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CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The purpose of this chapter of the EIS is to describe the existing environment's biological resources, physical and socioeconomic characteristics, and human uses in the project and surrounding study areas. It is a *discussion* of the affected environment for the additional resources that may be affected by the Proposed Action; **Chapter 4** is an *analysis* of the impacts on those resources.

3.1.1 General Project Setting

The project area is characterized by the existing operation and disturbance described in **Chapter 1** and depicted on **Figures 1-4** and **1-5**. The project area is in the Basin and Range physiographic province, in the central region of the north-south trending Humboldt Range. The Basin and Range province consists of narrow, short mountain ranges of moderate to high relief, separated by broad alluvial valleys or basins. The Humboldt Range is bounded on the east by the Buena Vista Valley and on the west by the Humboldt River Valley. The project area encompasses elevations ranging from approximately 4,960 feet amsl at the Packard Mine to approximately 7,300 feet amsl at the highest point of the Rochester Mine. The project area is in the Buena Vista Valley air basin. It is in a high desert environment, characterized by arid and semiarid conditions, minimal annual precipitation, and wide temperature ranges.

Winter temperatures are generally in the mid-20˚F range at night and low 40˚F range during the day. Meteorological data was obtained in the project area and at a nearby National Weather Service airport station, Lovelock Derby Field (data from 2007 through 2013). These data indicate that maximum annual high temperatures are generally in July or August, while the minimum annual low temperatures are generally between December and February. Average monthly temperature in the project area ranges between a low of 20.5˚F and a high of 69.4˚F.

Regional annual precipitation in Pershing County, depending on elevation, averages 7 inches of rain or 8 inches of snow over an average of 38 days of measurable precipitation. Most of the precipitation occurs in the winter and spring. Average monthly precipitation on-site ranges from 0.17 inch in September to 1.41 inches in March. The average annual combined precipitation (snow and rain) recorded at the mine site from 2011 through 2013 was approximately 8.61 inches. Most precipitation occurs from October through April (JBR 2014).

On-site data indicate that wind directions have a strong tendency to blow to the northeast-southwest, which is consistent with the terrain channeling effects in regions with topography that run generally northeast-southwest. Higher elevations promote more frequent wind, and winds in the higher elevations of the project area exhibit fewer calm hours than lower elevations in the adjacent valley bottoms.

Vegetation communities in the vicinity of the project area are a mix of the following:

- Alpine forest and high sagebrush vegetation at higher elevations
- Intermountain playa and saltbush scrub at the lower elevations

Communities are as follows:

- Big sagebrush shrubland
- Juniper savanna
- Invasive annual and biennial forb land
- Cold perennial springs and spring brooks
- Foothill and lower montane riparian woodland and shrubland
- Mixed salt desert scrub.

Wildlife species in the area are those found in the Great Basin and adapted to arid environments.

Dispersed recreation occurs in the vicinity of the project area, dominated primarily by primitive camping, hunting, and hiking.

3.1.2 Supplemental Authorities

In all its documents, the BLM must consider supplemental authorities that are subject to requirements specified by statute or executive order; these are listed in **Table 3-1**. The table lists the elements and their status as well as the rationale to determine whether an element would be affected by the Proposed Action. This chapter contains a discussion of the affected environment for each of the supplemental authorities that may be affected; they are analyzed in **Chapter 4**.

Table 3-1
Supplemental Authorities

Supplemental Authority Element	Not Present	Present/ Not Affected	Present/ May Be Affected	Rationale/Reference Section
Air and atmospheric resources			X	See **Section 3.2** of the EIS
Areas of Critical Environmental Concern	X			This element is not present in the project area and is not analyzed in the EIS.
Cultural resources			X	See **Section 3.3** of the EIS
Environmental justice	X			Minority and low-income populations, as defined in Executive Order (EO) 12898, Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations, are not present in the project area or vicinity.
Floodplains	X			This element is not present in the project area and is not analyzed in the EIS.
Invasive, nonnative species			X	Addressed in Vegetation (**Section 3.14**) of the EIS
Migratory birds			X	See **Section 3.4** of the EIS
Native American religious concerns		X		See **Section 3.5** of the EIS
Prime or Unique Farmlands	X			This element is not present in the project area and is not analyzed in the EIS.
Threatened and Endangered Species	X			Coordination was conducted with the United States Fish and Wildlife Service (USFWS) July 1, 2011, and no threatened or endangered species listed under the Endangered Species Act (ESA) were identified in the project area or vicinity. Threatened and endangered species status is not analyzed in this EIS.
Wastes and materials (hazardous and solid)			X	See **Section 3.6** of the EIS
Water quality (surface water and groundwater)			X	See **Section 3.7** of the EIS. Water quantity, while not a supplemental authority, is also addressed in **Section 3.7** of the EIS.
Wetlands and riparian zones			X	Addressed in Water Resources (**Section 3.7**) of the EIS
Wild and Scenic Rivers	X			This element is not present in the project area and is not analyzed in the EIS.
Wilderness	X			This element is not present in the project area and is not analyzed in the EIS.

Those elements listed under the supplemental authorities that do not occur in the project area or that would not be affected are not analyzed in this EIS; however, some of the supplemental authorities are discussed below to establish the baseline, or affected environment, for the project area.

3.1.3 Additional Affected Resources

In addition to the elements listed under supplemental authorities, the BLM considers other important resources and uses on public lands that may be impacted by the Proposed Action. Other resources or uses of the human environment that have been considered for this EIS are listed in **Table 3-2**.

Those resources that do not occur in the project area or that would not be affected by the Proposed Action are not analyzed in this EIS; however, some of these resources are discussed below to establish the baseline, or affected environment, for the project area.

Table 3-2
Additional Affected Resources

Additional Affected Resources	Not Present	Present/Not Affected	Present/May Be Affected	Rationale/Reference Section
Geology and minerals		X		See **Section 3.8** of the EIS.
Noise		X		Noise would not be affected. Noise impacts on special status species are addressed in **Section 3.12**, Special Status Species
Paleontological resources		X		This resource is not known to occur in the project area; in the event that paleontological resources are encountered, they would be left intact, and their presence immediately would be brought to the attention of the BLM authorized officer; therefore this resource is not analyzed.
Rangeland management		X		This element is present but there would be no adjustments to animal unit months associated with the project; therefore, this resource is not analyzed.
Realty		X		See **Section 3.9** of the EIS
Recreation		X		Recreation would not be affected; therefore, this resource is not analyzed.

Table 3-2
Additional Affected Resources

Additional Affected Resources	Not Present	Present/Not Affected	Present/May Be Affected	Rationale/Reference Section
Social values and economics conditions			X	See **Section 3.10** of the EIS.
Soils			X	See **Section 3.11** of the EIS.
Special status species			X	See **Section 3.12** of the EIS.
Transportation, access, and public safety			X	See **Section 3.13** of the EIS.
Vegetation (including invasive nonnative species)			X	See **Section 3.14** of the EIS.
Visual resources		X		Visual resources would not be affected. The visual setting for historic properties is addressed in **Section 3.3**, Cultural Resources.
Wilderness characteristics	X			This element is not present in the project area and is not analyzed in the EIS.
Wildlife			X	See **Section 3.15** of the EIS.
Wild horses and burros		X		Based on the results of internal scoping, impacts on wild horses and burros were not identified; therefore this resource is not analyzed in this EIS.

Wild Horses and Burros

The BLM is responsible for protecting, managing, and controlling wild horses and burros, in accordance with the Wild Free-Roaming Horses and Burros Act of 1971 (Public Law 92-195, as amended). The existing and proposed project is in the Humboldt Mountains Herd Area. While there may be some horses nearby, the BLM does not manage horses in this herd area. In addition, the mine is surrounded by three-strand barbed-wire fencing and the process areas are contained within an eight-foot-high chain-link fence to inhibit access by large wildlife species and livestock. Fencing excludes wild horses, burros, and other potential grazers from grazing in the project area.

Noise

Noise sources in the project area boundary are blasting, heavy machinery, and truck and other vehicle traffic. In areas within a 10-mile radius of the project area, including most of the Humboldt Range south of Unionville, noises are typical of a less developed landscape. Primary sources of noise are vehicles on I-80 and other secondary roads, occasional aircraft overflights, and natural sounds, such as animals and wind.

Recreation

There are no Special Recreation Management Areas (SRMAs) or Extensive Recreation Management Areas (ERMAs) associated with the project area. The recreation management area nearest to the project is the Pine Forest ERMA, which is 93 miles north of the project boundary.

The Humboldt Range receives light recreation use and does not have any developed recreation facilities. The main access routes for entry into the project area are Limerick Canyon Road and American Canyon Road. Visitors use them for pleasure driving, sightseeing, and accessing hiking and hunting spots in the Humboldt Range. Access for dispersed recreation would not change from current management of the CRI Mine.

Visual Resources

The CRI Mine is in an area characterized by visually dominant disturbance associated with the historical and existing mining. Operations have added linear elements, such as pit benches, HLP benches, a conveyor, fences, roads, power lines, and buildings, which introduce blocky, regular-shaped objects into a background of irregular-shaped vegetation and a curvilinear landform.

The CRI Mine is predominantly located in a Visual Resources Management (VRM) class IV area, with a nominal extent of VRM class III along the toe of the slope of the extreme northwestern edge of the mine. The objective of VRM class IV is to manage for activities that would significantly modify the 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 basic element repetition (BLM 1986a).

The VRM class III objective is to retain part of the character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the casual observer's view. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape (BLM 1986a).

3.2 AIR QUALITY AND ATMOSPHERIC RESOURCES

Air quality is determined by the concentration of air pollutants, visibility, odors, sound, and other energy forms (such as solar radiation) transmitted through the atmosphere (BLM 2009). Ambient air quality is affected by the type and amount of air pollutants emitted into the atmosphere, the size and topography of the air basin, prevailing meteorological conditions, and the conversion of air pollutants and other particles by a complex series of chemical and photochemical reactions in the atmosphere.

3.2.1 Regulatory Framework

Federal Regulatory Considerations

The federal Clean Air Act (42 USC, Sections 7401-7642, as amended) established the principal framework for national, state, and local efforts to protect air quality in the United States. Under the Clean Air Act, the EPA has set time-averaged standards known as National Ambient Air Quality Standards (NAAQS) for the following seven air pollutants considered to be key indicators of air quality:

- Carbon monoxide (CO)
- Lead
- Nitrogen dioxide (NO_2)
- Ozone
- Particulate matter with a diameter less than or equal to 10 microns (PM_{10})
- Particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$)
- Sulfur dioxide (SO_2)

States may set their own ambient air quality standards, but they must be at least as stringent as the national standards. The State of Nevada has adopted most of the NAAQS to regulate air pollution. It has adopted a more stringent CO standard for areas higher than 5,000 feet, a more stringent SO_2 standard, and a standard for hydrogen sulfide, for which there is no national standard (NAC 445B.22097). **Table 3-3** shows the Nevada and national ambient air quality standards.

Table 3-3
State and National Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada Standards	National Standards	
			Primary	Secondary
Ozone	1-hour (outside Lake Tahoe Basin)	0.12 ppm	—	—
	1-hour (in Lake Tahoe Basin)	0.10 ppm	—	—
	8-hour	—	0.075 ppm	Same as primary
CO	1-hour	35 ppm	35 ppm	—
	8-hour (areas below 5,000 feet)	9 ppm	9 ppm	—
	8-hour (areas at or above 5,000 feet)	6 ppm	9 ppm	—
NO_2	Annual average	0.053 ppm	0.053 ppm	Same as primary
	1-hour	—	0.100 ppm	—

Table 3-3
State and National Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada Standards	National Standards	
			Primary	Secondary
SO_2	Annual average	0.030 ppm	—	—
	24-hour	0.14 ppm	—	—
	3-hour	0.5 ppm	—	0.5 ppm
	1-hour	—	0.075 ppm	—
PM_{10}	Annual arithmetic mean	50 µg/m³	—	—
	24-hour	150 µg/m³	150 µg/m³	Same as primary
$PM_{2.5}$	Annual arithmetic mean	—	12 µg/m³	15 µg/m³
	24-hour	—	35 µg/m³	Same as primary
Lead particles (total suspended particulate sampler)	Calendar quarter	1.5 µg/m³	—	—
	Rolling 3-month average	—	0.15 µg/m³	Same as primary
Hydrogen sulfide	1-hour	0.08 ppm	—	—

Sources: Nevada Division of Environmental Protection (NDEP) 2010; EPA 2011

ppm = parts per million; µg/m³ = microgram per cubic meter

Notes:
All except the national PM_{10} and $PM_{2.5}$ standards are based on measurements corrected to 25 degrees Celsius and 1 atmosphere pressure.
The national PM_{10} and $PM_{2.5}$ standards are based on direct flow volume data without correction to standard temperature and pressure.
The 10 in PM_{10} and the 2.5 in $PM_{2.5}$ do not indicate strict particle size limits but identify the particle size class (aerodynamic diameter in microns) collected with 50 percent mass efficiency by certified sampling equipment. The maximum particle size collected by PM_{10} samplers is about 50 microns; the maximum particle size collected by $PM_{2.5}$ samplers is about 6 microns.
The national three-month rolling average standard for lead was adopted in November 2008. The previous calendar quarter lead standard will remain in effect for a minimum of one year.
The Nevada standard for hydrogen sulfide represents an increment above naturally occurring background concentrations.

In addition to the criteria pollutants listed above, the Clean Air Act regulates toxic air pollutants, or hazardous air pollutants (HAPs), that are known to cause or are suspected to cause cancer or other serious health effects or adverse environmental impacts. The HAP regulatory process identifies specific chemical substances that are potentially hazardous to human health and sets emission standards to regulate the amount of those substances that can be released by individual facilities or by specific types of equipment. The EPA has issued rules covering 80 categories of major industrial sources, as well as categories of smaller sources. Controls are usually required at the source to limit the release of these toxics into the atmosphere.

Prevention of Significant Deterioration

Prevention of significant deterioration sets forth a permit process that applies to one new major stationary sources or major modifications of existing sources, where the source is in an attainment or unclassifiable area, as defined by the NAAQS. The EPA Prevention of Significant Deterioration Program allows for increases in emissions from major sources, while ensuring that air quality does not degrade beyond the NAAQS levels. The existing air emission sources associated with the CRI Mine do not qualify as major sources under the program.

Air quality regions are classified as I, II, or III to indicate the degree of air quality deterioration that is allowed, while not exceeding the NAAQS (though no class III areas have been designated).

Class II areas allow a moderate change in air quality due to industrial growth, while still maintaining air quality that meets the NAAQS. The CRI Mine is in a class II area.

Class I areas are special areas of natural wonder and scenic beauty, such as national parks, national monuments, and wilderness areas, where air quality should be given special protection. Class I areas are subject to maximum limits on air quality degradation. There are 10 class I areas within 300 kilometers (186 miles) of the mine site. Based on the analysis of prevailing winds, the Jarbridge Wilderness is the only one of these class I areas that is downwind of the mine site. This wilderness area is approximately 265 kilometers (165 miles) to the west in Elko County (JBR 2014).

New Source Performance Standards

The EPA sets the New Source Performance Standards (40 CFR, Part 60, Subpart LL [Standards of Performance for Metallic Mineral Processing Plants]) for specific types of new or modified stationary sources. These standards set fixed emission limits for classes of sources to prevent deterioration of air quality from the construction of new sources and to reduce control costs by building pollution controls into the initial design of sources. In establishing the standards, the EPA is required to consider cost, impacts that do not affect the air, and energy requirements. Certain project units used to process metallic minerals are subject to the standards.

Title V Permitting

Federal operating permits, also known as Title V permits, are required for facilities that have the potential to emit the following:

- More than 100 tons per year of any regulated pollutant except particulate matter
- 10 tons per year of any single HAP
- 25 tons per year or more of any combination of HAP

Facilities that meet this threshold are required to submit a federal operating permit application. The CRI Mine does not require a Title V permit.

Community Right-to-Know Reporting
Operations at the CRI Mine are subject to annual reporting requirements under Section 313 of the Emergency Planning and Community Right-to-Know Act, also known as the EPA Toxic Release Inventory Program. The current list contains 594 chemicals in 31 chemical categories (EPA 2015). Reportable substances applicable to the CRI Mine are chromium, copper compounds, cyanide compounds, lead compounds, manganese, mercury compounds, nickel, nitrate compounds, silver compounds, and zinc compounds (EPA 2013a). The reporting threshold for mercury or mercury compounds is 10 pounds per calendar year. A mercury compound is defined as "any unique chemical substance that contains mercury as part of the chemical's infrastructure." Reporting data are used to calculate emissions from releases to air (fugitive and point sources), water discharges, land, transfers off-site, and other waste management activities.

Greenhouse Gas Reporting Rule
The Final Mandatory Reporting of Greenhouse Gases Rule, issued by the EPA on September 22, 2009, requires certain industries to submit annual reports to the EPA. These are the suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHGs. GHGs include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. CRI Mine operations have not been subject to the Mandatory Reporting of Greenhouse Gases Rule.

State Regulatory Considerations
The EPA has the authority to delegate primary responsibility for air pollution control to the states. The State of Nevada has further delegated this authority to the NDEP, Bureau of Air Quality Planning (BAPQ) and Bureau of Air Pollution Control (BAPC). These bureaus are responsible for air quality planning and pollution control, respectively, across most of Nevada, including in the project area.

BAPC is responsible for air quality permitting, compliance, and enforcement. It implements the Title V permit program and minor source permitting programs for facilities that emit less than 100 tons per year of all criteria pollutants and are not a major source of HAP. CRI's current mining operations are regulated under Class II Air Quality Operating Permit No. AP1044-0063.

Federal emission standards for HAPs have been promulgated as National Emission Standards for HAPs and as Maximum Available Control Technology (MACT) standards. The State of Nevada adopted regulations that require facilities to obtain a mercury operating permit to construct thermal process units at precious metals mining operations. Known as the Nevada Mercury Control Program, it requires mercury air emission controls. These controls are

subject to a MACT determination, as well as testing, sampling, operating, maintaining, monitoring, recordkeeping, and reporting as permit requirements. In accordance with Nevada Mercury Control Program regulations, facility operators must report annual mercury and mercury co-product emissions. The CRI Mine is operating under a Phase 2, Mercury Operating Permit to Construct No. AP-1044-2242.

3.2.2 Affected Environment

Air Quality

Current Air Quality Conditions

The project site is in the center of the Humboldt Range in northwestern Nevada's Pershing County. The mine occupies elevations ranging from 5,400 to 7,300 feet amsl, with high relief over most of the area. It is primarily in the Buena Vista Valley Air Basin.

The NDEP BAPQ operates and maintains a network of ambient air quality monitors throughout rural Nevada. There are no active monitoring stations in the air basin where the project is located. The bureau operated a PM_{10} monitoring station in Lovelock from 1992 to 1997; no violations of the PM_{10} standard were recorded during that period (JBR 2014).

The Clean Air Act requires each state to identify areas that have ambient air quality in violation of NAAQS, using the monitoring data collected through state monitoring networks. Areas that violate air quality standards are designated as nonattainment for the relevant criteria air pollutants; areas that comply with air quality standards are designated as attainment for the relevant criteria air pollutants; areas that have been redesignated from nonattainment to attainment are considered maintenance areas. Areas of uncertain status are generally designated as unclassifiable but are treated as attainment areas for regulatory purposes.

Pershing County is in an area designated as unclassifiable or attainment for all of the NAAQS (EPA 2014a); it is also in attainment with the state standards (JBR 2014). CRI has NDEP BAPC Control Class II Air Permit #AP1044-0063, as well as Mercury Control Program Permit #AP1044-2242.

Existing Air Emission Sources

JBR Environmental Consultants (2014) prepared an air resources baseline technical report for the POA 10. This report described permitted stationary sources within 25 kilometers (16 miles) of the CRI Mine site, emissions reported for Pershing County in the EPA's National Emission Inventory database, and 2012 facility-wide emissions for the CRI Mine. Information from this report is summarized below.

Stationary Sources within 25 Kilometers of the CRI Mine

There were five permitted sources within 25 kilometers (16 miles) of the CRI Mine. **Table 3-4** lists these sources and emission limits contained in their state air quality permits.

Table 3-4
Stationary Source Permitted Emission Limits

Facility	Permitted Emission Limit (Tons per Year)					
	$PM_{2.5}$	PM_{10}	SO_2	NO_x	CO	VOC*
Azzarello's Truck-N-Hoe	5 tons per year aggregated cap					
EP Minerals (Colado Plant)	102.71	101.39	99.00	98.00	57.80	17.19
Gold Acquisition Corp. (Relief Canyon Mine)	72.11	33.89	4.6	88.28	18.82	2.6
Nevada Department of Corrections (Lovelock Correctional Center)	0.88	0.88	1.61	11.48	1.25	0.61
Presco Energy						12.5

Source: JBR 2014

*Volatile organic compound

National Emission Inventory

The EPA's National Emission Inventory database contains information about sources that emit criteria air pollutants and their precursors and HAPs. The database includes estimates by county of annual air pollutant emissions from point, nonpoint, and mobile sources. The EPA collects information about sources and releases an updated version of the inventory database every three years, most recently in 2011. **Table 3-5** shows emissions for criteria air pollutants, GHGs, and mercury.

Table 3-5
2011 National Emissions Inventory, Pershing County, Nevada

Facility	Permitted Emission Limit (Tons per Year)						
	$PM_{2.5}$	PM_{10}	SO_2	NO_x	CO	VOC	GHG
Fuel combustion	9.76	10.01	13.65	147.83	107.02	83.99	—
Industrial	306.07	2,239.32	0.47	4.84	6.76	2.53	—
Mobile	66.79	74.94	10.46	2,490.54	4,670.80	733.70	258,444
Total	**382.62**	**2,324.27**	**24.58**	**2,643.21**	**4,784.58**	**820.22**	**258,444**

Source: EPA 2013b

GHGs include carbon dioxide, methane, and nitrous oxides; not included are biogenics (produced by living organisms), agriculture, fugitive dust, or fire categories.

CRI Mine Facility-Wide Emissions

In its air resource baseline report, JBR Environmental Consultants (2014) developed an emissions inventory for mine operations at the CRI Mine (see **Table 3-6**).

Table 3-6
Coeur Rochester Mine Emissions

Source	Emissions (Tons per Year)							
	$PM_{2.5}$	PM_{10}	SO_2	NO_x	CO	VOC	CO_{2e}	HAP
Point source	15	60	7.4	63	10	4.3	5,270	0.15
Process operations	32	319	0.44	584	595	48	35,418	0.72
Total	**47**	**379**	**7.84**	**647**	**605**	**52.3**	**40,688**	**0.87**

Source: JBR 2014

CO_{2e} = carbon dioxide equivalents; a measure that accounts for the global warming potential of the different composite of CO_2 and other greenhouse gases

As stated earlier (Community Right-to-Know Reporting) under the EPA's Toxic Release Inventory Program, operators of facilities that emit more than 10 pounds of mercury per calendar year (point sources and fugitive sources) are required to report it to the EPA. Under the Nevada Mercury Control Program, mine operators must report annual mercury emissions from point sources only. In addition, the Nevada Mercury Control Program has data and testing requirements that differ from the Toxic Release Inventory Program; therefore, reported emissions differ between reporting programs.

Under the Toxic Release Inventory Program, CRI reported 0.5 pound of fugitive or nonpoint mercury emissions and 2.7 pounds of stack or point mercury emissions in 2012 (EPA 2012). Under the Nevada Mercury Control Program, CRI reported 3.26 pounds of mercury emitted in 2012 (NDEP 2012a).

Climate

Detailed climate and meteorological information is included in the air resources baseline report (JBR 2014); summaries are provided below.

Climate

Nevada is predominantly an elevated plateau with basin and range geologic characteristics. The eastern part of the state has an average elevation of 5,000 to 6,000 feet; the western part is 3,800 to 5,000 feet, the lower limit being in the vicinity of Pyramid Lake and Carson Sink. Pershing County is arid, historically receiving only 7 inches of rain annually, 8 inches of snow, and approximately 38 days of measureable precipitation. The CRI Mine is in the center of the Humboldt Range, which is composed of a mix of alpine forest and high sagebrush vegetation. A perennial high pressure ridge in the region tends to keep the skies clear, which may produce large diurnal temperature swings. The average annual temperatures, averaged over 30 years, were a maximum of 56˚F and a minimum of 44˚F (JBR 2014).

Meteorological Data

CRI collects meteorological data from the on-site Rochester Mine Meteorological Station. Data collected are wind speed and direction, precipitation, temperature, barometric pressure, relative humidity, solar

radiation, and pan evaporation. Wind directions strongly tend to the northeast-southwest. Speeds vary somewhat but tend to be strongest from the south and northeast, consistent with the terrain channeling effects in the region.

The maximum and minimum annual temperatures from 2010 to 2013 were 93.3˚F and 1.1˚F. The average monthly temperature ranged between 20.5 and 69.4˚F.

Average monthly precipitation on-site ranged from 0.17 inch in September to 1.41 inches in March. The average annual combined snow and rain recorded at the mine from 2011 through 2013 was approximately 8.61 inches. Most precipitation occurs from October through April (JBR 2014).

Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change as a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean or the variability of its properties and that persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity (IPCC 2013).

GHGs are compounds in the atmosphere that absorb infrared radiation and radiate a portion of it back to the earth's surface, thus trapping heat and warming the atmosphere. GHGs occur naturally as well as through man-made processes.

