66.2 |
| Black Persons | 1 | 0.1 | 0.6 | 0.6 | 0 | 0 | 0.8 | 8.1 |
| Native Americans | 3.3 | 6.8 | 1.8 | 2.1 | 88.7 | 67.1 | 5.3 | 1.2 |
| Asian Persons | 1.4 | 0.4 | 1.3 | 0.4 | 0.3 | 0 | 0.9 | 7.2 |
| Pacific Islanders | 0.1 | 0 | 0.7 | 0 | 0 | 0 | 0.1 | 0.6 |
| Some Other Race | 11.8 | 10.4 | 31.1 | 27.1 | 1.4 | 2.9 | 10.3 | 12.0 |
| Two or More Races | 3.5 | 4.0 | 4.1 | 3.5 | 3.4 | 11.4 | 3.2 | 4.7 |
| Hispanic or Latino Persons (of any race)[1] | 26.4 | 20 | 61.7 | 68.3 | 12.8 | 32.9 | 22.9 | 26.5 |
| Minority Population[2] | 33.1 | 28.1 | 66.2 | 72.2 | 94.7 | 81.4 | 30.9 | 45.9 |

Sources: USCB, 2011a and 2011b

[1]Persons who identify their origin as Spanish, Hispanic or Latino may be of any race or combination of races; therefore the number and percentage of all the race groups may total more than the total population (100 percent) or the minority population percent.

[2]Minority population includes persons of any race or combination of races who identify their origin as Hispanic or Latino, and persons of a minority race or combination or races who are not of Hispanic or Latino origin.

As shown in the table, the 2010 Census Summary File 1 data for Nevada (USCB, 2011a) indicates that the minority population percentage was below 50 percent in Elko and Wells. The minority population percentage in the Elko and Wells are not meaningfully greater than the

minority population percentage in the general populations of Elko County and the state of Nevada, which were also below 50 percent. Accordingly, per the criteria provided in the EPA final guidance (1998), Elko and Wells are not minority populations. The general population of Elko County, as a whole, is also not identified as a minority population.

West Wendover and Wendover are identified as minority populations per the defining criteria provided in the EPA final guidance (1998). As shown in Table 3.17-1, the minority population percentage in West Wendover and Wendover is approximately 66.2 percent and 72.2 percent, respectively. The 2010 Census Summary File 1 data for Nevada (USCB, 2011a) indicates that the minority composition of the population of Elko County is approximately 30.9 percent. Thus, the minority population percentage in both cities is meaningfully greater than the percentage within the general population of the area of analysis.

The minority population percentage of the population of the Elko and Wells colonies also exceeds 50 percent, as shown in Table 3.17-1. The minority population percentage within both colonies is also meaningfully greater than the minority population percentage of the general population of Elko County. Per the EPA final guidance (1998), minority populations should be identified when the minority population percentage exceeds 50 percent or when the percentage is meaningfully greater than the minority population percentage in the general population. Accordingly, the Elko Colony and the Wells Colony are both identified as minority populations.

**Low-Income Population**

A summary of the income and poverty data for the communities and populations within the area of analysis identified as potentially affected by the project is provided in Table 3.17-2. The table also includes a summary for the general populations of Elko County and the state of Nevada, which are used for baseline comparisons in identifying low-income populations. Data presented in Table 3.17-2 is from the five-year estimates reported in the 2007-2011 American Community Survey for Nevada (USCB, 2012c) and Utah (2012d).

As Table 3.17-2 shows, the estimated percentage of persons below the poverty level in Elko County between 2007 and 2011 was 8.6 percent. The data is provided by the U.S. Census Bureau with a margin of error of 1.4 percent. The estimated percentage of persons below the poverty level in the state of Nevada during this period was 12.9 percent, with a margin of error of 0.3 percent. Thus, even when the margin of error is accounted for, the percent of persons below the poverty level in Elko County is lower than the percentage within the general population of the state of Nevada.

EJView, formerly known as the Environmental Justice Geographic Assessment Tool, is a mapping tool provided by the EPA that allows the public to create maps and generate reports based on geographic areas and various data sets. The 2006-2010 American Community Survey five-year estimates of the percentage of persons below the poverty level is a data set available for viewing in EJView. According to the EJView map depiction of the data set (EPA, 2012), Elko County was one of four counties in Nevada with less than 10 percent of persons

below the poverty level between 2006 and 2010. The map depiction of the data set (EPA, 2012) also indicates that the per capita income in Elko County was relatively greater than most of the other counties in Nevada. Accordingly, per the EPA final guidance (1998), the general population of Elko County, as a collective whole, is not identified as a low-income population.