The EPA estimated that national GHG emissions in 2012 (the most recent year for which national data has been tabulated) were 6,526 million metric tons of CO_{2e}. The EPA categorized the major economic sectors contributing to US emissions of GHGs in 2012 as follows (EPA 2014b:

- Electric power generation (32 percent)
- Transportation (28 percent)
- Industry (20 percent)
- Agriculture (10 percent)
- Commercial and residential sources (10 percent)

The NDEP estimated Nevada's statewide GHG emissions in 2010 (the most recent year for which state data has been tabulated) at 45 million metric tons of CO_{2e} (NDEP 2012b). The major sectors contributing to Nevada's GHG emissions in 2010 were as follows (NDEP 2012b):

- Electric power generation (38 percent)
- Transportation (34 percent)

- Industry (12 percent)
- Agriculture (3 percent)
- Commercial and residential sources (13 percent)

The social cost of carbon (SCC) is addressed in the Environmental Impacts discussion in **Section 4.6**, Social Values and Economic Conditions.

3.3 CULTURAL RESOURCES

The area of potential effect (APE) includes the proposed new disturbance within the project area (approximately 680 acres), the northern portion of the National Register of Historic Places (NRHP)-eligible Rochester Cultural District (RCD; CrNV-02-12593/D177), and the NRHP-eligible townsite of Panama (CRNV-02-401) (**Figure 3-1**, Area of Potential Effect). The APE is composed of the direct effects APE (proposed disturbance area) and the indirect effects APE. The entire APE is approximately 2,880 acres.

3.3.1 Regulatory Framework

The National Historic Preservation Act (NHPA; previously 16 USC, Section 470 et seq.; now 54 USC, Section 300101 et seq.) and its implementing regulations under 36 CFR, Part 800, require all federal agencies to consider effects of federal actions on cultural resources eligible for listing or listed on the NRHP.

NHPA compliance is guided by statewide protocols developed by state BLM offices and the State Historic Preservation Offices (SHPOs). In Nevada, the State Protocol Agreement between the BLM and the Nevada SHPO defines how the BLM and SHPO provide direction for implementing the NHPA (BLM 2014).

The treatment of historic properties during mineral development associated with the Coeur Rochester Mine is guided by a programmatic agreement, signed in 1992 by the BLM Winnemucca District, Nevada Division of Historic Preservation and Archaeology, and the Advisory Council on Historic Preservation (BLM et al. 1992).

Other laws related to cultural resources with which federal agencies must comply include the following:

- Archaeological and Historic Preservation Act of 1974
- Archaeological Resource Protection Act of 1979
- National Environmental Policy Act of 1969
- Federal Land Policy and Management Act of 1976

Consultation with tribes regarding Properties of Cultural and Religious Importance (PCRIs) can be found in **Section 3.5**, Native American Religious Concerns.

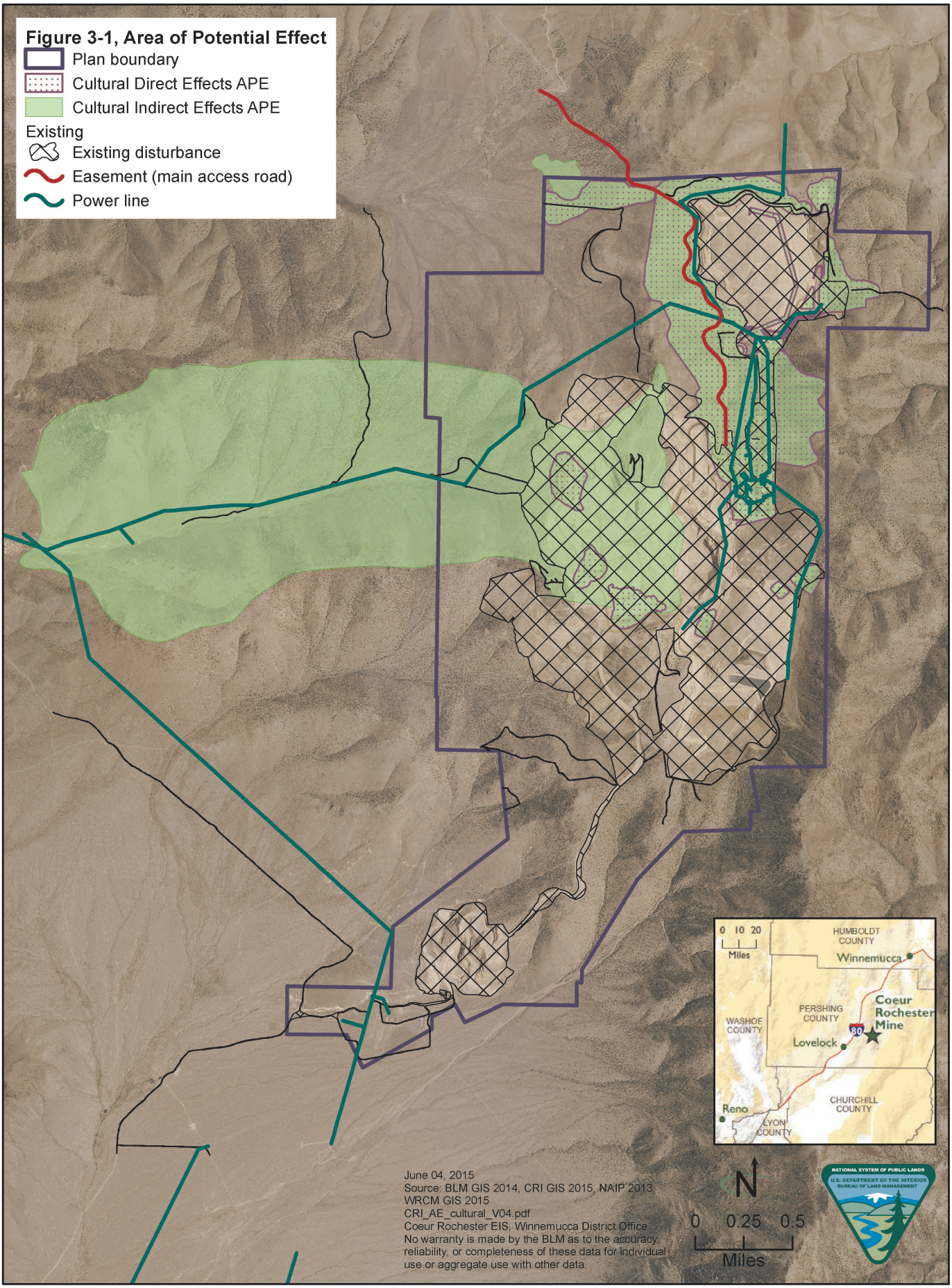
Figure 3-1, Area of Potential Effect
Plan boundary
Cultural Direct Effects APE
Cultural Indirect Effects APE
Existing
Existing disturbance
Easement (main access road)
Power line
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
PERSHING COUNTY
Coeur Rochester Mine
WASHOE COUNTY
80
Lovelock
CHURCHILL COUNTY
Reno
LYON COUNTY
June 04, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013, WRCM GIS 2015
CRI_AE_cultural_V04.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
N
0 0.25 0.5
Miles
NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

3.3.2 Affected Environment

Cultural resources (e.g., archaeological sites or districts) are normally identified and recorded or updated during class III intensive field surveys. Class III inventories cover the APE using pedestrian transects spaced no more than 30 meters (98 feet) apart when ground surface cover, such as snow or vegetation, no longer exceeds 25 percent (BLM 2014a). A report of these results, along with all site documentation, is then submitted to the BLM archaeologist and forwarded on to the SHPO for concurrence of site NRHP eligibility and any project impacts.

Twenty-one class III surveys have covered portions of the APE over the past 31 years. The surveys identified 14 sites in the APE (**Table 3-7**, Class III Inventories). These include three NRHP-eligible sites, including one in the direct effects APE and two in the indirect effects APE. The site in the direct effects APE, Site CrNV-22-3545, is a multicomponent site, consisting of a prehistoric complex and historic site. The prehistoric component is eligible under Criterion D, but the historic component is ineligible for listing on the NRHP. Of the sites in the indirect effects APE, Site CrNV-02-401 is the historic Panama townsite and Site CrNV-02-12598 is a mining complex. The Panama townsite is eligible for listing on the NRHP under Criteria A and D. The historic site of CrNV-02-12598 has been determined to be a contributing element of the historic Rochester Cultural District (CrNV-02-12593/D177), as defined by Babal et al. (1993) and Busby et al. (1993). The cultural district is eligible for listing on the NRHP under Criteria A and D. There are 11 additional sites in the APE that are not NRHP eligible.

Table 3-7
Class III Inventories

BLM Report No.	Year	Authors	Company/Agency	Title	Sites (CrNV-XX-XXXX)
CR2-968	1984	McGuckian, Peggy	BLM	Coeur Exploration Sump Improvement	
CR2-2007	1986	Hemphill, Martha L. and Thomas D. Burke	Archaeological Research Services, Inc.	Cultural Resources Assessment for the Rochester Mine Project Parcel Power Line Reroute	22-3545
CR2-2022	1986	Sutton, Paula A.	Archaeological Research Services, Inc.	Preliminary Cultural Resource Investigation of Sierra Pacific Power Company Transmission Line Corridor in Rochester Canyon, Pershing County, Nevada	

Table 3-7
Class III Inventories

BLM Report No.	Year	Authors	Company/Agency	Title	Sites (CrNV-XX-XXXX)
CR2-2024a	1986	Burke, Thomas D. and Martha L. Hemphill	Archaeological Research Services, Inc.	Coeur Explorations, Inc. Rochester Mining Development Project Parcel Inventory	22-3545 22-3563
CR2-2024b	1986	Clay, Vickie L. and Thomas D. Burke	Archaeological Research Services, Inc.	Coeur Explorations, Inc. Rochester Mining Development Project Parcel Inventory, Addendum	22-3545; 22-3563; 22-3588 (incorporated into 02/22-3545); 22-3589 (incorporated into 02/22-3545)
CR2-2024c	1986	Clay, Vickie L.	Archaeological Research Services, Inc.	Further Evaluation of MK7 Coeur Explorations, Inc. Rochester Mining Project Parcel Area	22-3545
CR2-2024e	1986	Zeier, Charles D.	Intermountain Research	Archaeological Investigations at Rochester Heights and Nearby Historic Settlements, Pershing County, Nevada	
CR2-2168	1987	Zeier, Charles D. and Lou Ann Speulda	Intermountain Research	A Class III Archaeological Inventory and Evaluation in Weaver Canyon, Pershing County, Nevada	
CR2-2168d	1989	Zeier, Charles D. and Elizabeth E. Budy	Intermountain Research	Adits and Anvils: Archaeological Data Recovery at Two Mineral Exploration Sites, Sunflower Hill, Pershing County, Nevada	
CR2-2321	1989	Lennon, Thomas J., Steven Mehls, Phillip Green	Western Cultural Resource Management, Inc.	A Cultural Resource Inventory of the Coeur-Rochester Weaver Saddle Area, Pershing County, Nevada	
CR2-2322	1989	Vierra, Robert K. and Jerry W. Oothoudt	Mariah Associates, Inc.	A Cultural Resources Survey of the Coeur-Rochester Project Expansion Area, Pershing County, Nevada	22-4760

Table 3-7
Class III Inventories

BLM Report No.	Year	Authors	Company/Agency	Title	Sites (CrNV-XX-XXXX)
CR2-2334	1989	Oothoudt, Jerry W.	Mariah Associates, Inc.	Further Archaeological Investigations at Site CrNV-22-3545	22-3545
CR2-2377	1990	Kautz, Robert R.	Mariah Associates, Inc.	A Class III Cultural Resources Survey of the Black Ridge, Humboldt Range, Pershing County, Nevada	
CR2-2416	1991	Mehls, Steven F.	Western Cultural Resource Management, Inc.	Multiple Property Documentation Form and Treatment Plan for the Historic Period Resources of the Rochester Mining District Study Area, Pershing County, Nevada	
CR2-2441	1991	Busby, Colin I., Donna M. Garaventa, and Melody E. Tannam	Basin Research Associates, Inc.	A Cultural Resources Inventory of the Friedman Dump Project Area in the Vicinity of the Coeur Rochester Mine, Pershing County, Nevada	
CR2-2491	1992	Busby, Colin I., Donna M. Garaventa, and Melody E. Tannam	Basin Research Associates, Inc.	Evaluation: an Evaluation of National Register Eligible and Unevaluated Cultural Resources from Inventories and Project within Amendment Areas B and C of the Coeur Rochester Mine, Pershing County, Nevada	
CR2-2511	1993	Busby, Colin I., Donna M. Garaventa, Stuart A. Guedon, Robert M. Harmon, Melody E. Tannam, David G.	Basin Research Associates, Inc.	Cultural Resources Inventory: Proposed 18.0+/- Acre Waste Rock Dump Expansion Project Vicinity of the Coeur Rochester Mine, Pershing County, Nevada	22-3563

Table 3-7
Class III Inventories

BLM Report No.	Year	Authors	Company/Agency	Title	Sites (CrNV-XX-XXXX)
		Brittin, Deborah M. DiPasqua, and Ranbir Sidhu			
CR2-2648 (N)	1994	Busby, Colin I.	Basin Research Associates, Inc.	Construction of an Underground Pipeline	
CR2-2670	1996	Busby, Colin I., Donna M. Garaventa, Stuart A. Guedon, and Melody E. Tannam	Basin Research Associates, Inc.	Cultural Resources Inventory: Proposed 28.7+/- acre Rock Disposal Site Permit Expansion Project, Vicinity of the Coeur Rochester Mine, Pershing County, Nevada	
CR2-3142	2011	Berg, Adam	ASM Affiliates	A Class III Cultural Resource Inventory of 3110 acres for the Barrick Gold Exploration, Inc. Spring Valley Project, Pershing County, Nevada	02-401; 02-11039; 02-11041
CR2-3167	2014	Stoner, Edward J. and Teresa Wriston	WCRM, Inc.	A Class III Cultural Resource Inventory for the Coeur Rochester, Inc. Plan of Operations Amendment (POA) Number 10 in Pershing County, Nevada	02-401; 22-3426 (incorporated into 22-3545); 22-3545; 22-3563; 22-3588 (incorporated into 22-3545); 22-3589 (incorporated into 22-3545); 22-4760; 22-11039; 22-11041; 02-11663; 02-12590; 02-12591; 02-12594; 02-12595; 02-12596; 02-12597; 02-12598

Source: Stoner and Wriston 2015

Most of the sites are related to twentieth century gold and silver mining, often associated with the developments in the Rochester Mining District (Babal et al. 1993; Shamberger 1973). The prehistoric sites in the inventory area reflect seasonal hunting and gathering encampments and task sites of Archaic to Late Prehistoric Age.

3.4 MIGRATORY BIRDS

This section describes the affected environment and existing conditions in the project area related to migratory birds. (Non-avian wildlife species are addressed in **Section 3.15**, Wildlife.) Special status wildlife species, including special status birds, are addressed in **Section 3.12**, Special Status Species.

3.4.1 Regulatory Framework

Migratory Bird Treaty Act of 1918

The MBTA implements a series of international treaties that provide for migratory bird protection. It authorizes the Secretary of the Interior to regulate the taking of migratory birds. The MBTA provides that it is 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, Section 703); it does not regulate habitat. The list of species protected by the MBTA was revised in March 2010 and includes almost all 1,007 bird species that are native to the United States.

3.4.2 Affected Environment

Survey Method

JBR Consultants, Inc., gathered baseline data and performed floristic and general wildlife, migratory bird, and special status wildlife species surveys in 2011, 2012, and 2013 (JBR 2013). The potential habitat for migratory birds is the 4,838-acre project area (see **Figure 1-2**); it does not include the study area for the golden eagle, which is a ten-mile radius around the project area. The golden eagle (*Aquila chrysaetos*) is discussed in **Section 3.12**, Special Status Species.

Migratory Birds

All bird species and the location of all bird nests observed in the project area during biological surveys conducted in 2011, 2012, and 2013 were recorded. Biologists used binoculars to scan for nests, and they walked transects (discussed below) to flush birds from nests.

In addition, point count bird survey transects were established, following the protocols provided by the Great Basin Bird Observatory (GBBO 2003). This method involves establishing transects approximately two miles long and in a single habitat type. Point count transects were surveyed from June 28 through July 1, 2011.

The location and number of transects was determined in consultation with the BLM. Transect 2 is in the project area, and Transect 1 is immediately outside

the project area. Transects were placed in the dominant habitat types contained in the project area, as described below. They were placed in areas that were sufficiently large enough to accommodate a transect in a single vegetation community. At two locations, transects were shortened or angled to remain in the same habitat type because sufficient continuous habitat was not present. Transect 1 was established in Inter-Mountain Basins Big Sagebrush Shrubland habitat (specifically Wyoming sagebrush) in the western and northern parts of Packard Flat. This transect is immediately outside the project area. Transect 2 was established in Inter-Mountain Basins Juniper Savannah and Inter-Mountain Basins Big Sagebrush Shrubland habitat on the slopes east of the northern part of the mine (see **Section 3.14**, Vegetation, for detailed descriptions of vegetation communities.)

Point count stations were established every 300 meters (984 feet) along the transect centerline. The biologists used a handheld global positioning system (GPS) unit to locate each point count station. Birds observed at each station were recorded, and the distance between each bird and the point count station was determined with an optical range finder. The bird's behavior was recorded, along with any evidence of breeding activity, such as nests, songs, and the presence of young birds.

Raptor Species

The biologists also documented the nests of other raptor species that they identified during the nesting golden eagle surveys (described in **Section 3.12**, Special Status Species). Comprehensive surveys for raptor nests were conducted concurrently with golden eagle nesting surveys in 2011 and May 27 to 29 and July 9, 2013. In 2012, observations of raptor nests were recorded during surveys for other wildlife. Findings are outlined in **Table 3-8**, Migratory Bird and Raptor Species observed in the Project Area.

Table 3-8
Migratory Bird and Raptor Species observed in the Project Area

Species	Special Status[1]	Years Observed	Nest Observed	Notes
Migratory Birds				
Sage sparrow (*Amphispiza belli*)	BCC	2011, 2012, 2012	—	Likely year-round resident; observed during point count transect surveys on Transect 1[2]
Black-throated sparrow (*A. bilineata*)		2011, 2012, 2013	Yes	Observed during point count transect surveys on transects 1[2] and 2
Scrub jay (*Aphelocoma californica*)		2011	—	American Canyon east of Stage IV Leach Pad
Juniper titmouse (*Baeolophus ridgwayi*)		2011, 2012	—	Year-round resident
Lesser goldfinch (*Carduelis psaltria*)		2011	—	South American Canyon Spring
House finch (*Carpodacus mexicanus*)		2011, 2012	—	Multiple observations

Table 3-8
Migratory Bird and Raptor Species observed in the Project Area

Species	Special Status[1]	Years Observed	Nest Observed	Notes
Turkey vulture (*Cathartes aura*)		2011	—	Multiple observations flying throughout project area
Canyon wren (*Catherpes mexicanus*)		2011	—	Single individual observed, likely migrant
Lark sparrow *Chondestes grammacus*)		2011	—	Sagebrush, juniper; observed during point count transect surveys on Transect 1[2]
Marsh wren (*Cistothorus palustris*)		2011	—	Spring through fall resident
Rock pigeon (*Columba livia*)		2013	—	Observed in abandoned mine workings
Common raven (*Corvus corax*)		2012, 2013	Yes	Commonly observed, several active nests on rock outcrops; observed during point count transect surveys on Transect 1[2]
Gray flycatcher (*Empidonax wrightii*)		2011, 2012	—	Summer resident; observed during point count transect surveys on Transect 2
Horned lark (*Eremophila alpestris*)		2011, 2012	—	Commonly observed; observed during point count transect surveys on Transect 1[2]
Brewer's blackbird (*Euphagus cyanocephalus*)		2011	Yes	About springs, nesting near office and shop area
House finch (*Haemorhous mexicanus*)		2011	—	Observed during point count transect surveys on Transect 2
Barn swallow (*Hirundo rustica)*		2011, 2012	—	Observed in abandoned mine workings and at South American Canyon Spring; observed during point count transect surveys on Transect 1[2]
Bullock's oriole (*Icterus bullockii*)		2012	—	American Canyon. Summer resident
Loggerhead shrike (*Lanius ludovicianus*)	BLM S, BCC	2011, 2012	—	Family group observed during point count transect surveys on Transect 1[2]
Song sparrow (*Melospiza melodia*)		2011	—	South American Canyon Spring
Northern mockingbird (*Mimus polyglottos*)		2013	—	Packard Flat
Brown-headed cowbird (*Molothrus ater*)		2011	—	Observed during point count transect surveys on Transect 1[2]
Townsend's solitaire (*Myadestes townsendii*)		2011	—	Juniper habitats
Sage thrasher (*Oreoscoptes montanus*)	BLM S	2011, 2012	—	Commonly observed; dense sagebrush habitat; observed during point count transect surveys on Transect 1[2]
Common poorwill (*Phalaenoptilus nuttallii*)		2011	—	Multiple observations
Black-billed magpie (*Pica hudsonia*)		2012	—	Year-round resident

Table 3-8
Migratory Bird and Raptor Species observed in the Project Area

Species	Special Status[1]	Years Observed	Nest Observed	Notes
Spotted towhee (*Pipilo maculatus*)		2011, 2012	—	Dense brush, juniper; summer resident
Mountain chickadee (*Poecile gambeli*)		2011	—	American Canyon east of Stage IV Leach Pad
Vesper sparrow (*Pooecetes gramineus*)		2011	—	North of Stage IV Leach Pad
Blue-gray gnatcatcher (*Polioptila caerulea*)		2011, 2012	—	Summer resident
Bushtit (*Psaltriparus minimus*)		2011, 2012	—	Dense brushy areas; year-round resident
American avocet (*Recurvirostra americana*)		2013	—	Observed during burrowing owl surveys
Rock wren (*Salpinctes obsoletus*)		2011	—	Commonly observed on rock outcrops on slopes; likely spring through fall resident; observed during point count transect surveys on Transect 2
Say's phoebe (*Sayornis saya*)		2011, 2012	—	Observed in abandoned mine workings, and in shop building area
Yellow-rumped warbler (*Setophaga coronata*)		2011	—	American Canyon east of Stage IV Leach Pad
Mountain bluebird (*Sialia currucoides*)		2011, 2012	—	Summer resident; juniper edge habitat; observed during point count transect surveys on Transect 2
Brewer's sparrow (*Spizella breweri*)	BLM S, BCC	2011, 2012, 2013	—	Commonly observed; Likely summer resident; observed during point count transect surveys on transects 1[2] and 2
Chipping sparrow (*S. passerina*)		2011	—	Juniper habitat
Northern rough-winged swallow (*Stelgidopteryx serripennis*)		2012	—	American Canyon
Western meadowlark (*Sturnella neglecta*)		2012, 2013, 2011	—	Sagebrush habitat; commonly observed; observed during point count transect surveys on Transect 1[2]
Bewick's wren (*Thryomanes bewickii*)		2011	—	American Canyon east of Stage IV Leach Pad; likely year-round resident
American robin (*Turdus migratorius*)		2011	—	Juniper habitat
Western kingbird *Tyrannus verticalis*		2011	—	Multiple observations
Violet-green swallow (*Tachycineta thalassina*)		2011, 2012	—	South American Canyon Spring
Warbling vireo (*Vireo gilvus*)		2011	—	American Canyon east of Stage IV Leach Pad
Mourning dove (*Zenaida macroura*)		2011	—	Sagebrush habitats, water sources
White-crowned sparrow (*Zonotrichia leucophrys*)		2011	—	Dense brush; winter resident

Table 3-8
Migratory Bird and Raptor Species observed in the Project Area

Species	Special Status[1]	Years Observed	Nest Observed	Notes
Raptor Species				
Cooper's hawk (*Accipiter cooperii*)		2011	Active nest	Active nest observed in Limerick Canyon in 2011; individual observed flying in project area
Northern harrier (*Circus cyaneus*)		2011, 2013	—	Over Packard Flat
Sharp-shinned hawk (*Accipiter striatus*)		2011	—	Flying over lower Limerick Canyon
Great horned owl (*Bubo virginianus*)		2011	—	Returned artificial call during nocturnal owl surveys
Swainson's hawk (*Buteo swainsoni*)	BLM S	2011, 2013	Active nest	Active nest observed in 2013; also observed flying over western Buena Vista Valley in 2011
Red-tailed hawk (*B. jamaicensis*)		2011, 2012, 2013	Multiple active nests	Three active nests were found in 2011: one that fledged young was found on an outcrop west of the Stage IV HLP, and two additional nests were found on transmission line structures near Spring Valley, north of the mine. One active nest was found in 2012: in a cottonwood tree in upper American Canyon over the road, with young. Two additional active nests were found in 2013.
Ferruginous hawk (*Buteo regalis*)	BLM S, BCC	2011, 2013	Multiple active nests	In 2011, active nest was found on a transmission line structure in Spring Valley, approximately 1.75 miles north of the mine. An additional active nest was observed in 2013.
Prairie falcon (*Falco mexicanus*)		2011, 2013	Multiple active nests	Three active nests (one in an inactive golden eagle nest) were observed in 2013. An additional observation was in Buena Vista Valley.
American kestrel (*Falco sparverius*)		2013	—	Individuals were observed in junipers and on outcrops in American Canyon and upper Limerick Canyon.

Source: JBR 2013

[1]BLM S: BLM Sensitive; BCC: USFWS Bird of Conservation Concern (USFWS 2008). Special status species are discussed in **Section 3.12**.
[2]Transect 1 was established immediately outside of the project area.

Nocturnal Owls

Nocturnal owl surveys were conducted by establishing three nocturnal owl-calling and spotlighting survey transects; each transect was surveyed for one night between June 28 and 30, 2011. Juniper woodlands are potential nesting habitat for long-eared owl (*Asio otus*), and woody riparian communities provide potential nesting habitat for short-eared owl (*A. flammeus*). Two transects were

established in areas with Inter-Mountain Basins Juniper Savanna along the east-central part of the project area, down to South American Canyon Spring. The second transect was established in the southeastern part of the project area, above Packard Gulch in the upper reaches of Wood Canyon. A third transect was established in riparian vegetation in lower American Canyon, east of the project area.

Owl calling and spotlighting stations were placed at 0.25-mile intervals. At each station, the observer listened for any owl calls for at least two minutes. Taped calls of long-eared and short-eared owls were broadcast with a wildlife caller, and the observer listened for responses for another two minutes. The calls were then played a second time, followed by another two-minute listening period. A one-million candlepower spotlight was used to illuminate the area and look for the eye shine of any wildlife in the area.

Survey Results

The project area is in the Intermountain Region, Great Basin Division, Central Great Basin Section Floristic Zone (Cronquist et al. 1972). This zone includes elevated valleys that are generally higher than 5,000 feet amsl. Vegetation in this section is dominated by sagebrush on the valley bottoms and a narrow belt of shadscale and halophytic vegetation[1] in saline playas. Pinyon-Juniper Woodland occurs in the higher elevations; here moisture is slightly higher, except for the portion of this section north of the Humboldt River, which is beyond the range of single-leaf pinyon (Cronquist et al. 1972).

Migratory Birds

Results of migratory bird surveys are summarized in **Table 3-8**.

Results of the migratory bird point count transect surveys are also summarized in **Table 3-8**, including the transect the species was observed on.

Raptor Species

Raptors observed during surveys in 2011 through 2013 are summarized in **Table 3-8**; golden eagle surveys and results are discussed in **Section 3.12**.

Nocturnal Owls

No owls were detected in Transects 1 and 3. Near the north end of Transect 2, north of South American Canyon Spring, a great horned owl (*Bubo virginianus*) returned a call. Artificial calling was terminated to minimize the risk of the great horned owl preying on a smaller owl species should that species respond to calls.

While no long-eared or short-eared owls responded to calls played during nocturnal surveys, a family group of seven long-eared owls was found in Great

[1]Able to synthesize complex organic compounds by photosynthesis

Basin Foothill and Lower Montane Riparian Woodland and Shrubland habitat in the Cole Canyon drainage, below Black Knob Spring. These birds may have been using a magpie nest found in the area. Three long-eared owls were also observed in this area in a willow thicket.

Western burrowing owl surveys are discussed in **Section 3.12**, Special Status Species.

3.5 NATIVE AMERICAN RELIGIOUS CONCERNS

3.5.1 Regulatory Framework

The following federal laws require the BLM to consult with affected tribes, tribal organizations, and individuals to advise on proposed projects that may have an effect on cultural sites, resources, and traditional activities:

- NHPA (previously 16 USC, Section 470 et seq.; now 54 USC, Section 300101 et seq.)
- American Indian Religious Freedom Act (AIRFA; Public Law 95-341)
- Native American Graves Protection and Repatriation Act (NAGPRA; Public Law 101-601)
- Executive Orders 13007 (1996, Indian Sacred Sites) and 13175 (2000, Consultation and Coordination with Indian Tribal Governments)
- Secretarial Order 3317 (2011, Department of the Interior Policy on Consultation with Indian Tribes)
- Archaeological Resource Protection Act of 1979

These laws direct the BLM to make its best efforts to identify sites, resources, and activities of religious, traditional, or cultural importance and then attempt to limit or even eliminate negative effects on those resources. In its consultation process, the BLM also uses BLM Manual Section 8120, Tribal Consultation Under Cultural Resource Authorities, and guidance from the *National Register Bulletin 38*, "Guidelines for Evaluating and Documenting Traditional Cultural Properties."

As defined in *National Register Bulletin 38*, a traditional cultural property (TCP) "can be defined generally as one that is eligible for inclusion in the National Register because of its association 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" (USDI 1998:1). Further, a TCP can be a location characterized by the following:

- Associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world

- Where Native American religious practitioners have historically gone and are known or thought to go today to perform ceremonial activities in accordance with traditional cultural rules of practice
- Where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historical identity

Assessment Area

The assessment area for Native American religious concerns is the project area.

Study Methods

Information provided in the following sections is based on the following:

- A literature search at the Winnemucca BLM Field Office
- Results of the Native American Consultation process
- Archival newspapers and ethnographic studies in the collections at the University of Nevada-Reno Special Collections
- The Nevada Historical Society

The BLM literature search and ethnographic studies were examined to identify traditional property site types considered important by the regional Native American communities.

3.5.2 Affected Environment

The project area is in the traditional territory of the Northern Paiutes and is outside the area of the Ruby Valley Treaty. To date, the tribes have raised no concerns about specific traditional sites, areas, or activities in the project area. However, the American Canyon and South American Canyon Springs are in the project area, and springs are a property type that is considered sacred to traditional Northern Paiutes (Tiley and McBride 2013:46, 51). Often they are specific places visited by shamans to receive spiritual instruction (Tiley and Rucks 2011) because of their association with *puha* ("power" in Northern Paiute; see also Bengston 2003:76-77).

The American Canyon and South American Canyon Springs were impacted by authorized developments at the mine during the 1980s and 1990s. Native American access to these springs ended when the plan boundary was fenced in the 1980s.

Native American Consultation

The BLM undertakes government-to-government consultation with Native American tribes to identify specific sites of religious, traditional, or cultural importance and activities and resources that may be affected by Proposed Actions. The purpose of consultation is to limit, restrict, or eliminate negative impacts on those sites, activities, or resources.

The project area is in the traditional Northern Paiute territory (Stewart 1939). On January 3, 2015, the BLM sent consultation letters to the Lovelock Paiute Tribe, the Pyramid Lake Paiute, and the Fort McDermitt Paiute-Shoshone Tribe. The BLM has received two signed registered letter receipts acknowledging that the consultation letters were received, and it does not expect further comments from the tribes. To date, no concerns have been raised by the tribes regarding specific traditional sites, areas, or activities in the project area; consultation is ongoing. At present there are no known direct or indirect impacts, thus this resource is not analyzed further.

3.6 WASTES AND MATERIALS (HAZARDOUS AND SOLID)

This section describes the affected environment and existing conditions in the project area for hazardous materials and safety.

3.6.1 Regulatory Framework

Wastes and materials in the state of Nevada are regulated by the following acts, laws, and policies:

- Comprehensive Environmental Response, Compensation, and Liability Act (Public Law 96-510 of 1980)
- RCRA (Public Law 94-580, October 21, 1976)
- Nevada NRS 459.400, Disposal of Hazardous Waste

3.6.2 Affected Environment

The CRI Mine is an open pit operation using cyanide heap leach facilities to produce gold and silver. Historically the mine has produced six million ounces of silver and 70,000 ounces of gold annually. Mining techniques are drilling, blasting, and hauling rock to ore leach pads or waste rock disposal sites. Extending the mine's life would also extend the presence of hazardous materials on the site. The CRI Mine has the appropriate waste management and emergency hazard response plans in place, which are on file at the Winnemucca BLM office.

Production at the mine has historically averaged 22,500 tons of ore and 33,000 tons of waste rock per day. Silver and gold are leached from ore using a cyanide solution from a drip irrigation system. In addition to cyanide, ammonium nitrate, fuel oils, explosives, solvents, and lubricants are used in mining operations.

A list of primary bulk fuels and reagents is provided in **Table 1-4**. As needed, bulk fuels and reagents are transported to the CRI Mine by trucks operated by licensed vendors via the Limerick Canyon Road from I-80. Reagents for ore processing are stored in a concrete secondary containment area at the process facility. This area is designed to contain 110 percent of the volume of the largest tank in a 100-year, 24-hour storm. Blasting agents and explosives are stored and used on-site, in accordance with MSHA and BATFE regulations. Blasting agents and explosives are stored in a security-controlled facility specifically designed for these types of materials.

In addition, there are two fuel storage facilities in the project area. The first is one 6,000-gallon, unleaded gasoline, aboveground storage tank; the second, which is at the ready line fuel depot west of the primary crusher, consists of three aboveground, diesel fuel, storage tanks with capacities of 8,000, 10,000, and 50,000 gallons. These tanks are in a concrete secondary containment unit that is designed to contain at least 110 percent of the volume of the largest tank.

Auxiliary generators are located throughout the mine site. Generator fuel is stored on the skids with the generators in secondary containment.

The CRI Mine's designated EPA identification number is NVD-986767572. It is classified as a large quantity generator (LQG) of hazardous waste, as defined by the RCRA. An LQG generates over 2,200 pounds of hazardous waste in a month. The LQG status requires that it adhere to specific on-site management, transportation, record keeping, and reporting requirements, as follows:

- LQGs may accumulate waste on-site for only 90 days (certain exceptions apply).
- LQGs do not have a limit on the amount of hazardous waste accumulated on-site.
- There must always be at least one employee available to respond to an emergency, who is responsible for coordinating all emergency response measures.
- LQGs must have detailed, written contingency plans for handling emergencies.
- LQGs must submit a hazardous waste report every two years.

The CRI Mine temporarily stores properly labeled hazardous wastes before transporting them to an off-site RCRA-approved recycler or to a treatment and disposal facility. The closest hazardous waste disposal facility is 21 Century EMN, LLC, outside Fernley in Lyon County, approximately 80 miles southwest of the mine. All hazardous wastes are stored, packaged, and manifested in compliance with all applicable state and federal regulations. Petroleum-contaminated soils are also transported off-site for disposal, but in the future the soils may be disposed of on-site, if approved by the State.

The CRI Mine has an on-site class III-waivered landfill authorized by the NDEP Bureau of Waste Management (Solid Waste Class III Landfill Waiver #SWMI-14-30). The approximately three-acre landfill is at the east side of the North RDS. All waste placed in the landfill is from the industrial operation of the mine. Waste that is classified as hazardous is properly labeled, stored, and transported from the mine, under manifest, by an approved hazardous waste hauler for disposal at approved disposal/treatment facilities.

Petroleum-contaminated soils are contained and stored at the wash bay. A licensed vendor periodically removes this material for disposal at an approved off-site facility.

The CRI project area has had incidental spills of fuels and hazardous materials during previous mining and mineral exploration, which were reported to the appropriate agencies. This includes overland releases of roughly 25 pounds of process solution containing weak acid dissociable (WAD) sodium cyanide from the process facilities. These releases flowed down Sage Hen Flats in upper American Canyon. The process solution was initially treated with calcium hypochlorite solution, which contributed to a high chloride level in the groundwater. The reported spills have been mitigated to the satisfaction of the appropriate agencies, and the contaminated materials have been treated and disposed of in accordance with state and federal regulations.

3.7 WATER QUALITY (SURFACE AND GROUND)

This section describes the affected environment and existing conditions in the project area for water resources, including surface water and groundwater quality. Water quantity is not an element associated with a Supplemental Authority as listed in the BLM NEPA Handbook (BLM 2008) and in the Nevada Instruction Memorandum 2009-030, Change 1; however, water quantity is also discussed in this section of the EIS.

3.7.1 Regulatory Framework

Water resources in the state of Nevada are regulated by the following acts, laws, and policies

- Federal Water Pollution Control Act (33 USC, Section 1251 et seq., 1972)
- Public Water Reserves No. 107
- Nevada Water Controls (NRS 445A)
- Nevada Water Law (NRS 533 and 534)

3.7.2 Affected Environment

Hydrology of the area surrounding the CRI Mine consists of springs and surface water in small drainages (JBR 2012a, 2012b) that are part of three hydrographic basins, groundwater in shallow alluvium, and groundwater in bedrock. The study area for water quantity and quality is shown in **Figure 3-2**, Hydrologic Model Area, which straddles portions of the following Nevada hydrographic basins:

- The Limerick and Rochester Canyon watersheds, which drain to the west into the Oreana Sub-Area (73A) of the Lovelock Valley Hydrographic Sub-Basin (73) of the Humboldt River Basin

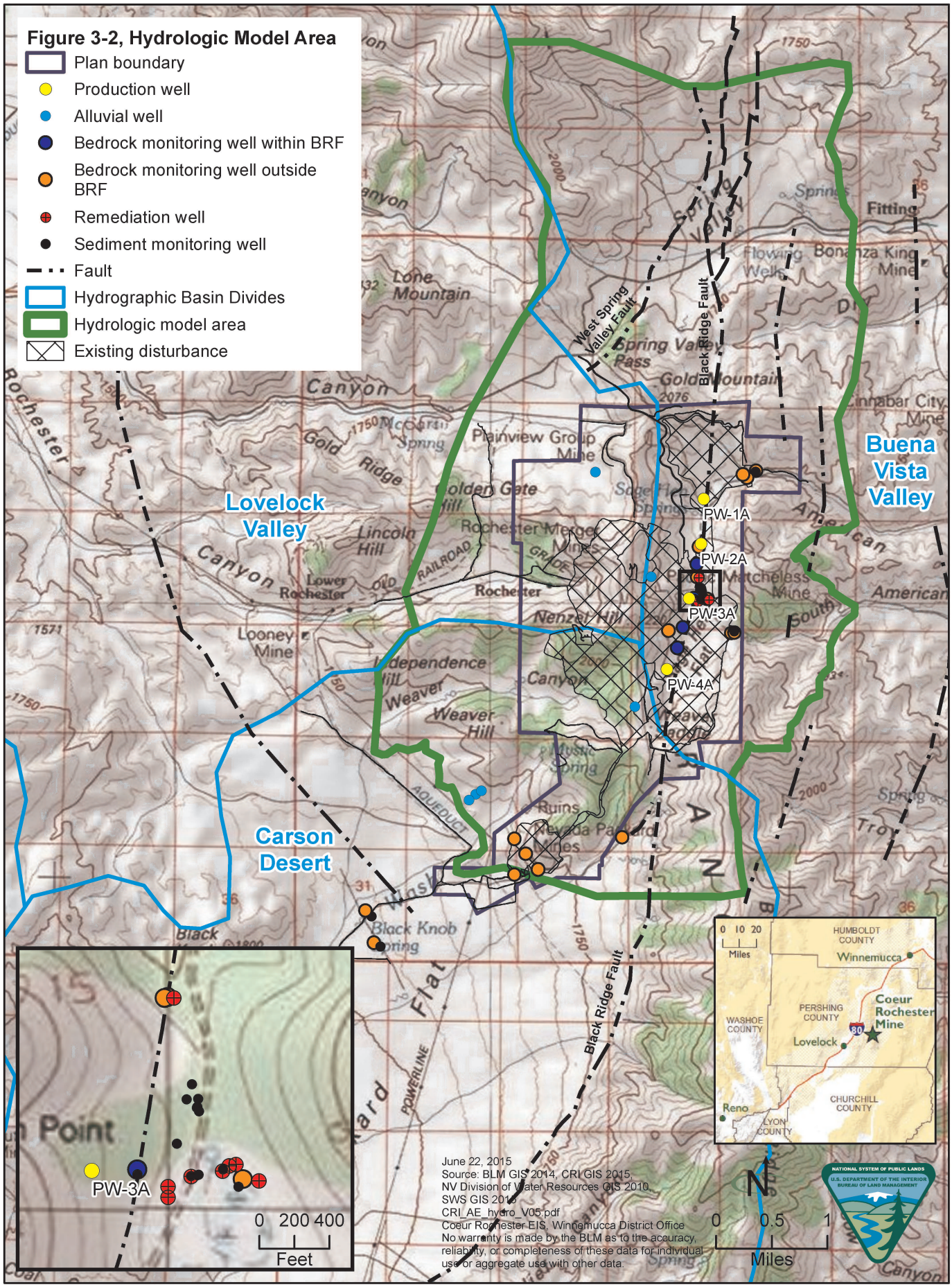
Figure 3-2, Hydrologic Model Area
Plan boundary
Production well
Alluvial well
Bedrock monitoring well within BRF
Bedrock monitoring well outside BRF
Remediation well
Sediment monitoring well
Fault
Hydrographic Basin Divides
Hydrologic model area
Existing disturbance
Lovelock Valley
Buena Vista Valley
Carson Desert
PW-1A
PW-2A
PW-3A
PW-4A
West Spring Valley Fault
Black Ridge Fault
Lone Mountain
Gold Mountain
Spring Valley Pass
Plainview Group Mine
Rochester
Looney Mine
Ruins
Black Knob
Fitting
Cinnabar City Mine
Matcheless Mine
Rochester Mercer Mines
Nenzel Hill
Weaver Hill
Lincoln Hill
Golden Gate Hill
Gold Ridge
Lower Rochester
Independence Hill
Mustang Spring
McCoy Spring
Point
0 200 400
Feet
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
PERSHING COUNTY
WASHOE COUNTY
Coeur Rochester Mine
Lovelock
CHURCHILL COUNTY
Reno
LYON COUNTY
June 22, 2015
Source: BLM GIS 2014, CRI GIS 2015, NV Division of Water Resources GIS 2010, SWS GIS 2015
CRI_AE_hydro_V05.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
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- The American and South American watersheds, which drain eastward into the Buena Vista Valley (Hydrographic Sub-Basin 129) of the Central Region
- The Weaver and Woody Canyon areas, which drain to the southwest into Packard Wash of the Packard Valley Sub-Area (101A) of the Carson Desert Sub-Basin (101) of the Carson River Basin and eventually into the Carson Sink (SWS 2015)

3.7.2.1 Surface Water

Description
The project area straddles the upper elevations of three hydrographic basins, resulting in surface water drainage flows downgradient from the mine into the basins described above.

Surface Water Quantity
Surface water flow in the project area is ephemeral. It most typically occurs after brief and intense periods of precipitation or snowmelt. Surface drainages are dry the remainder of the year, with the exception of the areas immediately downstream from mapped springs (**Figure 3-3**, Seeps and Springs). There are no perennial lakes, rivers, or streams in the project area. The closest perennial water body is the Humboldt River, which is approximately 9.5 miles to the west and downgradient of the project area.

Springs in the northern portion of the project area are the American Canyon Spring, Lower American Canyon Spring, and the South American Canyon Spring. The springs produce relatively low discharge, which is subject to rapid evaporation and infiltration into the shallow sediments (JBR 2012b).

The American Canyon Spring is in Sage Hen Flat, between the Stage I and Stage IV HLPs, and emanates from the shallow sediments. A small non-jurisdictional wetland area is associated with this spring, with an approximate flow of less than 1 to 4 gpm (JBR 2012b; USACE 2012).

The South American Canyon Spring is at the head of South American Canyon, east of the Stage I and Stage II HLPs. It forms a small pond, referred to as the South American Canyon Pond. Measured discharge at the South American Canyon Spring has ranged from less than 1 to 6 gpm. Neither of these springs has been designated as a jurisdictional Waters of the United States (JBR 2011, 2012b; USACE 2012).

The Lower American Canyon Spring is east of the Stage IV HLP in American Canyon, outside of the project area, and emanates from the shallow sediments. A small non-jurisdictional wetland is associated with this spring, with measured flows of approximately less than 1 to 2 gpm (JBR 2012b; USACE 2012).

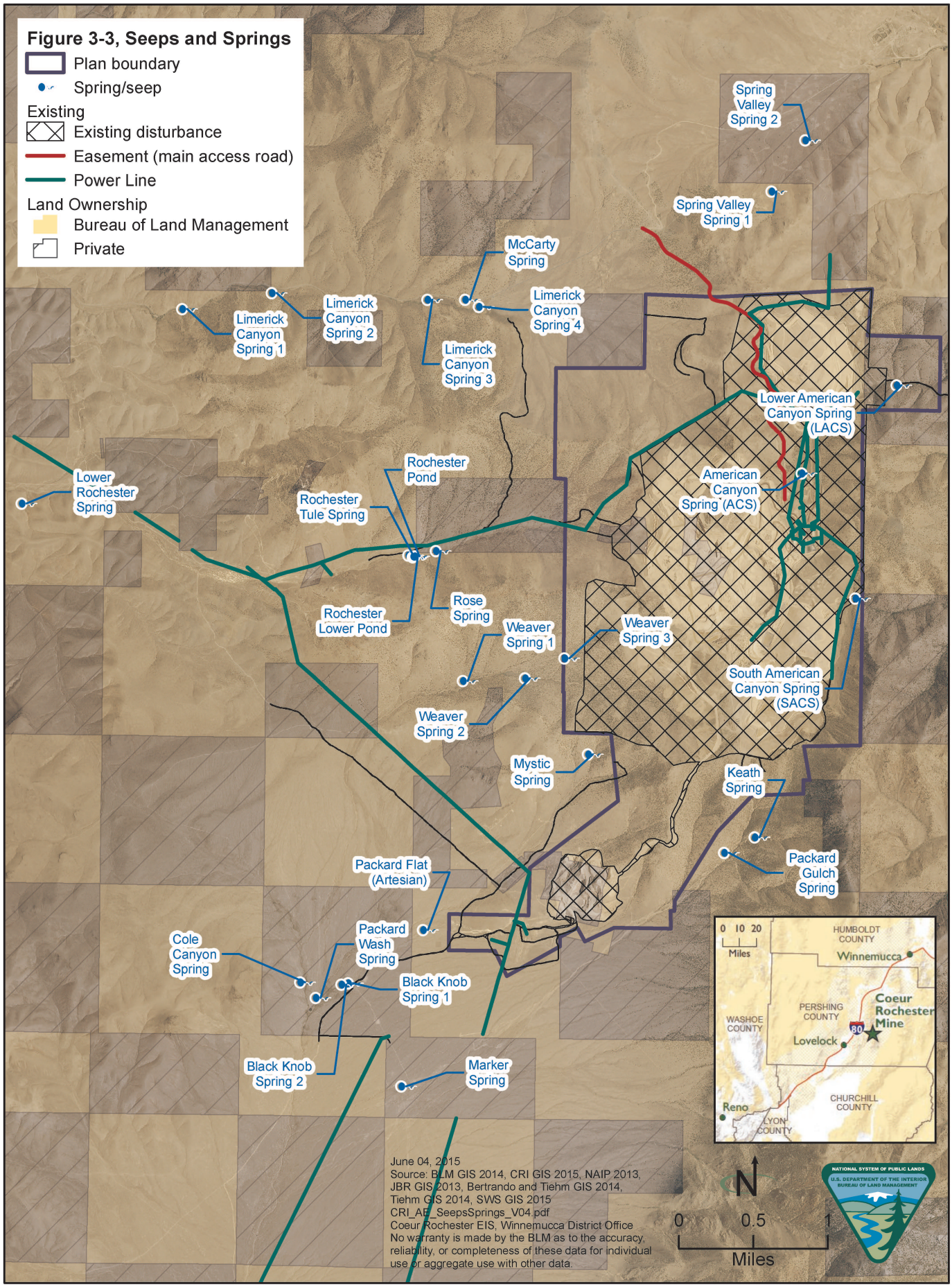
Figure 3-3, Seeps and Springs
Plan boundary
Spring/seep
Existing
Existing disturbance
Easement (main access road)
Power Line
Land Ownership
Bureau of Land Management
Private
Spring Valley Spring 2
Spring Valley Spring 1
McCarty Spring
Limerick Canyon Spring 4
Limerick Canyon Spring 2
Limerick Canyon Spring 1
Limerick Canyon Spring 3
Lower American Canyon Spring (LACS)
American Canyon Spring (ACS)
Lower Rochester Spring
Rochester Pond
Rochester Tule Spring
Rochester Lower Pond
Rose Spring
Weaver Spring 1
Weaver Spring 3
Weaver Spring 2
South American Canyon Spring (SACS)
Mystic Spring
Keath Spring
Packard Gulch Spring
Packard Flat (Artesian)
Packard Wash Spring
Cole Canyon Spring
Black Knob Spring 1
Black Knob Spring 2
Marker Spring
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
PERSHING COUNTY
WASHOE COUNTY
Coeur Rochester Mine
80
Lovelock
Reno
CHURCHILL COUNTY
LYON COUNTY
June 04, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013, JBR GIS 2013, Bertrando and Tiehm GIS 2014, Tiehm GIS 2014, SWS GIS 2015
CRI_AE_SeepsSprings_V04.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
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The American Canyon Spring, the South American Canyon Spring, and the Lower American Canyon Spring are regularly monitored as part of the Rochester Water Pollution Control Permit NEV0050037. The Mystic, Keath Canyon, Packard Gulch, and Packard Flat Springs are within half a mile downgradient of the project area. Flow measurements at these locations range from less than 1 to 10 gpm (JBR 2012a).

In addition to seeps and springs identified in recent baseline surveys (JBR 2012a, 2012b), historical wet areas are considered to be south of the Stage IV HLP, in the proposed Stage V HLP footprint (CRI 2015a). No evidence of subsurface moisture has been observed since the initial surveys conducted in 2011 and 2012 (JBR 2012a, 2012b).

Jurisdictional Wetlands and Waters of the United States

The project area does not contain jurisdictional wetlands or Waters of the United States (USACE 2012). A 2011 survey mapped 1.36 acres of ephemeral drainages and 4.23 acres of wetlands as isolated features, with no interstate commerce use (JBR 2011). The 2011 survey reaffirmed the USACE's 2000 and 2006 determinations that the project area does not contain a jurisdictional resource. In June 2012, the USACE confirmed the 2011 survey findings and conclusions and reaffirmed the previous determinations (USACE 2012).

Stormwater

Stormwater diversion BMPs are used to prevent or minimize potential impacts on stormwater quality from mining and to divert flow around mine facilities and into downstream drainages (CRI 2015b). As required by NAC 445A.433 (1)(c), these diversions have been designed to divert flows from the 100-year 24-hour storm.