**Table 3.17-2 Environmental Justice Indicators: Low-Income Populations**

| Community | Percent of Persons Below Poverty Level (Margin of Error) | Per Capita Income (Margin of Error) | Median Household Income (Margin of Error) |
|---|---|---|---|
| Elko | 5.9 (+/- 1.6 %) | $29,166 (+/- $3,044) | $71,114 (+/- $3,809) |
| Wells | 7.6 (+/- 6.4 %) | $25,023 (+/- $3,378) | $49,886 (+/- $11,722) |
| West Wendover | 24.0 (+/- 7.9 %) | $16,133 (+/- $2,261) | $39,726 (+/- $4,884) |
| Wendover | 23.1 % (+/- 14.4 %) | $12,582 (+/- $2,304) | $31,518 (+/- $9,218) |
| Elko Colony | 16.6 % (+/- 9.5 %) | $18,688 (+/- $2,861) | $38,417 (+/- $13,118) |
| Wells Colony | 16.7 % (+/- 31.1 %) | $12,217 (+/- $4,712) | $27,917 (+/- $53,804) |
| Elko County | 8.6 % (+/- 1.4 %) | $27,233 (+/- $1,362) | $69,459 (+/- $2,265) |
| Nevada | 12.9 % (+/- 0.3 %) | $27,625 (+/- $248) | $55,553 (+/- $449) |

Source: USCB, 2012c and 2012d

As shown in the table, the 2007-2011 American Community Survey for Nevada (USCB, 2012c) indicates that the percent of persons below the poverty level in Elko and Wells was less than 10 percent during the five-year period. The percent of persons below the poverty level in both places was also less than the percent of persons below the poverty level in Elko County between 2007 and 2011. Elko County was estimated to have a smaller percentage of persons below the poverty level than the general population of the entire state of Nevada, as shown in Table 3.17-2. The general population of Elko County, as a collective whole, is not identified as a low-income population. Accordingly, per the EPA final guidance for identifying low-income populations (1998), neither Elko nor Wells are identified as low-income populations either.

As shown in Table 3.17-2, the American Community Survey data for Utah (USCB, 2012d) estimates that an average of 23.1 percent of the persons in Wendover were below the poverty level between 2007 and 2011. However, the data is provided with a 14.4-percent margin of error. Thus, the percentage of persons below the poverty level in Wendover may be as low as 8.7 percent, which is not meaningfully greater than the percent of the general population of Elko County. However, the data (USCB, 2012d) indicates that the per capita income and the median household income were substantially less than income of the general population of the county between 2007 and 2011, as shown in the table. This suggests that the percent of persons below the poverty level was likely greater than 8.7 percent, and meaningfully greater than the general population of the county. Therefore, in accordance with the direction provided in the EPA final guidance (1998), Wendover is identified as a low-income population.

The U.S. Census Bureau for Nevada (2012a) estimates that the percent of persons below the poverty level in West Wendover was 24 percent between 2007 and 2011. As shown in Table 3.17-2, this is meaningfully greater than the percent of persons estimated to be below the poverty level in Elko County during this same period. The estimated 24 percent of persons is also slightly above the 23.1 percent of persons estimated to be below the poverty level in Wendover during this same period (USCB, 2012d). Wendover, as mentioned above, is identified as a low-income population. Thus, with a higher percentage of persons estimated to be below the poverty level, West Wendover is also identified as a low-income population. Additionally, the per capita income and the median household income in West Wendover is also meaningfully less in comparison to the general population of Elko County.

As shown in Table 3.17-2, the percentage of persons below the poverty level in the Elko and Wells colonies was estimated in excess of 16 percent between 2007 and 2011 (USCB, 2012c). Exceeding 16 percent, the percentage of persons below the poverty level within both colonies is meaningfully greater in comparison with the percent of persons below the poverty level in the general population of Elko County. The estimated per capita income in both colonies is less than the estimated per capita income of the county, as is the estimated median household income. Thus, the Elko Colony and the Wells Colony are both identified as low-income populations.

**Power Supply Pipeline**

Existing resources are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Existing resources are the same for the Cities' water supply as for the mining and processing facilities.

#### 3.17.3.2 North Facilities Alternative

The existing conditions related to environmental justice within the area of analysis for the North Facilities Alternative are the same as those identified and described for the Proposed Action.

#### 3.17.3.3 No Action Alternative

The existing conditions related to environmental justice within the area of analysis for the No Action Alternative are the same as those identified and described for the Proposed Action.

## 3.18 Hazardous Materials and Waste

### 3.18.1 Area of Analysis

The project site is located approximately 25 miles east-southeast of Wells, Nevada and 30 miles west-northwest of West Wendover, Nevada. Direct access to the project would be from I-80 at the Oasis/Montello exit (Exit 378). Newmont plans to use the existing Elko County Road 790 to

the main access gate of the Plan boundary and would upgrade this county road to a condition to support mine traffic.

#### 3.18.1.1 Proposed Action

**Mining and Processing Facilities**

The area of analysis for the mining and processing facilities occurs within the Plan boundary, which includes the associated access road and the potential transportation routes to the Plan boundary from the following major hubs from which materials would be transported.