Three stormwater and emergency management ponds in American and South American Canyons and Sage Hen Flats were constructed to provide additional storage capacity during upset or emergency conditions, such as power outages and extreme storms.

Additional water resources information for the project area can be found in the following:

- Environmental Assessment, Coeur Rochester Mine Expansion Project (BLM 2010)
- Updated Baseline Hydrologic And Geochemical Characterization Report (SWS 2014)
- Rochester and Packard Mines Hydrogeologic Summary (SWS 2012a)
- Rock and Water Baseline Characterization Summary for Plan of Operations Amendment 10 (CRI 2015b)

Surface Water Quality

Surface water quality has been evaluated by sampling the seeps and springs identified on **Figure 3-3**. A detailed presentation of spring and seep chemistry, along with analytical data, can be found in HydroGeo 2010 and SWS 2012b and 2013. **Figure 3-4**, Select Spring and Water Quality, shows the general spring and seep chemistry parameters (CRI 2015b).

In general, springs in the area range from a calcium chloride to sodium bicarbonate type, generally with water quality below Nevada Reference Values (NRVs), based on data from 15 springs near the project area. Occasional natural exceedances of the NRVs for TDS, manganese, aluminum, iron, mercury, and chloride have been documented. Although below the NRV, arsenic naturally exceeds the EPA standard in most springs. Cole Canyon Spring is the only spring that has naturally poor water quality, with high TDS and chloride. SWS (2014) summarizes the laboratory water quality data from samples collected at these locations through the fourth quarter of 2013.

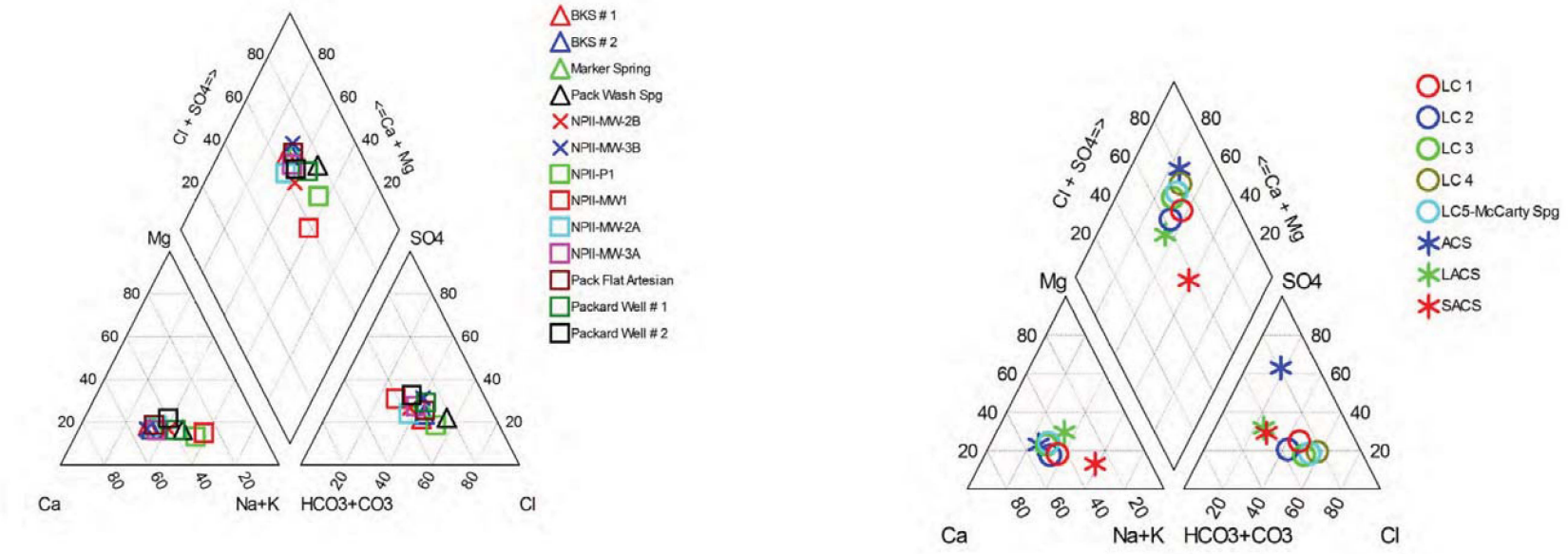
Water quality at the American Canyon Spring has been affected by historical spills and contamination from mining. American Canyon Spring water quality may also reflect the influence of upgradient sources in the project area, including a stormwater retention pond and the process facilities area (HydroGeo 2010). Contamination from a septic leach field and cyanide spills has been documented, but it is not adversely impacting water quality (SWS 2014). Water quality data has improved with a recent nitrate concentration at the water quality criterion of 10 mg/L, down from historical highs of over 50 mg/L. Arsenic remains elevated, which is attributed to natural background concentrations, because these concentrations were previously elevated (CRI 2015d).

A package sewer treatment plant was installed in 2012 to treat the nitrate concentrations in the spring above the NRV of 10 milligrams per liter. Nitrate concentrations ranged from 4.1 to 15 mg/L in 2012 and 2013. Chloride concentrations ranged from 110 to 160 mg/L and may reflect the influence of calcium hypochlorite detoxification of previous accidental releases of cyanide in the project area (HydroGeo 2010). WAD cyanide concentrations have remained below the detection limit.

CRI samples water quality quarterly at Lower American Canyon Spring, American Canyon Spring, and South American Canyon Spring, when discharge is sufficient for sample collection. This is in accordance with the Rochester Water Pollution Control Permit NEV0050037.

Water Quality—Heap Leach Pads

The following section outlines the findings from CRI's Rochester Mine Permanent Closure Plan Waste Rock Geochemistry and Closure Report (Knight Piésold 2011).



SOURCE: SWS 2014

		NAD 1983 UTM Zone 11N ABR DRAWN: ABR REVIEWED: VS 1 inch = 1,595 feet DATE: 1/15/2015 Figure16 .mxd		Select Spring and Water Quality Figure 3-4

No waters of the state were expected to become degraded by the HLP draindown, in light of the zero discharge management approach proposed. This includes engineered covers to reduce infiltration and routing draindown from the lined HLP facilities to double-lined e-cells.

Characterization of spent ore materials, including humidity cell testing (HCT), were discussed and findings were outlined in Appendix C of the Waste Rock Geochemistry and Closure Report (Knight Piésold 2011). Six sonic boring cores were drilled dry at Stages I, II, and IV HLPs, and 17 samples were collected at varying depths from the sonic core. Samples were sent to Western Environmental Testing Laboratory in Nevada for ABA analysis, MWMP testing, NAG testing, and HCTs. Insufficient sample volume remained after the MWMP tests, so new composite samples were prepared from the stored sonic core stored by CRI. These new composite samples were subjected to a second round of ABA testing in order to select samples for HCTs. MWMP analyses on the spent ore samples indicated circum-neutral pHs (ranging from 7.8 to 9.1), which is consistent with the low sulfur content in the leached ore.

Note that the MWMP test is not likely to be affected by process solution chemistry once the process solution is drained from the leached ore. This is because very little process solution is expected to remain in the drained ore.

These same tests indicated that average concentrations of aluminum, antimony, arsenic, lead, copper, iron, mercury, and silver exceeded the NDEP Profile I guidance levels. Because MWMP leachate contained metals in exceedance of Profile I guidance, the closure plan includes reducing infiltration rates and managing recovered water to achieve a zero discharge closure.

Summary Stage I MWMP Results—Stage I HLP MWMP analysis on the same sample intervals produced circum-neutral pHs, averaging 7.92. On average, concentrations of aluminum, antimony, arsenic, lead, copper, iron, mercury, and silver exceeded the NDEP Profile I standards; thallium was at the standard. All other constituents were below the standards, including WAD cyanide (Knight Piésold 2011, Appendix C-4).

Summary Stage II MWMP Results—MWMP results for the Stage II HLP are summarized in the Rochester Mine Permanent Closure Plan Waste Rock Geochemistry and Closure Report (Knight Piesold 2011). Average pH was circum-neutral. Aluminum, antimony, arsenic, copper, iron, lead, mercury, silver, WAD cyanide, and total nitrogen average concentrations were above the NDEP Profile I standards. All other constituents were below the NDEP Profile I standards (Knight Piésold 2011, Appendix C-4).

Summary Stage III MWMP Results—Results for Stage III HLP are not provided because the Stage III HLP was being developed at the time the report was prepared.

Summary Stage IV MWMP Results—MWMP results for the Stage IV HLP show average pH for the Stage IV HLP was circum-neutral. Aluminum, antimony, arsenic, copper, iron, lead, mercury, silver, thallium, total nitrogen, and WAD cyanide average concentrations exceeded the NDEP Profile I standards. All other constituents were below the standards (Knight Piésold 2011, Appendix C-4).

3.7.2.2 Groundwater

Description

The CRI Mine is on Quaternary alluvium and Late Permian and Lower Triassic bedrock of the Weaver and Rochester Formations. Limerick Canyon to the east also includes the Limerick greenstone and leucogranite, while in the Spring Valley to the north there is only Limerick greenstone (SWS 2015; **Figure 3-5**, Geology).

Several faults and fractures have been mapped, with major features having a north-south strike. Most structures result from extensional events that predominantly generated normal displacement faults and narrow graben-style collapse zones; here, structurally bound blocks are down-dropped into subjacent strata.

The dominant feature, the range front Black Ridge Fault (BRF) is traced as a relatively large, steeply dipping shear zone just east of the Rochester mine pit (**Figure 3-5**); it extends along the west flank of the Humboldt Range. Movement along this fault zone has displaced Mesozoic strata down to the west for approximately 2,000 feet; it may also have a significant component of right-lateral slip. The long history of fault reactivation has produced an approximately 200-foot-wide shear zone with variable width in the study area (SWS 2012a).

Groundwater in the area is in the following three distinct hydrogeologic units:

- Quaternary alluvium
- Bedrock unit outside the BRF
- Bedrock unit in the BRF

Groundwater generally flows from areas of higher elevations toward the center of the basins (e.g., Buena Vista Valley, Lovelock Valley, and Carson Desert). Due to the topography in the project area groundwater can flow in all directions; however, most of the groundwater flows either north or south in the BRF and adjacent bedrock groundwater system.

Quaternary alluvium generally contains discontinuous zones of groundwater that are perched above the bedrock groundwater systems. Groundwater generally flows in directions similar to the surface drainages.

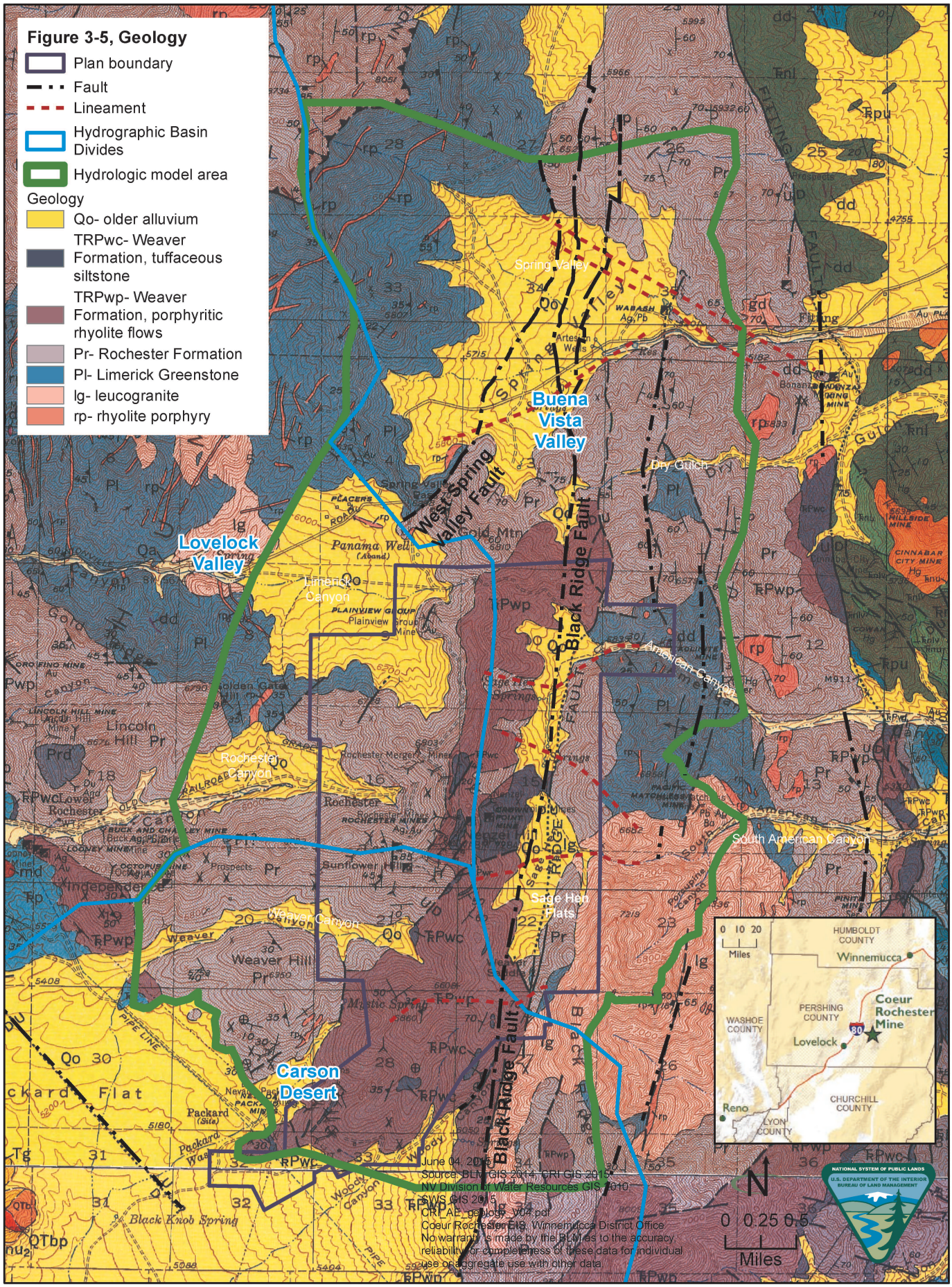


Figure 3-5, Geology
Plan boundary
Fault
Lineament
Hydrographic Basin Divides
Hydrologic model area
Geology
Qo- older alluvium
TRPwc- Weaver Formation, tuffaceous siltstone
TRPwp- Weaver Formation, porphyritic rhyolite flows
Pr- Rochester Formation
Pl- Limerick Greenstone
lg- leucogranite
rp- rhyolite porphyry
Buena Vista Valley
Lovelock Valley
Carson Desert
West Spring Valley Fault
Black Ridge Fault
Spring Valley
Panama Well
Rochester Canyon
Weaver Canyon
Weaver Hill
Sunflower Hill
Sage Hen Flats
American Canyon
South American Canyon
Dry Gulch
Black Knob Spring
Lincoln Hill
Rochester
Packard Flat
Miles
HUMBOLDT COUNTY
Winnemucca
PERSHING COUNTY
WASHOE COUNTY
Coeur Rochester Mine
Lovelock
CHURCHILL COUNTY
Reno
LYON COUNTY
0 10 20
0 0.25 0.5
Miles
June 04, 2015
Source: BLM GIS 2014, CRI GIS 2015
NV Division of Water Resources GIS 2010
SWS GIS 2015
CRI_AE_geology_v04.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data.
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Recharge to groundwater in the project area is derived from precipitation and snowmelt infiltration. Groundwater outflows to springs and underflows to portions of the bedrock aquifer system outside the project area, ephemeral streams, pumping mine production wells, and recovery (pump-back) wells and under-drains.

Due to the high elevation of much of the mine and relatively limited extent of shallow alluvial groundwater, evapotranspiration is limited. Potential annual evapotranspiration (37.5 inches) greatly exceeds precipitation (13.2 inches; SWS 2015).

Hydrogeology

Most structures result from extensional events that predominantly generated normal displacement faults and narrow graben-style collapse zones; here, structurally bound blocks are down-dropped into subjacent strata. These features likely contribute to the low transmissivity of the bedrock groundwater system (SWS 2012a).

As stated previously, the project area groundwater system contains three distinct hydrogeologic units. Most of the groundwater flow at the mine is in the BRF and adjacent bedrock groundwater system. Comparatively less groundwater flows in American Canyon and South American Canyon unconsolidated sediment units. This is due to the limited saturated thickness and low hydraulic conductivity of the alluvial deposits (SWS 2012a).

Shallow Quaternary alluvium—This shallow alluvium in the project area consists of several discontinuous units. They are composed of colluvium and alluvium found in Sage Hen Flat (Stage I, II, and III HLP areas), South American Canyon, American Canyon (Stage IV and V HLP areas), Packard Valley, Limerick Canyon, Rochester Canyon, Weaver Canyon, and Spring Valley. Shallow groundwater evapotranspiration occurs from these units.

The sediments in Sage Hen Flat, American Canyon, and South American Canyon are moderately heterogeneous, are of relatively limited extent, and are composed primarily of silt and clay materials, with discontinuous sand and gravel lenses (SWS 2015). Hydraulic conductivity derived from on-site tests has a geometric mean of 2.4×10^{-2} feet/day (SWS 2015).

Packard Valley, Limerick Canyon, and Spring Valley alluvial deposits primarily consist of interbedded low permeability silt and clay materials, with discontinuous sand and gravel lenses. Mean measured hydraulic conductivity in Packard Valley wells is 2.2×10^{-1} feet/day (SWS 2015).

Alluvial groundwater flows to the Buena Vista Valley—Groundwater in the Sage Hen Flat and South American Canyon alluvial systems flows from south to north under the Stage III, Stage II, and the southern portion of the Stage I HLP to the area of South American Canyon Spring; then the groundwater turns and flows

east to Buena Vista Valley (**Figure 3-6**, Fourth Quarter 2013 Alluvial Potentiometric Surface).

Based on borehole data, the alluvial deposits north of the Stage I HLP are isolated from and not hydraulically connected to alluvial deposits in the area of the American Canyon Spring or Lower American Canyon Spring. In the area of the American Canyon Spring, groundwater flow is to the north under the proposed Stage V HLP and then turns and flows east to Lower American Canyon Spring and then to Buena Vista Valley (SWS 2015). Water level elevations in alluvial wells in Spring Valley at the northern end of the project area indicate alluvial flow to the east, toward Buena Vista Valley (**Figure 3-6**; SWS 2015).

Alluvial groundwater flows to the Lovelock Valley—Water level elevations in Limerick Canyon indicate alluvial groundwater flow to the west, toward the five springs in Limerick Canyon (shown on **Figure 3-3**), and ultimately to the Humboldt River.

Alluvial groundwater flows to the Carson Desert—In the Packard area at the southern end of the project area, groundwater flow is southward, toward the center of Packard Wash and the Carson Sink.

Bedrock unit outside the BRF—This bedrock unit includes the Weaver Formation, Rochester Formation, Limerick Greenstone, and leucogranite bedrock outside the BRF. In general, this is a low hydraulic conductivity, low storage unit, with the average measured hydraulic conductivity in the Rochester pit area of 1.4×10^{-1} feet/day (SWS 2015). Fractures, faults, and formation changes result in some local zones of relatively higher conductivity. In the Rochester pit area, the hydraulic conductivity is enhanced by increased fracturing associated with the contact between the Weaver and Rochester Formations. Shallow bedrock also tends to have relatively higher hydraulic conductivity due to weathering, while deeper unaltered rocks tend to have lower conductivity. Groundwater in this unit generally flows along fractures and faults. The BRF intercepts groundwater flowing from the east and west beneath and in the vicinity of the Rochester pit (**Figure 3-7**, Fourth Quarter 2013 Bedrock Potentiometric Surface).

The seasonal fluctuation in water level in the pit backfill (after recovery) was estimated by evaluating the water budget during the three-month interval of highest precipitation (December, January, and February) and the three-month interval with highest evapotranspiration (July, August, and September). Results of the evaluation indicate that the pit backfill may reach an elevation of 6,175.5 feet after the winter season, forming a seasonal hydraulic expression, and will drop to an elevation of 6,173.9 feet after the summer season. However, the pit backfill was predicted to remain a hydraulic sink under the summer, winter, and average conditions (SWS 2015, p. 39).

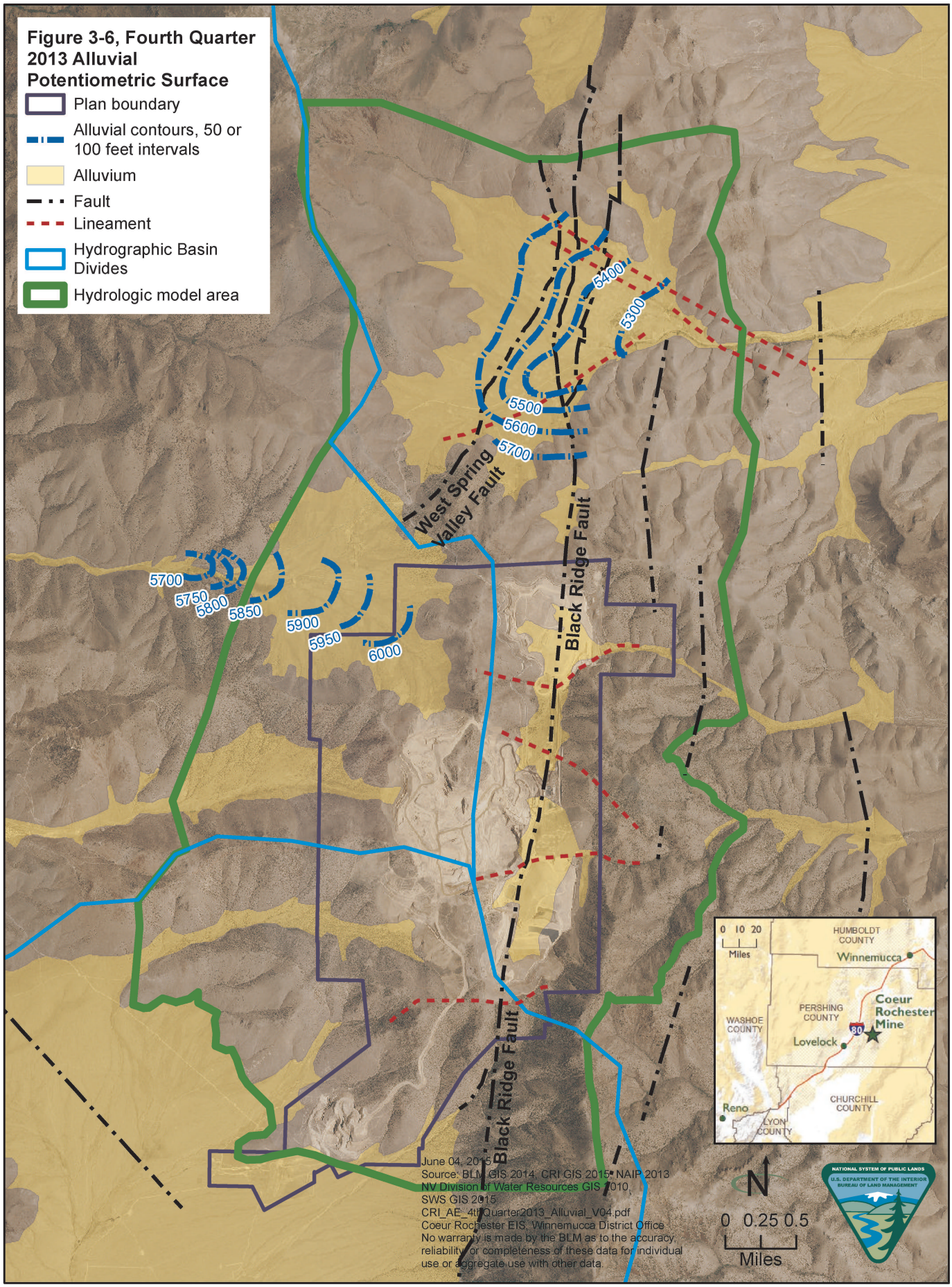
Figure 3-6, Fourth Quarter 2013 Alluvial Potentiometric Surface
Plan boundary
Alluvial contours, 50 or 100 feet intervals
Alluvium
Fault
Lineament
Hydrographic Basin Divides
Hydrologic model area
5400
5300
5500
5600
5700
5700
5750
5800
5850
5900
5950
6000
West Spring Valley Fault
Black Ridge Fault
Black Ridge Fault
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
PERSHING COUNTY
Coeur Rochester Mine
WASHOE COUNTY
Lovelock
80
Reno
CHURCHILL COUNTY
LYON COUNTY
June 04, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013
NV Division of Water Resources GIS 2010,
SWS GIS 2015
CRI_AE_4thQuarter2013_Alluvial_V04.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data.
N
0 0.25 0.5
Miles
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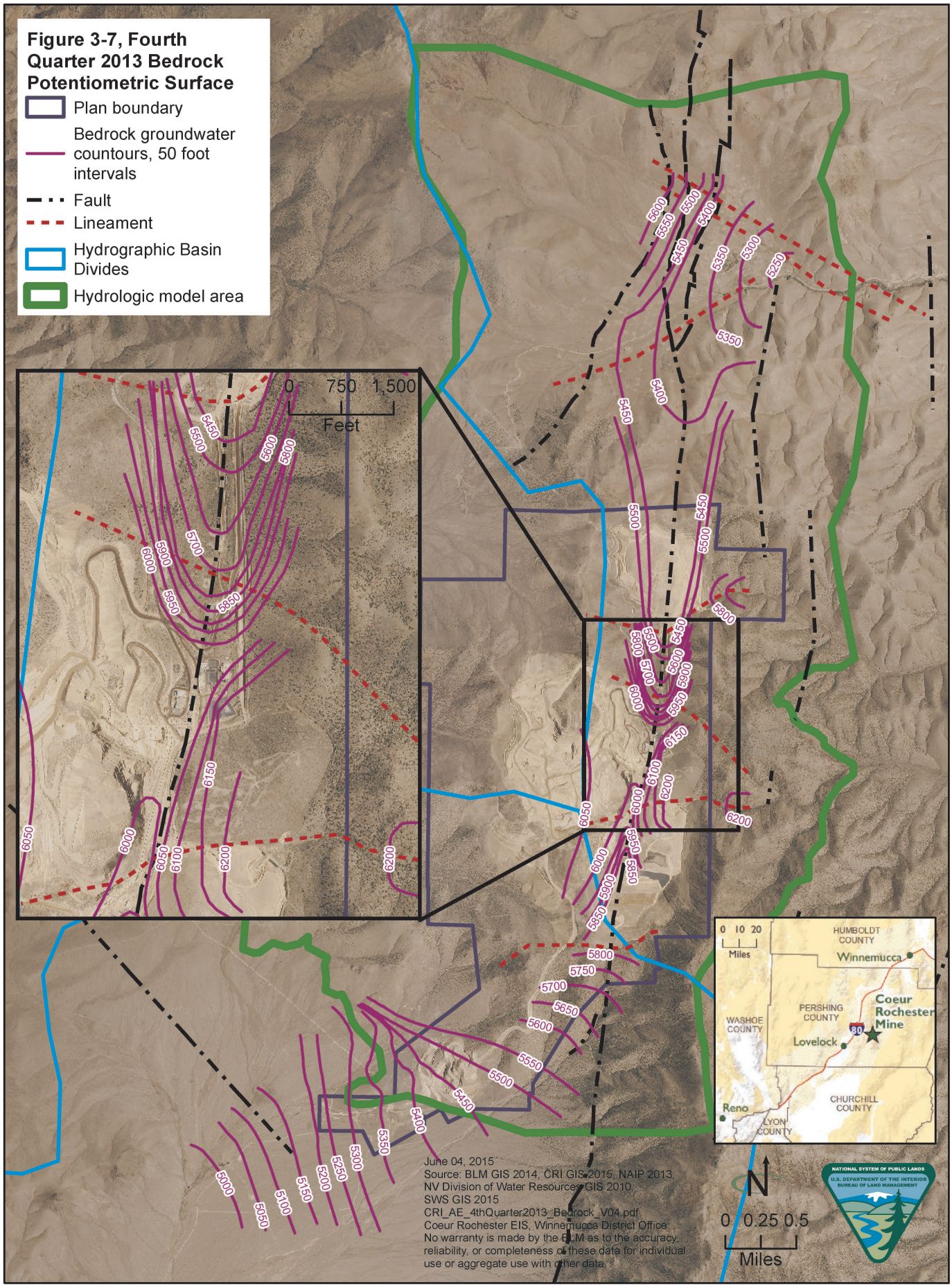
Figure 3-7, Fourth Quarter 2013 Bedrock Potentiometric Surface
Plan boundary
Bedrock groundwater countours, 50 foot intervals
Fault
Lineament
Hydrographic Basin Divides
Hydrologic model area
0 750 1,500
Feet
HUMBOLDT COUNTY
Winnemucca
Coeur Rochester Mine
PERSHING COUNTY
WASHOE COUNTY
Lovelock
CHURCHILL COUNTY
Reno
LYON COUNTY
0 10 20
Miles
June 04, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013, NV Division of Water Resources GIS 2010, SWS GIS 2015
CRI_AE_4thQuarter2013_Bedrock_V04.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
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Bedrock unit in the BRF—The BRF acts as a flow conduit in the area, with bedrock groundwater flow migrating toward and then along its trace. The BRF is encountered below approximately 450 feet (SWS 2015). This unit includes the BRF and drainage arteries in Spring Valley, American Canyon, South American Canyon, and Packard Wash. The BRF has a higher conductivity than the unfractured bedrock and alluvial deposits. This is due to shearing and fracturing that has occurred in the fault over time.

Measured values for hydraulic conductivity along the strike of the BRF average 1.3 feet per day (SWS 2012a). Hydraulic conductivity across the strike is reduced and is similar to values for the bedrock outside of the BRF. The specific storage of the BRF is also considered high for a bedrock unit, with model-estimated values ranging from $1x10^{-6}$ to $5x10^{-6}$ feet per day. Cross-cutting features intersect the BRF, including two faults in the vicinity of the proposed Stage V HLP. Cross-cutting faults generally restrict groundwater flow in the vicinity of the BRF, although groundwater contours at the scale of the project area do not show any effect (SWS 2015).

The BRF is the main drainage artery for the bedrock groundwater system in the portion of the project area, extending from the Stage III HLP on the south to north of the Stage IV HLP. There is a groundwater divide in the BRF in the vicinity of the Stage I HLP, with water in and near the BRF north of the divide flowing north to Buena Vista Valley, and water south of the divide flowing south toward Packard Wash and the Carson Desert (**Figure 3-7**).

Groundwater at the northern mapped extent of the BRF in Spring Valley appears to flow from the project area in the northwest then turn east-southeast, in accordance with topography and the direction of alluvial groundwater flow (**Figure 3-6**).

Water Rights

Water wells and water rights in the vicinity of the Coeur Rochester mine are listed in the NDWR database and are presented in SWS 2014 and CRI 2015a Appendix G. There are 95 groundwater rights in this database, including those for mine water supply wells PW-1A through PW-4A (Buena Vista) and two wells in Packard Sub-Area. CRI has total water rights of 2,088 afa. As stipulated by water rights permits, the combined annual freshwater use from these four supply wells cannot exceed 1,927 afa (CRI 2015, Appendix G). However, the 1,927 afa can be derived from an individual well or a combination of the four wells. Two additional wells are in the Packard Sub-Area and have additional water rights of 161.3 afa. In 2014-2015, the supply well total production was approximately 344 gpm, or approximately 550 afa (SWS 2015). There is also an application from the mine for a new Packard well to pump up to 806 afa (500 gpm) from the Carson Desert Valley (Packard Sub-Area).

Well Pumping

Water supply pumping for the mine has been ongoing in the BRF since 1987, with four pumping wells (PW-1, PW-2, PW-3, and PW-4) operating between 1987 and 1996. Production well PW-3 ceased operation in 2004 and was abandoned in 2013; PW-4 ceased operation in 2002 and was abandoned in 2012. As of 2014 replacement production wells PW-1A, PW-2A, PW-3A, and PW-4A are operational (**Figure 3-2**). All production wells are completed in the BRF hydrogeologic unit and range in depth from 620 to 1,530 feet (SWS 2015).

Water-supply pumping rates vary seasonally. Higher rates usually occur during the warmer parts of the year (May through October) for dust control and to make up for operational water lost to evaporation. In the cooler months (November through April) pumping rates are reduced by approximately half. Average total pumping is approximately 300 gpm, with average rates ranging from 42 to 111 gpm, but pumping rates vary by well and by year (SWS 2015).

Historical releases from the Stage 1 heap leach pad resulted in groundwater contamination. Leakage was first noticed in 1991 near the north side of the pad (HydroGeo 2010). Concentrations of arsenic, mercury, manganese, nitrate/nitrite, TDS, and WAD CN^- were measured to be above the Nevada Reference values in WI-16, WI-17R, WI-19, WI-29/R, MW-30/R, MW-35, MW-37, and MW54 (SWS 2014). Well TB-1, downgradient of the Stage 1 pad, exceeds Nevada Profile 1 reference values. The maximum detected concentration at TB-1 between March 2011 and May 2013 was 650 mg/L CN^-, 0.075 mg/L As, 3.8 mg/L Hg, and 2,300 mg/L TDS (SWS 2014).

Corrective actions have been implemented to remedy the elevated concentrations at HLP 1. In December 2013, additional pump-back wells MW-51, MW-52B, MW-53B, and MW-54 were started to supplement the existing catch basin central (CBC) sump and pump-back wells WI-16, WI-17R, and WI-29R (SWS 2014). The sump and pump-back wells lower the groundwater levels and provide hydraulic containment. Additionally, natural attenuation mechanisms, such as iron interactions/uptake and microbial processes, exist in the aquifer, which will aid in reducing contaminant mass. The efficiency of the pump-back system remains to be evaluated, due to its recent installation. At closure, the ET cover would be increased to 18 inches, and draindown from Stage 1 heap leach pad would be diverted to e-cells E and F (CRI 2014). The plume exists under both the No Action and Proposed Action scenarios.

Groundwater remediation north of the Stage 1 HLP has been ongoing since 2001. The Catch Basin Central sump and alluvial recovery wells WI-16, WI-17R, and WI-29R lower groundwater levels and provide hydraulic containment. New alluvial recovery wells MW-51, MW-52B, MW-53B, and MW-54 became operational in December 2013 and provide additional hydraulic containment and remediation (SWS 2015). Pumping rates for groundwater remediation pump-back wells WI-16, WI-17R, WI-29R, MW-50, MW-51, MW-52B, MW-53B, and

MW-54 for 2013 totaled less than 2 gpm. Well WI-16 operated from 2003 to the present. The addition of recovery wells well WI-17R operated from 2010 to 2012 and was dry in 2013; well WI-29R operated from 2012 to the present. The addition of wells MW-50, MW-51, MW-52B, MW-53B, and MW-54 in December 2013 is expected to increase the pumping rate to approximately 5 gpm.

The efficiency of the pump-back system remains to be evaluated because it was recently installed. At closure, the ET cover would be increased to 18 inches, and draindown from Stage 1 HLP would be diverted to e-cells E and F (CRI 2014). The plume exists under both the No Action and Proposed Action scenarios. However, the Proposed Action permits recycling of WAD cyanide back to mine processes during operations, minimizing expenses.

Under-drain sumps in catch basin central, catch basin west, catch basin east, catch basin north, and South American Canyon are pumped to maintain a constant head elevation. The combined average flow rate for 2013 for these drains is approximately 13 gpm (SWS 2015).

Groundwater Quality

Shallow Quaternary alluvium—Groundwater in Quaternary unconsolidated sediments is characterized as sodium-bicarbonate/sulfate type. The groundwater has generally high levels of TDS, near neutral pH, and high levels of trace constituents, particularly arsenic, cadmium, iron, manganese, and nitrate. The groundwater is poor quality and is not suitable for human consumption or, in some cases, for livestock watering. The quality of the groundwater in the shallow sediment is better in the South American Canyon and American Canyon than in the Sage Hen Flat (HydroGeo 2010).

Historical releases from the Stage 1 HLP resulted in concentrations of arsenic, mercury, manganese, nitrate/nitrite, TDS, and weak acid dissociable cyanide measured to be above the Nevada reference values in WI-16, WI-17R, WI-19, WI-29/R, MW-30/R, MW-35, MW-37, and MW54 (SWS 2014). Well TB-1, downgradient of the Stage 1 pad, exceeds Nevada profile I reference values. The maximum detected concentration at TB-1 between March 2011 and May 2013 was 650 mg/L cyanide, 0.075 mg/L of arsenic, 3.8 mg/L of mercury, and 2,300 mg/L of TDS (SWS 2014). Past uncontrolled releases were cleaned up using calcium hypochlorite in Sage Hen Flat. In particular, releases and cleanup have locally affected the alluvial groundwater quality, primarily elevating the levels of nitrate and chloride at the toe of the north dike of the Stage I heap and process pond areas. Cyanide is oxidized by calcium hypochlorite, thereby diminishing its toxicity.

Bedrock unit in the BRF—The BRF zone water chemistry is a sodium/calcium-bicarbonate type with moderate levels of TDS, slightly basic pH, and low levels of trace constituents, except arsenic, iron, and manganese. The groundwater in

the bedrock is of good quality (SWS 2012a). Detailed groundwater chemistry data is provided in SWS 2012a and 2013 and CRI 2015b.

Bedrock Groundwater—Bedrock groundwater outside the BRF zone is a sodium-bicarbonate type in the South American Canyon and Sage Hen Flat areas and calcium-bicarbonate type in American Canyon. The water has naturally elevated TDS, near neutral pH, and elevated levels of trace constituents, particularly arsenic, iron, manganese, and nitrate. Detailed groundwater chemistry data is presented in SWS 2012a, 2012b, and 2013 and CRI 2015b.

Past releases were cleaned up using calcium hypochlorite in Sage Hen Flats, and have locally affected the bedrock groundwater quality with elevated levels of nitrate, chloride, and other mine-related constituents.

3.8 GEOLOGY AND MINERALS

3.8.1 Regulatory Framework

The 1872 General Mining Law establishes the right to access and develop mineral resources on federally administered public lands. Congress has charged the BLM with managing activities on public lands under the General Mining Law, through regulations at 43 CFR, Part 3809.

Congress has passed two laws that established the policy for mineral resources development in the United States: the Mining and Mineral Policy Act of 1970 (MMPA) and the Materials and Minerals Policy Research and Development Act of 1980. Congress declared that the national mineral policy is "...to foster and encourage private enterprise in (1) the development of economically sound and stable domestic mining, minerals, metal and mineral reclamation industries, (2) the orderly and economic development of domestic resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security, and environmental needs ...." The 1980 act reiterates these statements from the 1970 act.

3.8.2 Affected Environment

Geology

The Basin and Range province consists of narrow, short mountain ranges of moderate to high relief, separated by broad, alluvial valleys or basins. The CRI mine and project area is in the Basin and Range physiographic province, in the central region of the north-south trending Humboldt Range. In the Humboldt Mountains, exposed rocks span from Permian to Quaternary age. The Humboldt Range is bounded on the east by the Buena Vista Valley and on the west by the Humboldt River Valley. The oldest rock units occur as mixed assemblages of rhyolite flows, tuffs, and volcaniclastic units. Younger units occur in a sequence of limestone, dolomite, sandstone, siltstone, slates, and argillites (Knight Piesold 2013). Rock types are intrusive and extrusive igneous rocks,

sedimentary rocks of biologic, clastic, and chemical origin, and various low-grade metamorphic rocks.

The project area, inclusive of the CRI Mine pit geology, includes Quaternary sediments and Late Permian and Lower Triassic bedrock of the Koipato Group. The three main geologic units in the project area are as follows:

- Quaternary Alluvium (Unconsolidated Valley Fill Sediments),
- Weaver Formation of the Koipato Group
- Rochester Formation of the Koipato Group

A generalized stratigraphic column for the Weaver and Rochester Formations is presented in **Figure 3-8**, A Generalized Stratigraphic Column for the Weaver and Rochester Formations.

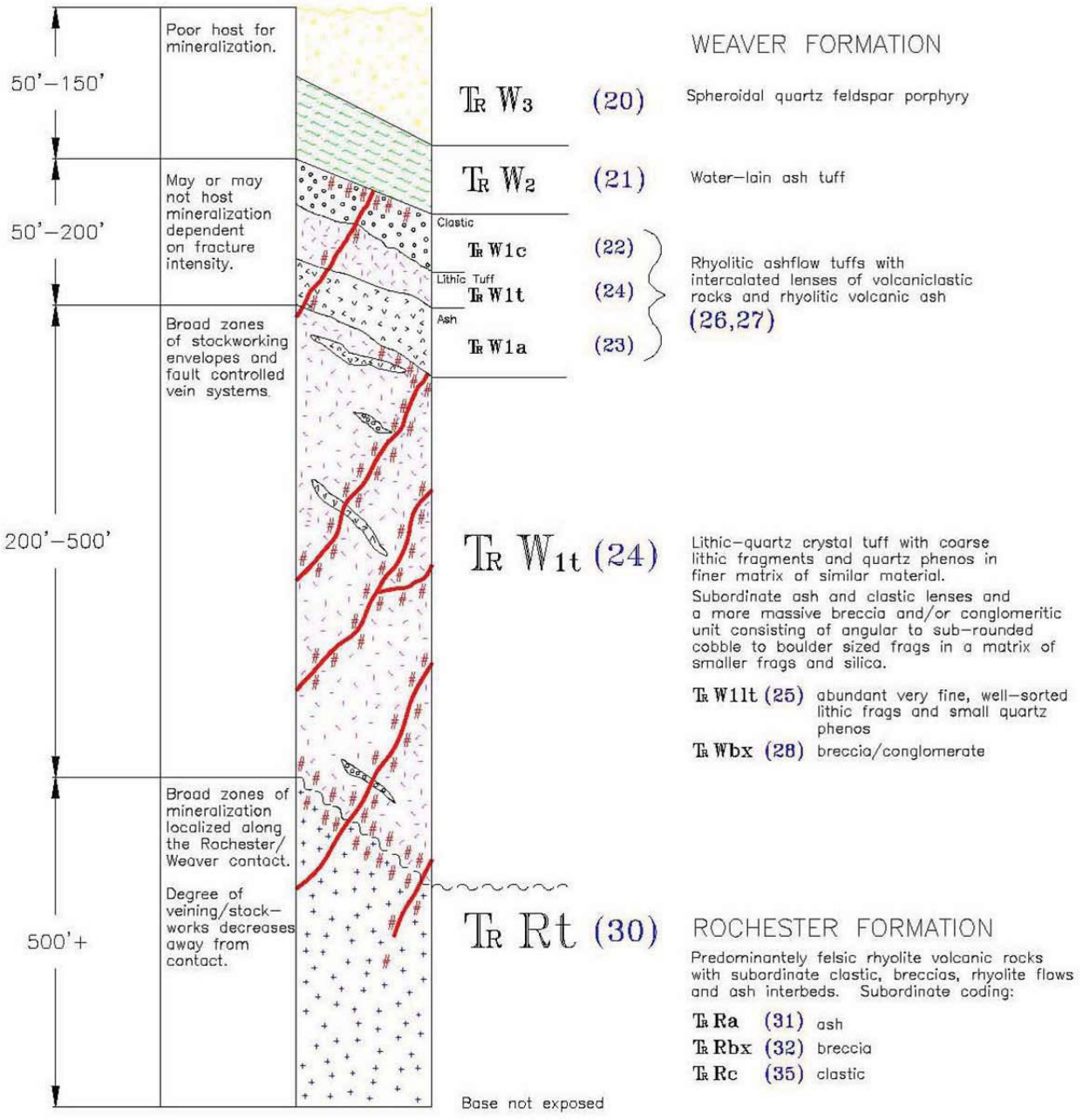
Most of the mine facilities are in the quaternary alluvium, made up of unconsolidated alluvium, colluvium, and minor lacustrine sediments (Qo-undifferentiated). The sediments are limited in extent and are deposited in a non-alluvial fan environment (SWS 2012a, 2012b). The shallow sediments are composed of laterally discontinuous alluvium and colluvium associated with the main drainages in the project area. Most unconsolidated alluvium is in ephemeral surface water drainage channels, the base of slopes, upper American Canyon, and Sage Hen Flat.

The Weaver Formation is younger than the Rochester rhyolites and overlies the Rochester unconformably. The Weaver units consist of spherulitic tuffs, air fall and water lain ash, shale/siltstone, fine-grained volcaniclastics, tuffs, and lithic tuffs. The Weaver Formation makes up 34 percent of the Rochester Pit (SRK 2014).

The Rochester Formation is dominated by tuffs, flows, breccias, and tuffaceous sediments. The interbedded lenses of tuffaceous sediments range from mudstone to boulder size breccias (SWS 2012a). Textural variations result in strong vertical layering, due to contrasting hydraulic properties (SWS 2010a). This formation is fractured and faulted and hosts mineralization along favorable fault trends. The Rochester Formation is estimated to be 1,800 feet thick. The ore body mineralization is the result of the intrusion of a granodiorite unit during the Cretaceous era, which produced hydrothermal alteration, including quartz veins and mineral alterations in the strata. The Rochester Formation is 66 percent of the Rochester Pit (SRK 2014).

Mineralization

Sulfide mineralization is hosted in both the Rochester and Weaver Formations and occurs in veins and stock works, generally along north-south, north-east, and minor east-west orientations. The upper portion of the deposit has been extensively oxidized.



A Generalized Stratigraphic Column for the Weaver and Rochester Formations

Figure 3-8

Seismicity

Construction of mine facilities is regulated by standards of the Uniform Building Code; Humboldt County currently uses the 2006 code (International Code Council 2006). The seismic zone designation throughout Humboldt and Pershing Counties is D1 on a scale ranging from 1 (indicating less damage expected) to 4 (indicating the most damage expected). Humboldt and Pershing Counties do not have specific regulations for building construction.

The project area is in the Great Basin seismic zone, a region characterized by moderately high rates of seismic activity (Algermissen et al. 1982). It is in seismic zone 4, based on seismic zone maps developed by the USACE (1983). The design of facilities and structures associated with the Proposed Action has incorporated the seismic risk, including an assessment on the potential effect of earthquake-induced ground movement in the project area.

Parameters typically used to characterize seismicity are magnitude of the controlling earthquake, maximum horizontal acceleration induced in bedrock, and probability of occurrence of the controlling earthquake.

According to maps developed by the US Geological Survey (USGS, no date), this area has a peak horizontal ground acceleration as a percentage of gravity of 0.12 (or 0.12 g). This corresponds to the 475-year event, defined as having a 10 percent probability of being exceeded in 50 years. The design earthquake used for the Proposed Action and past facility designs at the mine is a magnitude 6.5, yielding a horizontal ground acceleration of 0.12 g (CRI 2015c). This value transforms from the bedrock acceleration to that associated with the acceleration that would be experienced throughout a potential sliding mass (determined to be 0.15 g [Knight Piésold 2010]).

Following are the occurrences of historical strong or major earthquakes (magnitudes greater than 6) within 100 miles of the project area:

- 1915 magnitude 7.6—Pleasant Valley Fault zone (37 miles)
- 1954 magnitude 7.1—Dixie Valley - Fairview Fault zone (74 miles)
- 1954 magnitude 6.7—Middlegate Fault (75 miles)
- 1954 magnitude 6.6—Dixie Valley Fault zone (54 miles)
- 1954 magnitude 6.5—Rainbow Mountain Fault zone (57 miles)

Locally, the BRF is the major structural feature in the project area. It is traced as a relatively large shear zone just east of the Rochester pit (**Figure 3-5**). It is a range front structure and an extensive regional feature along the west flank of the Humboldt Range, with a vertical offset of approximately 2,000 feet. The late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, and age of faulted deposits) suggest the slip rate during this period is less than 0.2 millimeter a year (Adams et al. 1999).

Rock Characterization

Mining would continue in the permit-authorized boundaries of the Rochester and Packard pits. The Rochester pit would be mined using conventional mining equipment for crushing and placing on the heap leach facilities. A description of mining operations and waste rock management protocols is in **Section 1.8.2**, Existing and Approved Facilities and Employment.

CRI manages waste rock in accordance with Appendix C of the WRMP, revised in 2011, and Appendix D of the updated backfill management plan, revised in 2010. Based on the potential to generate acid, CRI places mined waste on the RDSs or uses it as backfill in the Rochester pit. Approximately 240 million tons of waste rock have been mined and placed in the Rochester pit during the life of the mine. Approximately 1.3 million tons of the waste rock material was classified as PAG.

In 2014 the BLM Winnemucca Field Office and SRK, on behalf of CRI, provided the BLM Nevada State Office with a comprehensive summary of the geochemical characterization data available for the proposed plan amendment. The report was prepared to provide the BLM with a summary of the data review and findings to support POA 10.

Numerous rock geochemical characterization studies have been completed for the Coeur Rochester Mine and are still relevant to POA 10. These studies are the following:

- Schafer 1995—An initial investigation completed by Schafer and Associates consisting of static and kinetic testing on materials mined above the 6,600-foot amsl elevation (SRK 2014, Appendix C).
- Maxim 1998—Study completed by Maxim Technologies, Inc., consisting of static and kinetic testing on materials below the 6,600-foot amsl elevation (SRK 2014, Appendix D).
- Maxim 2000—Results from Schafer (1995) and Maxim (1998) were used to develop selective handling criteria for in-pit management of PAG material, as part of the waste rock management program. Based on the ABA and kinetic test data, a cutoff of 0.4 percent total sulfur is used to define PAG material for waste rock management (SRK 2014, Appendix E).
- WMC 2009—Supplemental characterization completed by Water Management Consultants (WMC), during which three samples were collected from the Rochester pit and two samples were collected from backfill material to support POA 8 backfill operations (SRK 2014, Appendix F).
- CRI Operational Monitoring—Total sulfur data from blast holes generated from the ongoing monitoring program conducted by CRI during operations, as described in the NORMP and UBMP, from 2011 to present (SRK 2014, Appendix G).

- CRI WPCP Monitoring—Composites representative of waste rock mined during the quarter are submitted for ABA and MWMP testing. A summary of these data has been provided in annual WRMP reports for WPCP NEV0050037 (SRK 2014, Appendix H).
- CRI WPCP Monitoring—Composites representative of waste rock mined during the quarter are submitted for ABA and MWMP testing. A summary of these data has been provided in annual WRMP reports for WPCP NEV0050037 (SRK 2014, Appendix H).
- CRI Closure Characterization 2011—To support the closure plan development, CRI conducted sonic drilling and static testing of the waste rock samples after the non-PAG RDSs had been exposed to oxygen and water for over 10 years (SRK 2014, Appendix I).