- From Reno via I-80 east to the Oasis/Montello exit (Exit 378), and south via Elko County Road 790 to the main access gate of the Long Canyon Mine Operations;
- From Elko via I-80 east to the Oasis/Montello exit (Exit 378), and south via Elko County Road 790 to the main access gate of the Long Canyon Mine Operations;
- From Salt Lake City via I-80 west, to the Oasis/Montello exit (Exit 378), and south via Elko County Road 790 to the main access gate of the Long Canyon Mine Operations; and
- From Wendover via I-80 west, to the Oasis/Montello exit (Exit 378), and south via Elko County Road 790 to the main access gate of the Long Canyon Mine Operations.

Bulk chemicals and supplies would typically be transported to the site on trucks via I-80, either from the east (Salt Lake City/Wendover) or west (Reno/Elko). Table 2.2-4 describes the amount of annual use and the shipment quantity for reagents to the site.

**Power Supply Pipeline**

The area of analysis includes the power supply pipeline corridor.

**Cities' Water Supply**

The area includes Section 21, T35N, R66E, where the municipal wells for the Cities would be installed.

#### 3.18.1.2 North Facilities Alternative

The area of analysis for the North Facilities Alternative is the same as that for the Proposed Action.

#### 3.18.1.3 No Action Alternative

The area of analysis for the No Action Alternative occurs within the approved exploration Plan boundary.

### 3.18.2 Data Sources and Methodology

#### 3.18.2.1 Proposed Action

**Mining and Processing Facilities**

The following indicators were used when describing the affected environment for hazardous and solid waste materials:

- Potential transportation routes between the major hubs in the project vicinity; and
- Locations of water sources along the major transportation routes.

Data sources for this section were acquired from existing documents and satellite imagery.

**Power Supply Pipeline**

Data sources and methodologies are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Data sources and methodologies are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.18.2.2 North Facilities Alternative

The data sources and methods used for the North Facilities Alternative are the same as those used for the Proposed Action.

#### 3.18.2.3 No Action Alternative

The data sources and methods used for the No Action Alternative are the same as those used for the Proposed Action.

### 3.18.3 Existing Conditions

#### 3.18.3.1 Proposed Action

**Mining and Processing Facilities**

The affected environment for hazardous materials and solid and hazardous waste includes air, soil, biological resources, and water that could be potentially affected by an accidental release during transportation to and from the Plan boundary and during storage and use on the Plan boundary.

Bulk chemicals would typically be transported to the site on trucks via one of the access routes and any hazardous wastes would be transported from the site using the same routes.

The only current development in the Plan boundary is the Big Springs Ranch. Regulated materials consisting of petroleum products associated with vehicle fueling and maintenance were observed during an environmental review of the Big Springs Ranch in 2010. Above-ground storage tanks with no secondary containment were noted on the property, with some visible surface soil staining. Seven areas of solid waste dumping were also observed during the environmental review (Enviroscientists, Inc., 2010).

A hazardous substance, as identified by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) is described in the following statutes:

- Clean Water Act, Sections 307(a) and 311 (EPA, 2002a);
- Resource Conservation and Recovery Act, Section 3001 (EPA, 2002b);
- Clean Air Act, Section 112 (EPA, 2004); and
- Toxic Substances Control Act, Section 7 (EPA, 2002c).

Pursuant to regulations promulgated under CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, reporting the release of a hazardous substance to the environment must occur immediately upon knowledge of a release of a reportable quantity to the National Response Center (40 CFR 302). NAC 445A.347 also requires immediate reporting of a release of a reportable quantity of a hazardous substance to the Nevada Division of Emergency Management. The NDEP's Water Pollution Control Permit program also includes requirements for reporting as soon as possible, but no later than 24 hours after the discovery to the NDEP, Bureau of Corrective Actions. A list of primary fuels and reagents that would be transported to the Plan boundary, and utilized by the Proposed Action, is provided in Table 2.2-4.

The NDEP Bureau of Waste Management regulates the hazardous waste program in the state of Nevada. Hazardous waste management is subject to specific requirements that are dependent upon the amount of hazardous waste produced at a facility in a calendar month. Hazardous waste generators are required to adhere to specific on-site management, transportation, record keeping, and reporting requirements. All hazardous wastes must be stored, packaged, and shipped to a permitted waste disposal facility in compliance with applicable local, state, and federal regulations.

**Power Supply Pipeline**

Existing resources are the same for the power supply pipeline corridor as for the mining and processing facilities area.

**Cities' Water Supply**

Existing resources are the same for the Cities' water supply as for the mining and processing facilities area.

#### 3.18.3.2 North Facilities Alternative

The existing conditions for the North Facilities Alternative are the same as those used for the Proposed Action.

#### 3.18.3.3 No Action Alternative

The existing conditions for the No Action Alternative are the same as those used for the Proposed Action.