The geochemical testing methods in the above-referenced characterization studies are as follows:

- Whole rock analysis, using both four-acid digest and aqua regia digest and inductively coupled plasma analysis to determine total metal and metalloid chemistry
- Acid base accounting, using the modified Sobek method, with LECO sulfur speciation analysis
- Meteoric water mobility procedure (ASTM E-2242-02), with geochemical analysis of the leachate for specific constituents
- Modified synthetic precipitation leachate procedure (USEPA 1998) and analysis of leachate
- Kinetic testing using the humidity cell test (ASTM D5744-96), designed to simulate water-rock interactions and predict the rate of reaction for acid generation and metals mobility

Table 3-9 outlines the sampling conducted for each of the characterization studies.

Whole Rock and Mineralogical Analysis Results—Schafer and Associates (1995) conducted whole rock elemental analysis of drill cuttings from the mine pit. A total of 25 samples were analyzed from both the Rochester (9 samples) and Weaver (16 samples) formations. Results of the analyses indicated the presence of elevated levels of arsenic, antimony, and mercury, relative to background concentrations found in typical unmineralized rhyolite (Schafer and Associates 1995). Barium and lead were present in many samples, at slightly elevated concentrations, and cadmium, thallium, copper, molybdenum, manganese, and zinc were present in a few samples. Elevated copper concentrations were limited to the 6,800-foot level Rochester Formation.

Table 3-9
Rochester Sample Matrix

Characterization Program	Whole Rock Analysis	ABA	Total Sulfur	NAG pH	MWMP/ SPLP	HCT
Schafer (1995) and Maxim (1998/2000)	25	156	156	81	30	18
RockWMC (2009)	--	5	5	--	2	--
CRI–Blast Hole Samples (2000-2007)	--	--	20,302	--	--	--
CRI–Blast Hole Samples (2011-2013)	--	--	6,348	--	--	--
CRI–WPCP Composite Samples (1999-2007)	--	--	--	--	64	--
CRI–WPCP Composite Samples (2011 to present)	--	16	16	--	16	2
CRI–Closure Characterization (2011)	--	45	45	--	45	--
Total	**25**	**222**	**26,872**	**81**	**157**	**20**

Source SRK 2014

SPLP = Synthetic Precipitation Leaching Procedure
HVP = humidity cell testing

A comprehensive review of mineralogical data for the Rochester ore deposit is presented in Maxim (1998), and a review of the waste rock mineralogical data is presented in Maxim (2000). In these studies, Maxim evaluated the sulfide mineralogy and the order that the mineral constituents are formed (i.e., paragenesis) in ore samples. The resulting analysis provides an understanding of the mineralogy that controls potential acid generation in waste rock materials.

The key sulfide minerals identified in these studies were pyrite, sphalerite, and galena, with minor amounts of chalcopyrite, covellite, tetrahedrite, argentite, polybasite, and arsenopyrite. Secondary oxide minerals were goethite, hematite, jarosite, and cerussite. These studies document the presence of amorphous and anhedral sphalerite and galena, which tend to oxidize readily. However, oxidation of monovalent sulfide minerals (e.g., sphalerite, covellite, and galena) does not release acidity. In addition, silica and iron oxide encapsulation of pyrite was also observed, which limits oxidation of pyrite.

Observations from the mineralogical studies suggest pyrite represents only a portion of the sulfide minerals that would be expected to occur in the Rochester pit materials, and the remaining sulfide minerals are monovalent. Therefore, predictions of acid generation based on total sulfur or sulfide sulfur content may be overestimated.

As noted above, the presence of secondary sulfate minerals was observed in both the Weaver and Rochester Formation samples. These minerals are soluble

and produce acidity under weathering conditions. However, this acidity would tend to be associated with the "first flush" rinsing and would not provide a sustainable source of long-term acidity.

Acid Base Accounting Results—A total of 156 samples were collected from the Weaver and Rochester Formations and submitted for ABA, as part of the Schafer (1995) and Maxim (1998, 2000) geochemical characterization programs. The average results for the combined Schafer and Maxim dataset are summarized in **Table 3-10**, below, for the Weaver and Rochester formations.

Table 3-10
Schafer and Maxim Average ABA Results

Formation	Description	NAG pH (s.u.)	NP	Total Sulfur (wt %)	Sulfide Sulfur (wt %)	Sulfate Sulfur (wt %)	AP	NNP	NPR
Weaver Formation	Count	42	107	107	107	107	107	107	107
	Minimum	2.5	<0.01	<0.01	<0.01	<0.01	<0.31	-48	0.20
	Maximum	6.6	9	2.0	1.8	0.42	57	9	29
	Median	4.6	3.0	0.02	0.01	0.01	0.3	1.7	6.4
	Average	4.5	3.3	0.12	0.07	0.04	2.3	0.9	8.2
Rochester Formation	Count	39	49	49	49	49	49	49	49
	Minimum	2.3	<0.01	<0.01	<0.01	<0.01	<0.31	-87	0.01
	Maximum	5.6	9.0	4.0	3.0	0.25	93	8.7	29
	Median	3.9	3.0	0.10	0.03	0.02	0.9	0.7	3.2
	Average	3.7	3.3	0.62	0.52	0.05	16	-13	4.4
All Data	Count	81	156	156	156	156	156	156	156
	Minimum	2.3	<0.01	<0.01	<0.01	<0.01	<0.31	-87	0.01
	Maximum	6.6	9.0	4.0	3.0	0.42	93	9	29
	Median	4.4	3.0	0.04	0.01	0.02	0.3	1.69	6.4
	Average	4.1	3.3	0.27	0.21	0.04	6.7	-3.4	7.0

Source SRK 2014

NAG pH: Net acid generation potential pH (s.u.)
s.u.: standard units
NP: Acid-neutralizing potential reported in kg CaCO3 eq/t.
AP: Acid-generating potential, calculated as 31.25 x sulfide sulfur (%) and reported in kg CaCO3 eq/t.
NNP: Net neutralizing potential, calculated as NP - AP and reported in kg CaCO3 eq/t.
NPR: Neutralizing potential ratio, calculated as NP/AP.

ABA provides an industry-recognized assessment of the acid generation or acid neutralization potential of rock materials. An estimate of acid generation is made by assuming complete reaction between all of the minerals with acid potential and all of the minerals with neutralizing potential (essentially dissolution of carbonate minerals and, to a very limited extent, silicate minerals, as the latter have very slow reaction kinetics; Bowell et al. 2000). The AP values were calculated from sulfide sulfur concentrations and reported as $CaCO_3$ equivalents per 1,000 tons of rock. The NP values were determined using the

modified Sobek protocol. This includes a digestion to expel any CO_2, followed by a back titration with NaOH to a pH of 8.3 s.u. Neutralizing potential is calculated as $CaCO_3$ equivalents per 1,000 tons of rock.

The balance between the acid-generating mineral phases and acid-neutralizing mineral phases is referred to as the net neutralization potential (NNP), which is equal to the difference between NP and AP. The NNP allows the samples to be classified as potentially acid consuming or acid producing. A positive value of NNP indicates the sample neutralizes more acid than is produced during oxidation. A negative NNP value indicates there are more acid-producing constituents than acid-neutralizing constituents. Materials that would be considered to have a high potential for acid neutralization produce a net neutralizing potential of greater than 20 kg $CaCO_3$ eq/t.

ABA data is also described using the NPR, which is calculated by dividing the NP by the AP. Material that would be considered to have a high potential for acid generation produces a net neutralizing potential of less than -20 kg $CaCO_3$ eq/t and NPR of less than 1. Samples with NNP values between -20 and 20 and NPR values between 1 and 3 are considered to have an uncertain potential for acid generation (SRK 2014).

ABA results are typically compared to criteria provided by the BLM (2004) and guidance provided by the NDEP (1990) in order to determine the potential for the waste rock material to generate acid. Criteria provided by the NDEP (1990) considers samples in which NP exceeds AP by 20 percent (NPR = 1.2) to be non-acid generating without further testing. The Nevada BLM Water Resource Data and Analysis Guide for Mining Activities (BLM 2004) establish the following guidelines for evaluating ABA test results:

- NPR values greater than 3 and NNP values greater than 20 kg $CaCO_3$ eq/t are not acid generating and do not require further testing.
- NPR values less than 3 and NNP values less than 20 kg $CaCO_3$ eq/t have uncertain potential and require further evaluation using kinetic test methods.

These criteria are typically used to categorize the samples and determine if kinetic testing is needed to address the uncertainties of the ABA data.

As reported by Schafer (1995) and Maxim (1998, 2000), the total sulfur values for all 156 samples range from <0.01 wt% to 4 wt%. The average total sulfur by lithology is 0.12 wt% for the Weaver Formation and 0.62 wt% for the Rochester Formation. However, 107 of these samples (70 percent) had a sulfide sulfur concentration less than 0.2 wt% or less. NP values for all 156 samples ranged from <0.010 to 9.0 kg $CaCO_3$ eq/t, indicating low amounts of neutralizing

capacity in both of the formations. As a result, NNP values for all 156 samples are low, ranging from -87 kg $CaCO_3$ eq/t to 9 kg $CaCO_3$ eq/t.

The average NNP values per lithology ranged from 0.9 kg $CaCO_3$ eq/t for the Weaver Formation and -13 kg $CaCO_3$ eq/t for the Rochester Formation. The NPR values for all 156 samples range from 0.01 to 29, with an average of 7. The average NPR values per lithology ranged from 8.2 for the Weaver Formation and 4.4 for the Rochester Formation. Although most of the NNP values indicate an uncertain potential for acid generation, based primarily on the lack of NP, the NPR values indicate most of the samples are non-acid forming, with average values greater than 3.

The waste rock in the Rochester pit have an uncertain potential for acid generation or are acid generating, with NNP values less than -20 kg $CaCO_3$ eq/t and NPR values less than 1 (SRK 2014, Figure 4-1). None of the 156 samples are classified as non-acid generating based on the BLM criteria. The samples from the Rochester Formation generally show a greater potential for acid generation, compared with the samples from the Weaver Formation. This can be related to a generally higher sulfide sulfur concentration for the Rochester samples, compared with the Weaver samples (SRK 2014).

Net Acid-Generation Testing—NAG testing is used to determine the net acid remaining after being subjected to a strong oxidizing agent (hydrogen peroxide). The acid that is formed reacts with the neutralizing components in a sample, which provides a direct measurement of the net acidity generated after a period of exposure and weathering. The final pH values (NAG pH) can be used to differentiate between PAG and non-PAG materials. Samples with NAG pH values greater than 4 s.u. are predicted to be non-acid forming.

Net acid generation is predicted for samples with a NAG pH value greater than 4 s.u. The average NAG pH for the Rochester and Weaver Formation samples were 3.7 and 4.5, respectively. Of the 81 samples subjected to NAG pH measurements, a minimum pH of 2.3 and maximum pH of 6.6 were reported.

The NAG pH is plotted versus NPR and shows there is a good correlation between the NAG and ABA test results (SRK 2014, Figure 4-4). Those samples with a NAG pH less than 4 show a greater potential for acid generation from the ABA results, with NPR values less than 1. A good correlation is also seen between NAG pH and the total sulfur content of the sample (SRK 2014, Figure 4-5). The greatest potential for acid generation is seen in samples from the Rochester Formation. In comparison, the Weaver samples show a lower potential for acid generation.

Meteoric Water Mobility Procedure and Synthetic Precipitation Leaching Procedure—Between 1995 and 2000, a total of 51 samples were tested for metal mobility, including 15 samples using the SPLP and 36 using the Nevada MWMP. SPLP and MWMP are designed to determine the potential for release

of chemical constituents from a solid that is exposed to meteoric precipitation (rain or snowmelt). Details of the SPLP and MWMP tests are summarized in Schafer (1995) and Maxim (2000), respectively. The extracts ranged in pH from slightly acidic to near neutral, with pH values ranging from 4 to 6.4 s.u. The SPLP extracts contained elevated levels of barium and iron relative to the applicable standards. MWMP results indicated that concentrations of aluminum, cadmium, copper, lead, and zinc for some samples were slightly elevated, compared with NDEP reference values (SRK 2014).

Kinetic Testing—As part of the initial characterization programs, 18 waste rock samples from the Weaver and Rochester Formations were tested using HCTs to further assess the potential for acid generation. Details of the testing can be found in Schafer (1995) and Maxim (1998 and 2000). The 1995-1996 samples selected for kinetic testing were representative of PAG materials with low NPR values and were conducted to address the uncertainties of the ABA tests. The 1998-1999 tests were focused on material with relatively higher sulfur content. This was done to characterize material most likely to be reactive, and these tests are representative of a small fraction of the waste rock material that is potentially acid generating.

Table 3-11, Summary of Humidity Cell Test Data, presents a summary of the kinetic test results (humidity cell testing) from the Schafer (1995) and Maxim (1998, 2000) studies, along with the static test data for each sample. Total sulfur concentrations for all samples included in the kinetic test program ranged from 0.13 to 2.54 wt%, and sulfide sulfur ranged from 0.01 to 2.45 wt%. Final pH values ranged from 3.3 to 8.7 s.u., with most of the final effluent pH values between 4.0 and 5.5 s.u.

Table 3-11
Summary of Humidity Cell Test Data

Formation	Test Duration	Total Sulfur (wt%)	Sulfide Sulfur (wt%)	NP (kg $CaCO_3$ eq/t)	NNP (kg $CaCO_3$ eq/t)	NPR	Final HCT pH (s.u.)	Alk (mg/L)	Acidity (mg/L)	Sulfate (mg/L)	Sample #
Rochester	34	0.8	0.72	-24	-1.4	1	4	<1	30	46	6550 P2-29
	52	1.59	0.75	9	-14.4	0.39	4.5	<1	17.2	18	95KC-1007
	52	2.45	2.45	3.1	-73.5	0.04	4.5	<1	18.2	29	95KC-1008
	24	0.53	0.26	18	9.8	2.2	6.6	3.1	2	3	95KC-1009
	23	1.03	0.8	-50	-24.8	0.01	3.8	<1	20	29	97-09-01
	23	0.85	0.44	-27	-13.3	0.03	4.2	<1	19	9	97-09-02
	23	2.54	1.63	-102	-50.8	0	3.6	<1	80	68	97-10-02
	23	1.75	1.14	-71	-35.1	0.01	3.3	<1	129	66	97-10-03
	37	0.23	0.2	1	-5.3	0.2	5.4	1	9	8	98GCM06
	23	0.39	0.34	9	-1.6	0.8	6.4	3	2	6	98GCM11
	37	0.2	0.01	2	1.7	6.4	5.1	1	6	2	98GCM19
	23	0.67	0.62	3	-16.4	0.2	3.5	<1	51	91	98GCM52
	22	0.44	0.35	-21	-10	0.1	4.1	<1	21	32	98MM1002RT
	25	0.13	0.1	-5	-1.4	0.6	8.7	30	-16	3	RT-Waste (Q3)
Weaver	24	0.46	0.06	7.8	5.9	4.2	7.1	4.8	1.4	<0.5	96-2QTRW
	37	0.37	0.04	9	7.8	7.2	5.1	1	9	8	98GCM14
	37	0.72	0.1	1	-2.1	0.3	4	<1	24	48	98GCM34
	23	0.15	0.15	6	1.3	1.3	6.9	12	0	6	98GCM71

Alkalinity values at the end of the tests were generally very low, ranging in value from <1 mg/L to 30 mg/L (as $CaCO_3$). Acidity values ranged from -16 to 129 mg/L (as $CaCO_3$), with an average value of 23.5 mg/L (as $CaCO_3$), reflecting overall low acidity production. Sulfate concentrations were also low, with final concentrations ranging from 2 to 91 mg/L and an average final sulfate concentration of about 28 mg/L. These sulfate concentrations indicate a low potential for sulfide oxidation.

Under low pH conditions, cadmium, lead, zinc, and occasional copper and aluminum concentrations showed a higher release rate. Under neutral pH conditions, waste rock materials show very low or undetectable levels of metals, with a few transient values of aluminum, lead, manganese, and selenium.

The static geochemical data were compared with the kinetic test results to identify critical threshold values that could be used as criteria for identifying PAG versus non-PAG material. Final HCT pH values less than 5.0 s.u. were used to classify cells as PAG material, and cells with final pH values greater than 5.0 s.u. were considered non-PAG material. This is a conservative assumption, given that the pH of the initial deionized water used for the tests was about 5.0 s.u.

Based on site-specific HCT data, samples with NNP values greater than 0 kg $CaCO_3$ eq/t were non-PAG and samples with NNP values less than -10 kg $CaCO_3$ eq/t were consistently PAG. The samples with NNP values between this range varied widely in acid generation/neutralization. Similarly, material with NPR values above 1.0 were non-PAG, based on humidity cell testing, and material with NPR values below 0.1 were PAG. The final HCT pH data versus total sulfur content correlation indicates that materials with total sulfur less than 0.4 wt% are non-PAG, and materials with total sulfur greater than 0.4 wt% are PAG based.

Summary and Conclusions

SRK has reviewed geochemistry data to determine its adequacy to meet the data requirements for POA 10. SRK made an initial evaluation of the potential impacts from the temporary stockpiling of PAG waste rock material outside the pit.

The following conclusions can be made from the data review and evaluation:

- Pervasive oxidation of sulfides in the Rochester deposit results in limited sulfide sulfur content and an overall low potential for ARDML.
- Due to the limited buffering capacity in the system, the acid generation potential is controlled by the sulfide sulfur content of the material.
- The initial characterization programs that provided the basis for the NORMP are validated and confirmed by subsequent characterization and monitoring activities.

- The waste rock materials associated with the Rochester Pit are mainly non-PAG and demonstrate a low potential for acid generation and metals release. Less than 5 percent of the total waste rock will consist of PAG material.
- Data from Rotosonic holes drilled in the existing RDSs demonstrate the effectiveness of the site-specific criteria for identifying PAG material, as prescribed in the NORMP.
- PAG material can be analytically identified (based on total sulfur) and properly managed to reduce the potential for ARDML.

The temporary stockpiling of waste rock is unlikely to result in an environmental impact for the following reasons:

- PAG stockpile operations are short-term activities, and the stockpiles will be completely removed during mine closure. This relatively short duration of stockpile operations precludes the potential for long-term leaching of the PAG material.
- Due to the short residence time (10 years), there is a low risk of developing a saturated condition in the temporary PAG storage area that would be sufficient enough to recharge the underlying soils.
- Temporary PAG stockpiles would overlie a minimum of 50 feet of non-PAG material within the footprint of the existing RDSs.
- At closure, the PAG material would be relocated to a PAG cell above the saturated zone (6,250 feet amsl) within the pit and would be covered with 50 feet of non-PAG, as currently approved for the POA 8 (current NORMP and UBMP).

Based on these conclusions, there is limited potential for the temporary stockpiling of PAG material on the RDSs to degrade groundwater. In addition, the data evaluation demonstrates that the existing database is adequate to meet the data requirements for POA 10 (SRK 2014).

The various materials characterization programs span nearly 20 years, during which characterization testing methods and regulatory guidance (BLM and NDEP) have evolved; the most recent guidance updates are from September 2013 (BLM IM-NV-2013-046).

The revised NDEP and BLM testing requirements include a revised acid base accounting method (i.e., Nevada Modified Sobek Method) and the requirement for NDEP laboratory certification. The revised testing protocols stipulated by the current BLM and NDEP guidance are not retroactive to earlier materials characterization programs; nevertheless, the comparability and validity of the original (Schafer 1998 and Maxim 2000) and supplemental (CRI 2000 to 2013)

geochemical characterization data was affirmed via a systematic evaluation (SRK 2014). This evaluation identified no data errors or inconsistencies that could invalidate data collected under the original characterization programs.

Subsequent characterization program data (CRI 2000 to 2013) was also evaluated and determined to be valid and applicable to the waste rock material associated with the Proposed Action (SRK 2014). Based on the mineral characterization, rock materials at the site are characterized by low acid-generating potential and low acid-neutralizing potential.

3.9 LANDS AND REALTY

3.9.1 Regulatory Framework

The primary entities responsible for land use planning in the project boundary are the BLM and Pershing County. Overarching federal law, BLM policy, and procedural guidance is found in FLPMA and the BLM NEPA Handbook (H-1790-1). They direct BLM activities related to ROW authorizations and environmental impact document preparation. The Winnemucca RMP (pending ROD) further guides the management of lands and resources on BLM-administered lands in the project boundary by providing more specific land use planning criteria for locations in the RMP area.

The most common BLM land use authorization is a right-of-way. A ROW authorizes the use of BLM-administered land for a specific project, such as a road, pipeline, or power line. A ROW provides the authorized holder with the nonexclusive right and privilege to construct, operate, and maintain infrastructure on BLM-administered land for a term appropriate to the life of a project. Infrastructure in ROWs can be placed over, under, on, or through BLM-administered lands. In accordance with 43 CFR, Part 2801.2, the objective of the BLM's program is to grant ROWs to qualified entities and direct and control the use of those ROWs to protect natural resources, to promote use of ROWs by multiple users, and to coordinate uses with applicable governing bodies.

County-level land use planning criteria applicable to the project area are found in the Pershing County Master Plan (2012a). It contains goals and policies to provide adequate ROWs to serve existing and proposed development in the county and to maintain those ROWs to meet adequate levels of service and safety standards.

3.9.2 Affected Environment

The ROWs on BLM-administered lands in the project area are associated with Limerick Canyon Road (also known as Spring Valley Road) and three electrical power lines (see **Table 3-12** and **Figure 3-9**, Rights-of-way). The Limerick Canyon Road ROW is 60 feet wide, with an approximately 12-foot-wide paved road surface. The ROW extends north-south from the northern edge of the

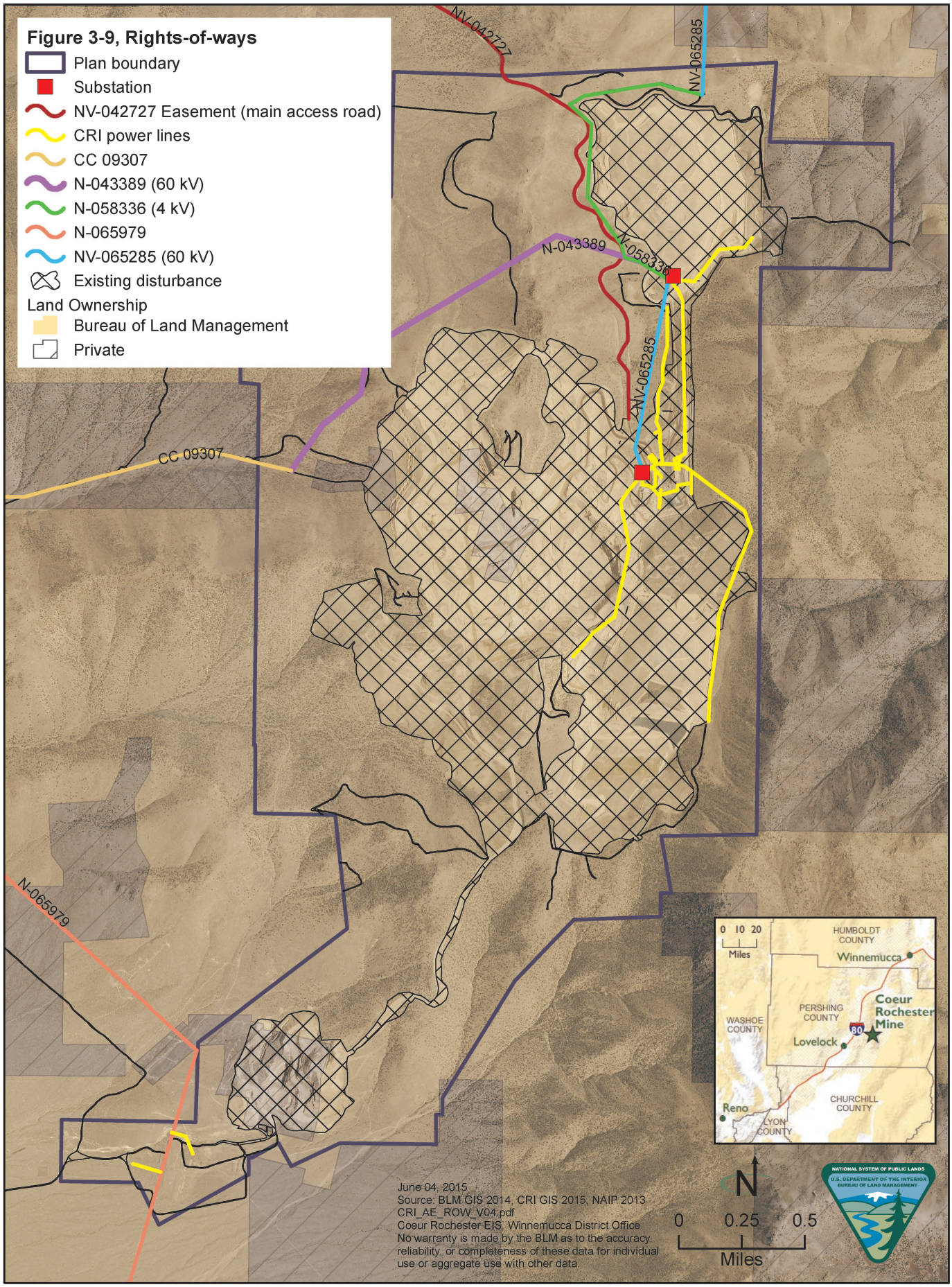


Figure 3-9, Rights-of-ways
Plan boundary
Substation
NV-042727 Easement (main access road)
CRI power lines
CC 09307
N-043389 (60 kV)
N-058336 (4 kV)
N-065979
NV-065285 (60 kV)
Existing disturbance
Land Ownership
Bureau of Land Management
Private
NV-042727
NV-065285
N-043389
N-058336
NV-065285
CC 09307
N-065979
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
Coeur Rochester Mine
PERSHING COUNTY
WASHOE COUNTY
Lovelock
80
Reno
CHURCHILL COUNTY
LYON COUNTY
June 04, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013
CRI_AE_ROW_V04.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
N
0 0.25 0.5
Miles
NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Table 3-12
Existing ROWs

ROW Name	Description
Limerick Canyon Road	60-foot-wide roadway with 12-foot travel lane entering the project area from the northwest
Power line 1	4kV power line (NV Energy ROW N-058336) next to Rochester main access road
Power line 2	60kV power line (NV Energy ROW N-043389), which traverses west to east across the project area and is south of the stage IV HLP
Power line 3	60kV power line (NV Energy ROW N-065285) in the proposed Stage V HLP footprint

project boundary to the administration and maintenance building complex, northeast of the Rochester pit. CRI holds the original ROW authorization for the segment of Limerick Canyon Road in the project boundary and is responsible for maintaining the roadway.

In addition to Limerick Canyon Road, American Canyon Road is an 8- to 12-foot-wide gravel-surfaced roadway that extends westward from Buffalo Spring Road. It intersects with Limerick Canyon Road near the northern edge of the plan boundary. The total length of the portion of American Canyon Road on BLM-administered land is approximately 5.7 miles, with 1.3 miles in the project boundary.

While there is currently no ROW associated with American Canyon Road, Pershing County maintains the roadway, which is as an important access road to the CRI Mine and surrounding locations. Collectively, Limerick and American Canyon Roads are the main access roads to the CRI Mine. See **Figure 3-9** for a depiction of existing road ROW locations.

Two 60kV electrical power lines (ROW N-043389 and N-065285) and one 4kV power line (ROW N-058336), owned and operated by NV Energy, transfer electricity in the project area (**Figure 3-9**). The American Canyon substation, at the southern edge of the Stage IV HLP, receives and redirects incoming power from the lines.

In addition to the NV Energy lines, there are three 4kV power lines that are owned and operated by CRI. Two lines extend south from the American Canyon substation and a third line enters the American Canyon substation from the east. There are no ROWs associated with these small distribution lines.

The processing of these ROW modifications would not affect other ROWs or private land, and as such, would not have an impact on lands and realty management.

3.10 SOCIAL VALUES AND ECONOMIC CONDITIONS

This section summarizes the current and recent socioeconomic conditions in areas and communities that could be affected by the Proposed Action: economic, population, and housing conditions, local government and school district infrastructure, key public service systems, fiscal conditions, and the social setting. Additional details are included in the Socioeconomic and Environmental Justice Baseline Assessment (Blankenship Consulting 2013), available at the BLM's Winnemucca Field Office.

The CRI Mine is about 24 miles northeast of Lovelock, the Pershing County seat. The study area for the socioeconomics analysis is Pershing and Humboldt Counties, with additional specifics provided for the cities of Lovelock, Winnemucca, and Imlay. The specific study area was determined based on the primary location of workers employed at the mine and the location of most goods and services purchased to support mine operations and mine employees.

3.10.1 Regulatory Framework

Appendix D of the BLM Land Use Planning Handbook H16011 provides guidance on integrating social science information into the planning process. According to regulations in the FLPMA and the NEPA guidelines, the BLM must incorporate social and economic information into the planning and decision-making process.

3.10.2 Affected Environment

Lovelock, Imlay, and Winnemucca are most likely to be affected by construction and operation of the proposed project. Some current residents of each of these communities may become employed by the project, and project employees relocating from elsewhere may choose to reside in these communities. CRI, its contractors, and employees may purchase goods and services from businesses in these communities, and local governments and school districts would provide services to resident project employees and households.

Lovelock

Lovelock (2012 population 1,936 [Nevada State Demographer 2012b]) is the Pershing County seat. It is in the southern part of the county, approximately 90 miles from Reno and 60 miles from Fernley on I-80. The Union Pacific Railroad, which passes through the city, follows I-80 along the Humboldt River. Located in an area of extensive marshland, Lovelock was a traditional resting and livestock watering and grazing place for pioneers traveling to California. The city began as a railroad community in the 1860s when George Lovelock, the original homesteader, offered 85 acres to the Union Pacific Railroad for a rail town.

Imlay

The unincorporated town of Imlay (2012 population 186) is in northern Pershing County on I-80. Established as a railroad town in the late 1860s, Imlay and its neighboring town, Mill City, which was established as a mining town, now

principally offer fuel and essential convenience retail and services for interstate travelers.

Winnemucca

Winnemucca (2012 population 7,997) is the Humboldt County seat. Like Lovelock, Winnemucca was settled as a mining community; now it also relies on agriculture (Winnemucca is home to both the world's largest potato field and largest potato dehydration facility), transportation (both the Union Pacific Railroad and I-80 run through the city), and tourism/outdoor recreation (Humboldt County 2002).

Table 3-13 displays highway/road distances from the mine to area communities, recent population estimates for these communities, and the percentage of the Rochester workforce that lives in each community.

Table 3-13
Travel Distance/Population: Project Study Area Communities and Places

County and Community	Approximate Travel Distance from the Coeur Rochester Mine (Miles)	2012 Population	Residency Distribution of 2012 Rochester Workforce
Pershing County		7,013	62% (175 workers)
Lovelock	24	1,936	59% (168 workers)
Imlay	36	186	<0.7% (2 workers)
Humboldt County			
Winnemucca	70	7,997	15% (42 workers)
Churchill County			
Fallon	80	8,706	8% (23 workers)
Lyon County			
Fernley	85	18,831	9% (25 workers)
Washoe County			
Reno	117	90,214	4% (12 workers)
Sparks	113	229,859	

Sources: Nevada Department of Transportation 2012; Nevada State Demographer 2012a (for community population)

Economic Background

Mining has long had an important economic presence in both Pershing and Humboldt Counties, with the industry's contribution waxing and waning over time. The present era of large-scale mining operations began in the late 1970s. Construction, tourism/travel support, and government employment play important secondary roles in the county economy. Agriculture is economically and culturally important, although it is a smaller part of the economy than mining.

The region's mining industry has experienced several expansion and contraction cycles since the late 1970s. The expansionary phases triggered short-term increases in industrial construction at the mines, while the resulting population

growth supported commercial and residential development. Total employment doubled in each county between 1985 and 1997, with more than 1,500 jobs added in Pershing County and 5,500 jobs added in Humboldt County. Data from the US Bureau of Economic Analysis indicate that total employment peaked in both counties in 1997. In subsequent years more than 1,500 mining jobs were lost in Humboldt County, and another 300 mining jobs were lost in Pershing County by 2001.

Beginning in 2003, mining underwent another expansion period in response to higher gold prices. Then a drop in mining employment in Pershing County in 2009 reflected the suspension of mining at the CRI Mine. Conversely an increase in mining employment in 2011 reflected the resumption of mining in that year.

Construction and opening of Lovelock State Prison in 1995 brought a new and stable source of jobs to Pershing County. Those jobs were the primary factors underlying the increase in total government employment from 376 employees in 1993 to 709 in 2000.

In 2011, the combined employment of the two counties was 12,894 jobs. The total represented a net gain of more than 2,900 jobs in the two counties, as compared to 1990, and an average compounded annual growth of 1.2 percent. Although employment gains were registered in both counties, most of the growth occurred in Humboldt County (**Table 3-14**). In 2011, the CRI Mine supported an estimated 577 jobs in Pershing County and elsewhere in northern Nevada; of these, 289 were either CRI employees or contractors employed at the site.

Table 3-14
Total Employment in Pershing and Humboldt Counties: 1990, 2001, and 2011

	1990	1997	2001	2011	1990 to 2011 Change	Compounded Growth Rates
Pershing County	2,289	2,919	2,381	2,467	178	0.4%
Humboldt County	7,686	10,910	8,340	10,427	2,741	1.5%

Source: US Bureau of Economic Analysis 2012a

Pershing and Humboldt Counties did not suffer as severe an economic dislocation during the recession of 2007-2010 as did southern Nevada. Industrial and residential construction slowed, the mining and retail trade industries contracted somewhat, and unemployment rose; nevertheless, the scale of the effects was relatively smaller than those in the state as a whole.

Despite the similarities in the mining industry employment over the past several decades, the structural composition of the local economies differs dramatically between the two counties. The Pershing County public sector employment

accounts for 28.8 percent of all employment—more than double that in Humboldt County. Farm employment's share of total employment is also twice as large in Pershing County. In Humboldt County, employment in the non-farm private industries accounts for more than 62 percent of all jobs, compared to 39 percent in Pershing County (see **Table 3-15**).

Table 3-15
County Employment by Broad Industrial Grouping (Place of Work Basis), 2011

	Farm	Mining	All Other Private (Non-Farm)[1]	Government	Total
Pershing County	216	585	956	710	2,467
	8.8%	23.7%	38.8%	28.8%	100%[2]
Humboldt County	444	2,001	6,504	1,478	10,427
	4.3%	19.2%	62.4%	14.2%	100%[2]

Source: US Bureau of Economic Analysis 2012b
[1]This includes mining, agricultural services and forestry, construction, manufacturing, wholesale and retail trade, transportation, utilities, and services.
[2] Total subject to rounding

The mining industry's contributions to local employment and economic activity extend beyond its direct effects. This is because the capital investment in new, upgraded, and replacement mining facilities supports commercial/industrial construction. Moreover, the direct and indirect increases in employment and population foster new residential and public sector infrastructure development. Employment in the real estate, trade, and other consumer-oriented services also expanded during the period of growth in mining.

The major employers in each county at the beginning of 2013 are shown in **Table 3-16**. The dominant role of mining companies and public sector employers in both counties (particularly in Pershing County) and the relative greater diversity among large employers in Humboldt County are evident.

Table 3-16
Major Employers in Pershing and Humboldt Counties: First Quarter 2013

Pershing County		Humboldt County	
Employer	**Approx. Size (Employees)**	**Employer**	**Approx. Size (Employees)**
State of Nevada—Department of Corrections	200 to 299	Newmont Mining	500 to 599
Coeur Rochester, Inc.	200 to 299	Humboldt County School District	500 to 599
Florida Canyon Mining, Inc.	100 to 199	Hycroft Resources & Development	400 to 499
Eagle-Picher Minerals, Inc.	100 to 199	Turquoise Ridge Joint Venture	400 to 499
Pershing County School District	100 to 199	Goldcorp Marigold Mining	300 to 399
Pershing General Hospital	90 to 99	Wal-Mart	200 to 299
Pershing County	90 to 99	Humboldt General Hospital	200 to 299

Table 3-16
Major Employers in Pershing and Humboldt Counties: First Quarter 2013

Pershing County		Humboldt County	
Employer	**Approx. Size (Employees)**	**Employer**	**Approx. Size (Employees)**
		Humboldt County	200 to 299
		Winners Hotel & Casino	100 to 199
		Schmueser & Associates (construction)	100 to 199
		Carry-On Trailer (manufacturing)	100 to 199
		Winnemucca Inn (hotel/casino)	100 to 199

Source: Nevada Department of Employment, Training, and Rehabilitation 2013

In 2006, before the recession, unemployment was relatively low in both counties and the state as a whole. Beginning in late 2007 unemployment rates climbed, eventually peaking in 2010 at nearly 14 percent for the state. The 14 percent rate was dominated by the severe labor market conditions in Clark County/Las Vegas.

Unemployment rates in northern Nevada also climbed, peaking at just over 11.0 percent in Pershing County and 8.2 percent in Humboldt County. Labor market conditions in Nevada and the two counties have since improved and unemployment has declined, both in absolute numbers of unemployed and as a share of the labor force. Not apparent in the unemployment rates is that the size of the labor force and the number of employed both increased in northern Nevada during the recessionary years (2008 to 2010), expanding by nearly 250 workers and job seekers in Pershing County and 1,200 workers in Humboldt County. Those trends underscore the underlying role of the mining industry and industrial construction projects in attracting job-seekers during the recession. It is also indicative of the contributory role that the subsequent resumption of mining at the CRI Mine played in improving the local economy and reducing local unemployment in Pershing County (see **Table 3-17**).

Current labor market conditions suggest some availability of labor in the current population to meet future labor requirements. Labor market conditions are likely to change over the next several years in conjunction with the labor force needs of other mines in the area in response to declining gold prices if the current trend continues.

As discussed, mining plays a critical role in the economies of both counties, generating substantial payrolls for their workers. A summary of earnings by place of work, the major adjustments to income, and resulting total personal income for the two counties (**Table 3-18**).

Table 3-17
Regional Labor Force: Unemployment and Unemployment Rates, 2008 to 2013

	2008	2009	2010	2011	2012	2013 (July)
Pershing County						
Labor force	2,497	2,636	2,731	2,805	2,767	2,938
Unemployed	185	266	300	316	286	264
Unemployment rate	7.4%	10.1%	11.0%	11.3%	10.3%	9.0%
Humboldt County						
Labor force	8,069	8,699	9,264	9,609	9,644	10,336
Unemployed	421	658	757	696	598	606
Unemployment rate	5.2%	7.6%	8.2%	7.2%	6.2%	5.9%
State of Nevada						
Unemployment rate (%)	7.0	11.6	13.7	13.5	11.6	9.9

Source: US Bureau of Labor Statistics 2013

Table 3-18
Pershing and Humboldt County Personal Income by Place of Residence, 2011

	Pershing County		Humboldt County	
	$ 1,000s	%	$1,000s	%
Earnings by place of work	114,086	65.7	$596,549	82.9
Residency adjustment[1]	7,560	4.4	1,979	0.3
Social security deductions	-8,669	-5.0	-53,791	-7.5
Other Income to Residents	60,571	34.9	175,237	24.3
Total personal income of local residents	173,548	100.0	719,974	100.0

Source: US Bureau of Economic Analysis 2012c
[1]A positive residency adjustment shows that net earnings of workers employed in a county exceed those paid to workers who reside elsewhere. A negative residency adjustment shows that the net earnings of workers employed in a county but who reside elsewhere are in excess of the earnings of residents employed outside the county.

Personal income data for Pershing County showed total earnings of nearly $114.1 million for workers employed in the county in 2011 (the most current figure available at the time of this assessment). The total included nearly $40 million in the mining sector, approximately half of which was in conjunction with the CRI Mine. Of CRI's total payroll, nearly two-thirds accrues to Pershing County residents and 15 percent accrues to Humboldt County residents. Also in 2011 the mining industry generated total labor earnings of $195.2 million in Humboldt County, one-third of the total labor earnings of county residents.

As is common across the western states, the average annual wages and salaries in the mining industry are substantially higher than those for other industries. In 2012, for instance, the average annual wages for workers in the natural resources and mining industry in Pershing County was $65,550, compared to an average for all other workers of $35,443 (NDETR 2013). In addition to supporting CRI's workers, the benefits of the higher income accrue indirectly to other sectors of the local economy.

In addition to the earnings of residents, both counties also realized a net inflow of earnings by residents working outside of the county. The net residency adjustment was an inflow of nearly $7.6 million in Pershing County and $2.0 million in Humboldt County (**Table 3-18**). Non-labor income from such sources as social security deductions, dividends, rents, and interest accounted for the remaining adjustments to local income. Non-labor sources of income totaled nearly $60.6 million in 2011, fully one-third of the total income in Pershing County.

Although larger in absolute magnitude, the $175.2 million in other income in Humboldt County represented approximately one-fourth of the total income. High levels of non-labor income may represent a higher proportion of retirees in an area.

The expansion of the mining industry has generated substantial growth in personal income in the two counties, both in total and on a per capita basis. Despite that growth, residents of Pershing and Humboldt Counties both trailed the statewide average through most of the last decade, until the recession resulted in a dramatic drop in the statewide average between 2008 and 2009. Per capita incomes also declined locally during that period, but not to the same degree as elsewhere in the state. Consequently, per capita personal income in Humboldt County surpassed the statewide average in 2009, 2010, and 2011.

Pershing County per capita income, as reported by the US Bureau of Economic Analysis, lagged behind its neighbor and the statewide average by a considerable margin in 2011, $25,772 compared to $36,964. However, both figures are based on population estimates that include individuals incarcerated in the state's correctional facilities, which skews the figures downward for the normal resident population. Adjusting the local personal income to reflect the 1,700 inmates raises the estimated per capita income by approximately $8,500 in 2011, to $34,339. This is still less than the statewide average but is much more comparable (US Bureau of Economic Analysis 2012a).

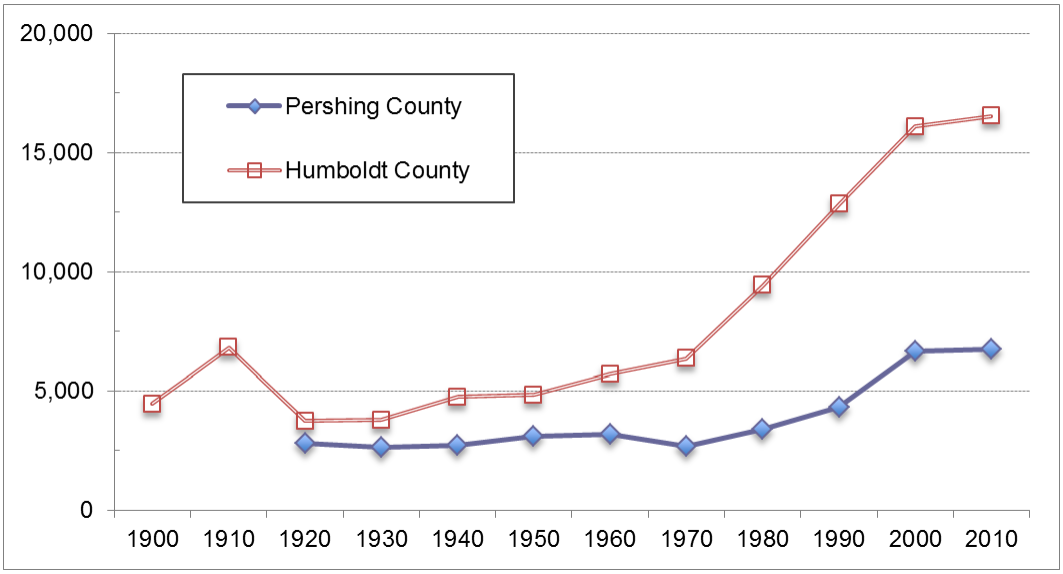
Population

Pershing County's population, first enumerated in the 1920 census, fluctuated between 2,600 and 3,400 in the ensuing six decades. Population essentially doubled in the two decades after that, in response to a dramatic increase in mining employment in the late 1980s, due in large part to the beginning of mining at the CRI Mine. Pershing County's population was further increased by \ constructing, opening, and subsequently expanding the Lovelock Correctional Facility in the mid-1990s. The inmate population accounts for approximately one-quarter of the county's population.

Pershing County's population remained relatively stable through 1970, while that of Humboldt County increased steadily. Between 1970 and 2000, Pershing County's population increased by more than 150 percent to 16,106. Since 2000, Humboldt County's population declined by nearly 1,400 residents through 2003,

before subsequent growth resulted in a net gain of just over 400 residents by 2010 (see **Figure 3-10**, Population: Pershing and Humboldt Counties, 1900 to 2010). The net gain was considerably more modest than the county had experienced in the preceding 30 years.

Figure 3-10
Population: Pershing and Humboldt Counties, 1900 to 2010



Source: U.S. Census Bureau, 2013.

At the time of the 2010 Census, approximately one-third of Pershing County's residents lived in Lovelock, with most of the remainder living in nearby unincorporated areas. Over time, the balance of population between Lovelock and other areas has been relatively stable.

In Humboldt County approximately 40 percent of the residents live in Winnemucca. Historically the share was higher, but in recent years virtually all of the population growth has been in outlying areas of the county.

A summary of population changes over the last decade is included in **Table 3-19**. Overall, both counties have had relatively stable population over the past decade (see **Figure 3-11**, Population: Pershing and Humboldt Counties, 2000-2012).

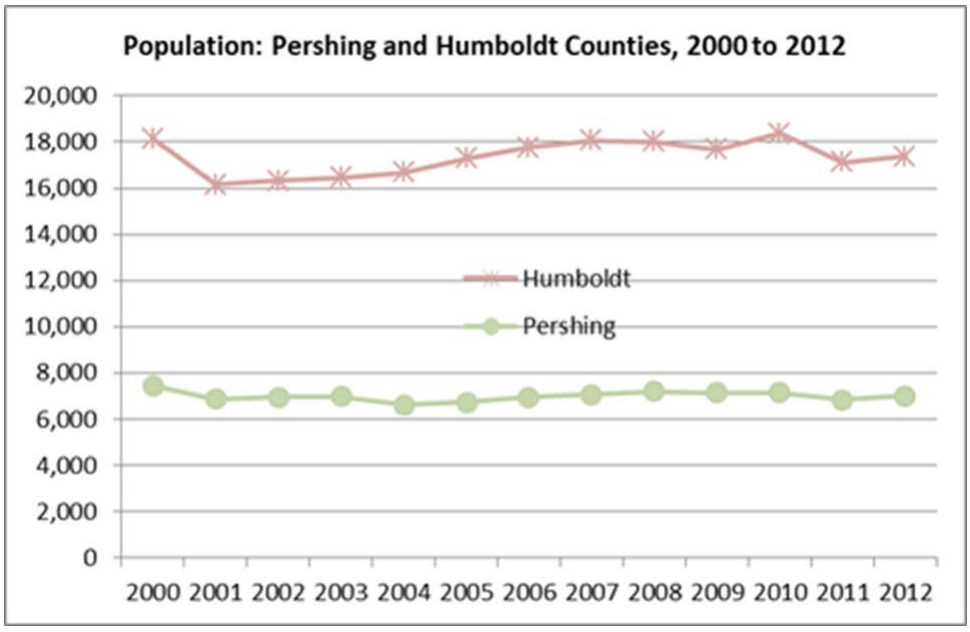
Population projections from the Nevada State Demographer indicate a loss of 9 and 8 percent in Pershing and Humboldt County from 2010 to 2030 (see **Table 3-20**). It is not clear that the Nevada State Demographer's forecasts take into consideration potential growth from mining projects that are proposed for the northern Nevada region.

Table 3-19
Pershing and Humboldt County Population, 2000 to 2012

Year	Pershing County			Humboldt County		
	Lovelock	Rest of the County	County Total	Winnemucca	Rest of the County	County Total
2000	2,772	4,686	7,458	8,884	9,265	18,149
2001	2,144	4,729	6,873	7,001	9,163	16,164
2002	2,267	4,670	6,937	7,234	9,074	16,308
2003	2,405	4,562	6,967	7,280	9,177	16,457
2004	2,381	4,250	6,631	7,249	9,443	16,692
2005	2,363	4,373	6,736	7,401	9,892	17,293
2006	2,427	4,528	6,955	7,643	10,108	17,751
2007	2,465	4,610	7,075	7,646	10,406	18,052
2008	2,458	4,734	7,192	7,659	10,355	18,014
2009	2,411	4,738	7,149	7,593	10,097	17,690
2010	2,274	4,859	7,133	7,961	10,403	18,364
2011	2,171	4,676	6,847	7,839	9,296	17,135
2012	1,936	5,077	7,013	7,997	9,387	17,384

Source: Nevada State Demographer 2012a

Figure 3-11
Population: Pershing and Humboldt Counties, 2000-2012



Source: Nevada State Demographers 2012a

Table 3-20
Projected Resident Population: Pershing and Humboldt Counties, 2010 to 2030

	2010	2015	2020	2025	2030	2010 to 2030	
						Absolute	Percent
Pershing County	7,133	6,946	6,794	6,615	6,498	-635	-9%
Humboldt County	18,364	18,071	17,874	17,131	16,842	-1,522	-8%
State of Nevada	2,724,634	2,857,223	3,043,607	3,199,430	3,338,269	613,635	23%

Source: Nevada State Demographer 2013

The Nevada State Demographer does not publish sub-county population forecasts. However, based on past growth trends, most of the projected decline in Pershing County would likely be concentrated in and near Lovelock, while that in Humboldt County would be centered in and near Winnemucca.

In 2010, more than 63 percent of Pershing County's residents and 52 percent of Humboldt County's residents were male; the median ages of area residents were 41.0 years for Pershing County and 36.2 years for Humboldt County, compared to 36.3 years in Nevada as a whole. The disproportionately high percentage of males in Pershing County reflects the nearly 1,700 male inmates incarcerated at the Lovelock Correctional Facility. The incarcerated population is also reflected in a disproportionately high share of residents 18 to 64 years of age; 67.4 in Pershing County compared to 62.4 percent in Humboldt County and 63.4 percent statewide.

The average household sizes of 2.51 persons in Pershing County and 2.60 persons in Humboldt County are both slightly smaller than the statewide average of 2.65 persons per household (US Census Bureau 2010).

The racial composition of the populations in Pershing and Humboldt Counties is more predominantly white than that of the state as a whole. In 2010, 68.2 and 68.9 percent of county residents respectively identified themselves as white of non-Hispanic decent, compared to 54.1 percent at the statewide level (US Census Bureau 2010).

Housing

Table 3-21 is a summary of housing conditions in Pershing and Humboldt Counties, as reported in the US Census for 2000 and 2010. Based on 2013 American Community Survey Census data, total occupancy rates have increased in both Pershing (86 percent) and Humboldt (89 percent) Counties (US Census Bureau 2013).

Table 3-22 displays the characteristics of vacant housing. Many units reported as vacant are uninhabitable or used as second or vacation homes, which are only seasonally occupied. Others are for sale or are sold but not yet occupied. Of the vacant units, 114 were available in Lovelock (92 for rent and 22 for sale),

Table 3-21
Pershing and Humboldt County Housing Inventories, 2000 and 2010

Units	Pershing County		Humboldt County	
	2000 Census	2010 Census	2000 Census	2010 Census
Total units	2,389	2,464	6,954	7,123
Occupancy status				
Occupied	1,962 (82%)	2,018 (82%)	5,733 (82%)	6,289 (88%)
Vacant	427 (18%)	446 (18%)	1,221 (18%)	834 (12%)
Occupied units, by type				
Owner-occupied	1,363	1,394	4,179	4,467
Renter-occupied	599	624	1,554	1,822

Sources: US Census Bureau 2001 and 2010

Table 3-22
Pershing and Humboldt County: Characteristics of Vacant Housing, 2010

	Vacant Units, by Type					
	Total Vacant	For Rent	For Sale	For Recreation Use	Rented or Sold: Not Occupied	Other
Pershing County	446	141	29	77	12	187
Lovelock	177	92	22	14	3	46
Imlay	36	4	1	10	0	21
Humboldt County	834	148	47	265	71	303
Winnemucca	288	102	27	58	31	70

Sources: US Census Bureau 2010

five in Imlay (four for rent and one for sale), and 129 in Winnemucca (102 for rent and 27 for sale). Rental units created as "man camps," which can range from barracks-style modular units to communities of permanent structures that provide temporary employee housing to workers, would typically be classified under the rental units category if constructed as permanent structures.

A review of housing listings and discussions with area realtors reveal that even fewer rental units were available during the fall of 2013 (Benolkin 2013;[2] Estes 2013;[3] Hawkins 2013[4]).

Temporary housing resources include motels, hotels, and recreational vehicle (RV) parks. **Table 3-23** summarizes temporary housing resources

[2]Andrew Benolkin. 2013. New Attitude Real Estate. Personal communication with C. Thornton-Kolbe, Progress Resources. September 30, 2013.
[3]Harvey Estes. 2013. Century 21/Sonoma Realty. Personal communication with C. Thornton-Kolbe, Progress Resources. September 30, 2013.
[4]Harold Hawkins. Vision West Realty. Personal communication with C. Thornton-Kolbe, Progress Resources. September 30, 2013.

Table 3-23
Temporary Housing Resources in the Study Area

	Lovelock	Winnemucca	Imlay/Mill City
Motels	7	21	1
Motel rooms	132	1,032	24
RV parks	3	4	1
RV spaces	38	164	36*

Source: Nevada Commission on Tourism 2013

*A planned expansion would add 12 to 16 new spaces by spring of 2014 (Esenarro 2013[5]).

in Lovelock, Unionville, Imlay/Mill City, and Winnemucca. This information was obtained from the Nevada Commission on Tourism's database, from proprietors, and from websites. There are ample motel and RV accommodations in Lovelock and Winnemucca, although there may be competition for these resources from I-80 travelers and tourism/recreation visitors during the summer. There also may be additional resources beyond those included in the database and obtained from these inquiries, including any temporary man camps established outside of existing RV parks.

Public Services and Infrastructure

In the two-county socioeconomic study area, services are provided by federal, state, and local entities. The Nevada Highway Patrol provides law enforcement services on the highways that access the project area. The BLM's Lovelock Fire Station is in the Lovelock Volunteer Fire Department station through a cooperative agreement with the City of Lovelock. Station equipment includes two type IV wildland engines. The Nevada Division of Forestry Humboldt Conservation Camp in Winnemucca provides fire suppression services for all rural non-federal land around the project area.

Counties and nearby communities that may supply workers to the project and host visiting project workers would be required to provide infrastructure and services to them and o their households. Local workers hired for the project would not represent an incremental service demand for these communities.

Pershing County provides a limited range of services to the unincorporated area around the project area, primarily law enforcement, emergency response (fire and ambulance), and road maintenance. Key infrastructure and services are law enforcement, emergency response, water supply, wastewater collection and treatment, solid waste disposal, health care, social services, and schools. These services are described in the following section on county and community infrastructure and services.

[5]Dusti Esenarro. 2013. Proprietor, Star Point Trading Post and RV Park, Unionville, Nevada. Personal communication with G. Blankenship, Blankenship Consulting LLC. October 29, 2013.

Law Enforcement

The Pershing County Sheriff's Office provides law enforcement services in the unincorporated areas of the county. It also operates the county detention facility and provides dispatch services for law enforcement and emergency response services in the county. October 2013 staff were 13 sworn officers: the sheriff, a lieutenant, two sergeants, and nine deputies (four patrol and five detention). One patrol deputy is stationed in Imlay. All deputies are certified as category 1, so that deputies assigned to detention can also serve as patrol deputies, if needed. Currently the Pershing County Sheriff's Office has five dispatchers. Current staffing is below the optimal level, requiring off-duty deputies to cover for illnesses and vacations and during high demand periods (Bjerke 2013).[6]

Law enforcement services in Lovelock are provided by the Lovelock Police Department. October 2013 staff were the chief of police and four patrol officers. The Lovelock Police Department and the Pershing County Sheriff's Office support each other in response to emergencies and law enforcement incidents when necessary (Bjerke[7] 2013; BLM 2012).

Law enforcement services in Winnemucca are provided by the Winnemucca Police Department. It is composed of the patrol division, animal control, investigative services, and administrative services. In late 2011, the Winnemucca Police Department employed 18 sworn officers. It has a mutual aid agreement with the Humboldt County Sheriff's Office (BLM 2012).

Emergency Response

The Lovelock Volunteer Fire Department (VFD) serves both Lovelock and the unincorporated portions of Pershing County not on federal lands. It provides both fire and emergency medical and ambulance services. The VFD has 30 firefighter positions. As of October 2013, 25 positions were filled and five were vacant. All firefighters are also required to staff the ambulances. The department currently has five engines, one water tanker, one rescue truck, and one brush truck. The VFD handles approximately 20 structural fires and 40 to 50 brush and wildland fires per year (Pershing County 2013a).

The 12-member Rye Patch VFD provides fire suppression services for the Rye Patch area of Pershing County. The Rye Patch VFD equipment includes one type II engine and one type VI engine.

The Winnemucca VFD provides residential and commercial fire protection services in the city. There are currently 25 volunteer firefighters. The rolling apparatus at the Winnemucca VFD is composed of three class A pumpers, three

[6]Thomas Bjerke. 2013. Lieutenant, Pershing County Sheriff's Office. Personal communication with G. Blankenship, Blankenship Consulting LLC. October 29, 2013.
[7]Ibid.

brush and wildland trucks, and one equipment van. The Winnemucca VFD is adequately staffed to handle emergencies for the city population (BLM 2012).

The all-volunteer Winnemucca Rural Fire Department (RFD) provides fire protection services to the Grass Valley area of Humboldt County and a portion of Pershing County. It is staffed by one fire chief and 25 on-call firefighters. The Winnemucca RFD has four brush trucks, three pumpers, and one interphase engine. Current staffing levels are adequate to accommodate firefighting demands (BLM 2012).

The Lovelock VFD provides emergency medical response and ambulance service to Lovelock and unincorporated Pershing County. The department is equipped with three ambulances. All firefighters are cross trained and certified either as emergency medical technician (EMT) I or EMT II. Most emergency medical and ambulance calls are related to traffic accidents on I-80 (Pershing County 2013b).

Humboldt General Hospital EMS Rescue provides emergency medical response and ambulance services throughout Humboldt County. EMS Rescue staffs a tactical emergency medical service team and a hazardous materials unit (HGH 2013). Currently EMS Rescue has 24 full-time paramedics and EMTs and 30 casual call volunteers. Emergency response equipment is five advanced life support ambulances and one intermediate life support ambulance, one ambulance/rescue vehicle, two rescue trucks, six ambulances, an 18-bed mobile hospital, and a hazardous materials trailer (HGH 2013).

Water Supply and Treatment

The Lovelock Meadows Water District provides water service to approximately 3,900 residents in and around Lovelock and to the Lovelock Correctional Facility. The water district's system capacity is 2.8 million gallons per day (mgd); recent system usage has been approximately 1.85 mgd. The system's capacity would accommodate 400 to 500 additional residential service connections, or approximately 1,000 additional residents (BLM 2012; LMWD 2007).

The community of Imlay's water system provides service to approximately 200 people. Average system usage is approximately 28,000 gpd (BLM 2012).

The City of Winnemucca Sewer and Water Department provides water to approximately 8,000 customers. The water system relies on a series of groundwater wells, with a production capacity of approximately 15 mgd and storage capacity of approximately 7.85 million gallons. Recent average demand has been approximately 3.5 mgd, with a peak demand of 6 mgd (BLM 2012).

The City of Lovelock provides wastewater collection and treatment services in city limits and adjacent residential areas of the county, serving approximately 750 connections and 2,500 individuals. The wastewater treatment facility is permitted for 0.6 mgd. Recent usage has been approximately 275,000 gpd, or approximately 100 gpd per person. The facility operated at less than 50 percent

of capacity in 2011 (BLM 2012). Rural areas of Pershing County rely on individual septic systems for wastewater disposal.

The Winnemucca wastewater facility serves approximately 8,000 customers, with approximately 3,500 connections. Treatment capacity is approximately 2.0 mgd, with an average use of approximately 1.0 mgd. Recent peak day usage was approximately 1.5 mgd. The McDermitt Sewage Ponds, the Paradise Valley Wastewater Treatment Facility, and the Orovada General Improvement District also provide community wastewater treatment services to residents in Humboldt County. Septic systems are used outside of the service areas of these treatment facilities (BLM 2012).

Solid Waste Disposal

The Pershing County landfill has a permitted volume of over 2.2 million cubic yards and a total disposal capacity of almost 1.9 million cubic yards. The landfill has a remaining disposal capacity of 0.87 million cubic yards and an estimated closure date of 2058 (NDEP 2013).

The Humboldt County Regional Landfill, approximately four miles north of Winnemucca, serves the city and the surrounding unincorporated area. The landfill has a total permitted volume of over 2.5 million cubic yards and a total disposal capacity of 2 million cubic yards. The landfill has a remaining disposal capacity of 1.3 million cubic yards and an estimated closure date of 2035 (NDEP 2013).

Health Care

Pershing General Hospital in Lovelock is a 38-bed acute long-term care hospital. It provides emergency room, radiology, laboratory, and a variety of inpatient care services. The hospital also operates an outpatient clinic and a 25-bed skilled nursing facility (Pershing General Hospital 2013).

Humboldt General Hospital in Winnemucca is a 52-bed general and surgical hospital that offers a variety of services, including a 24-hour emergency room, radiology, and laboratory. The hospital also provides a walk-in clinic and a long-term care facility (HGH 2013).

The Nevada Department of Health and Human Service's Community Health Nursing Program provides a variety of health care services to people of all ages and incomes at its clinics in Lovelock and Winnemucca (NDHHS 2013a, 2013b, and 2013c).

Other Services (Including Utilities)

Current direct economic effects of the CRI Mine are expenditures of nearly $80 million per year for contractor operations and other goods and services. Of that total, $21.0 million is associated with on-site contractors. An estimated 27 percent of the remaining expenditures are with vendors and suppliers in Pershing and Humboldt Counties and elsewhere in Nevada. These purchases

are for environmental, engineering, and construction services; heavy equipment leasing and services; fuel; mining and mineral processing materials; electricity; and tires, among many others (Blankenship Consulting 2014).

Education

The Pershing County School District is based in the town of Lovelock and the Humboldt County School District is based in Winnemucca. Together these districts are responsible for providing public education in the study area.

The Pershing County School District operates a high school and middle school (both in Lovelock) and two elementary schools in the towns of Lovelock and Imlay. The Humboldt County School District operates 13 schools. Its eight elementary schools are in Winnemucca, McDermitt, Orovada, Denio, and Kings River. Middle school/junior high schools are in Winnemucca (two schools) and McDermitt. One high school is in Winnemucca and one is in McDermitt. The schools in Lovelock and Winnemucca are those that would most likely be affected by project-related enrollments.

There are no charter schools operating in either Pershing or Humboldt County.

Fall enrollment in the Pershing County School District (grades K-12) declined steadily over the past decade, from a high of 859 in 2002-2003 to 663 in 2010-2011. A modest increase, primarily affecting the secondary level, occurred in the following two years, raising total enrollment by 26 students (**Table 3-24**). Due to the travel distances to district schools resulting from terrain and highway access constraints, approximately 200 students residing in the northern part of the Pershing County School District boundary attend school in the neighboring Humboldt County School District.

Due to past enrollment declines, the Pershing County and Humboldt County School Districts both have adequate facility capacity to accommodate increases in enrollment in their schools in Lovelock and Winnemucca. However, both districts do have ongoing facility maintenance and modernization needs. Both districts have also undertaken construction programs to promote energy efficiency/conservation. A substantial increase in enrollment could require additional staff, depending on the magnitude and age/grade distribution of the increases.

Total fall enrollment in the Humboldt County School District grades K-12 also declined steadily between school years 2002-2003 and 2008-2009, recording a net loss of 160 students, or approximately five percent. The declines affected both the elementary and secondary grades. Since that time, elementary enrollments have increased by 124 students and secondary enrollments have increased by 26 students.

Table 3-24
Pershing and Humboldt County School District Enrollment for School Years 2002-2003 to 2012-2013

School Year	Pershing County School District			Humboldt County School District		
	Kindergarten Through 6th	7th Through 12th	Total	Kindergarten Through 6th	7th Through 12th	Total
2002-2003	454	405	859	1,831	1,625	3,456
2003-2004	422	400	822	1,834	1,631	3,465
2004-2005	394	390	784	1,819	1,587	3,406
2005-2006	394	396	790	1,795	1,604	3,399
2006-2007	400	387	787	1,799	1,559	3,348
2007-2008	374	337	711	1,820	1,522	3,342
2008-2009	392	311	703	1,787	1,509	3,296
2009-2010	377	331	708	1,840	1,517	3,357
2010-2011	366	297	663	1,834	1,501	3,335
2011-2012	364	313	677	1,882	1,510	3,392
2012-2013	370	327	697	1,911	1,535	3,446

Source: Nevada Department of Education 2006-2011, 2012, and 2013

Local Government Fiscal Conditions

Local government finances in Nevada involve a combination of locally derived, state-shared, and federal government-shared revenues. The local revenues consist primarily of ad valorem/property taxes on real and personal property and the net proceeds of mines operating in the county. The state-shared revenues are from sales, motor vehicle, fuel, and gaming tax revenues. Federal government-shared revenues are derived from leases and mineral production on federal lands, payments authorized by various federal programs, and revenues provided under the federal payments-in-lieu of taxes (PILT) program.

Local government expenditures include the costs of providing required administrative and governmental services and developing and maintaining county, municipal, and special district infrastructure and equipment. Expenditures are influenced by the following:

- Size of the geographic area served
- Local land use and settlement patterns
- Resident population
- Seasonal demands, such as those associated with tourism, hunting, and wildfire risk
- Levels of service provided

Local government officials must balance available resources and competing demands for funds. During the annual budgeting process, they must plan for future needs and changes in economic conditions.

The general fund budget of Pershing County reflects the dominant role of ad valorem taxes and intergovernmental transfers in funding government operations. This is combined with the influences of a small population base, large service territory, and year-to-year variances in the mining-related tax base and revenues.

Pershing County's budgeted general fund revenues for the current and past two fiscal years have ranged between $9.46 million in fiscal year 2012-2013 and $10.42 million in fiscal year 2011-2012 (see **Table 3-25**). The range reflects considerable year-to-year variation in all major revenue categories, including more than $1.1 million in taxes and nearly $750,000 in intergovernmental revenues.

A 2012 analysis of CRI's economic contribution estimated that the portion of the sales and use, property, and net proceeds taxes paid in 2001 that accrued to Pershing County represented about eight percent of the county's total current revenue receipts in that year (BCLLC/SDLLC 2012).

Table 3-25
Pershing County General Fund Revenues (in Dollars): Fiscal Years 2011-2012 to 2013-2014

	2011-2012 (Actual)	2012-2013 (Estimated)	2013-2014 (Budgeted)
Taxes	$3,184,201	$2,678,623	$3,793,616
Licenses and permits	73,029	39,100	44,900
Intergovernmental	5,632,616	5,597,161	4,886,459
Charges for services	545,684	387,779	364,943
Fines and forfeitures	230,668	182,440	185,100
Miscellaneous	749,180	573,607	497,356
Total revenue	**$10,415,378**	**$9,458,710**	**$9,772,374**

Source: Pershing County 2013c

General fund budgets in Humboldt County indicate a decline in revenues between actual 2011-2012 revenues and budgeted 2013-2014 revenues. this decreased by $8.5 million to $24.1 million (see **Table 3-26**). Most of the decline is associated with lower ad valorem tax revenues, which do not account for taxes on the net proceeds of mining. Future accounting of these revenues will likely increase available revenues to support local government operations. Budgeted revenues from other sources also reflect reductions from past years.

Ad valorem taxes levied on taxable assessed valuation are vital sources of local revenue. In turn, local taxable valuation is very sensitive to changes in the net proceeds of minerals. Pershing County's total assessed valuation has increased

Table 3-26
Humboldt County General Fund Revenues (In Dollars): Fiscal Years 2011-2012 to 2013-2014

	2011-2012 (Actual)	2012-2013 (Estimated)	2013-2014 (Budgeted)
Taxes	$11,444,834	$4,781,000	$5,362,013
Licenses and permits	1,056,752	711,000	711,000
Intergovernmental	17,559,938	14,851,904	16,212,543
Charges for services	1,148,038	916,700	921,800
Fines and forfeitures	675,938	669,500	669,500
Miscellaneous	750,845	263,000	265,200
Total revenue	**$32,636,345**	**$22,193,104**	**$24,142,056**

Source: Humboldt County 2013

by more than 85 percent in the last six fiscal years, with most of the increase resulting from rising net proceeds of minerals (see **Table 3-27**). Increases in industrial valuation associated with mining property also contributed to the rise. As has been demonstrated elsewhere in Nevada, net proceeds can be volatile in response to changes in the commodity price of gold and the subsequent effects of changing prices on company development and production plans.

Humboldt County's total assessed valuation has also registered significant gains in recent years. It more than doubled between fiscal years 2007-2008 and 2013-2014, with a gain of more than $680 million occurring in just the past two years.

Table 3-27
Pershing County Assessed Valuation[1]: Fiscal Years 2007-2008 through 2013-2014

Fiscal Year	Secured and Unsecured[2]	Net Proceeds of Minerals	Total
2007-2008	$161.2	$30.0	$191.2
2008-2009	174.4	30.0	204.4
2009-2010	189.3	18.4	207.7
2010-2011	189.0	16.7	205.8
2011-2012	194.0	12.4	206.4
2012-2013	204.0	32.4	236.4
2013-2014	216.5	109.0	325.5

Source: Nevada Department of Taxation 2013f

[1]Values are in millions of dollars.
[2]Secured property generally refers to real property, mobile homes placed on foundations, and some improvements held by a title, whereby the taxes assessed create a lien on the property. Unsecured property generally refers to personal property, mobile homes not placed on foundations, and other property interest subject to property tax.

The tax rate applied to net proceeds is on a sliding scale of between 2 and 5 percent, depending on the ratio of net to gross proceeds. Most of the larger mines tend to be taxed at the higher end of the range, which can be at a rate in excess of the local tax rate. Revenues generated by the local tax rates accrue to

local governments and school districts in which the mining occurs, while revenues in excess of that amount accrue to the state.

Intergovernmental revenues from the state are the Basic City-County Relief Tax (BCCRT), Supplemental City-County Relief Tax (SCCRT), motor vehicle property taxes, and fuel taxes. The BCCRT and SCCRT are statewide sales and use taxes enacted to provide property tax relief. BCCRT is a state-mandated county-imposed sales and use tax returned to the county of origin, while revenues derived from the SCCRT sales and use taxes are pooled and distributed according to a specific formula.

Sales and use tax rates in Nevada are primarily established at the state level, with a limited number of local options. The minimum statewide rate is 6.85 percent, which is comprised of four components: a 2.0 percent general state sales and use tax rate, the BCCRT of 0.5 percent, SCCRT of 1.75 percent, and the Local School Support Tax (LSST) of 2.6 percent. The local receipts from the LSST are distributed to the local school district as part of the education funding program.

Use tax proceeds from out-of-state sales are pooled as part of the statewide funding program used to supplement district budgets where the LSST receipts are inadequate to meet the guaranteed funding levels. The distribution of revenues generated by the other taxes is summarized in **Table 3-28**.

Table 3-28
Sales and Use Tax Rates: Pershing County

Description/Component	Rate	Distribution
State sales and tax	2.00%	State general fund
BCCRT	0.50%	Local receipts to county where sale is made. Out-of-state distributed to cities and counties based on formula.
SCCRT	1.75%	Receipts distributed to qualifying local governments according to statutory formula.
LSST	2.60%	Local receipts to local school district. Receipts from out of state go into state distributive schools fund.
Minimum statewide rate	6.85%	**Applicable rate in Humboldt County**
Local options	0.25%	Local infrastructure and public safety improvements
Total with options	**7.10%**	**Applicable rate in Pershing County**

Source: Nevada Department of Taxation 2013b

A local option sales and use tax of 0.25 percent is levied in Pershing County. In recent years, proceeds generated by that levy are devoted to local infrastructure and public safety improvements, primarily equipment for the Lovelock Fire Department, which also serves outlying areas of Pershing County.

Sales and use taxes under Nevada's tax code are not confined to the traditional retail stores and restaurants but are assessed on all industries. In Pershing and Humboldt Counties, sales by local manufacturers and wholesalers, along with

and out-of-state purchases by mining and other industrial companies, account for substantial portions of the total taxable sales (see **Table 3-29**).

Table 3-29
Taxable Retail Sales by Total and by Major Industry: Pershing and Humboldt Counties, Fiscal Year 2012-2013

Industry (Source of sales/receipts)	Pershing County		Humboldt County	
	Taxable Sales	Percent of Total	Taxable Sales	Percent of Total
Mining	2,312,773	2.4	30,119,950	3.3
Utilities	525,009	0.5	28,298,295	3.1
Construction	3,863,237	4.0	48,368,854	5.3
Manufacturing	38,596,238	40.0	365,262,120	39.7
Wholesale	18,914,339	19.6	166,988,488	18.1
Retail	14,012,003	14.5	199,770,175	21.7
Transportation, finance, and real estate	7,416,713	7.7	16,002,993	1.7
Services	10,764,020	11.2	65,561,423	7.1
Other	37,966	0.0	739,569	0.1
Total	**$96,442,298**	**100.0**	**$921,111,867**	**100.0**

Source: Nevada Department of Taxation 2013c

Total annual taxable sales in Humboldt County are on the order of six to eight times those in Pershing County. This reflects the differences in the scale of the mining industry, the size of the resident population (consumer demand), and other factors (see **Table 3-30**). Total annual sales in both counties increased dramatically in recent years, primarily in response to mining sector investment and higher production. Such increases tend to generate additional revenues for local government and school districts, although some gains accruing to the school district are offset by decreases in state funding.

Table 3-30
Taxable Sales: Pershing and Humboldt Counties, Fiscal Years 2007-2008 to 2012-2013

Fiscal Year	Pershing County		Humboldt County	
	Annual Sales	Change from Previous Year	Annual Sales	Change from Previous Year
2007-2008	$ 67,278,641	NA	$508,712,673	NA
2008-2009	62,892,280	-6.5%	498,791,105	-2.0%
2009-2010	65,680,937	4.4%	533,666,736	7.0%
2010-2011	78,095,806	18.9%	748,153,148	40.2%
2011-2012	106,443,254	36.3%	740,656,235	-1.0%
2012-2013	96,442,298	-9.4%	921,111,867	24.4%

Source: Nevada Department of Taxation 2013d

Intergovernmental revenues also include various federal payments and grants, including PILT. Administered by the US Department of the Interior, the PILT program distributes payments to county governments to help offset foregone property taxes resulting from lands in federal rather than private ownership.

Annual payments are based on the number of acres of qualified federal lands in a county, the county population, the level of funding appropriated by Congress, and several other factors. PILT payments help local governments carry out services such as law enforcement, firefighting, search-and-rescue, and road maintenance and construction.

In fiscal year 2012-2013, Pershing County received $1,001,367 in federal PILT, and Humboldt County received $1,604,229. The number and amount of qualified federal acres and PILT payments to Pershing and Humboldt Counties are summarized in **Table 3-31**.

Table 3-31
Federal Payments In Lieu of Taxes: Acreages and Annual Payment, Fiscal Year 2012-2103

	PILT Acres by Agency				PILT
	BLM	US Forest Service	Other*	Total	
Pershing County	2,908,621	—	19,180	2,927,801	$1,001,367
Humboldt County	4,318,946	288,434	371,423	4,978,803	$1,604,229

Source: US Department of the Interior 2013
*Includes the Bureau of Reclamation and USFWS

PILT payments are in addition to other federal revenues, such as the portion of fees for grazing on public lands that the federal government transfers to the states.

The overlapping countywide ad valorem tax rates of all entities in Pershing County is $3.0968 per $100 in valuation for 2013-2104 (see **Table 3-32**). This is 15 percent below the state-mandated maximum of $3.66 but still among the highest in the state. Pershing County's levy is $1.3568, 44 percent of the total. The Pershing County School District's levy is $1.150, consisting of the mandated statewide levy of 0.750 for operating purposes and 0.400 for debt service on the district's $5.5 million in outstanding intermediate and long-term debt. An additional levy of $0.42 is imposed on taxable property in the county to support the Pershing County Hospital District. In addition to the countywide levies, taxable property in Lovelock is subject to an additional municipal levy of $0.5624 per $100 in valuation, while property in Imlay is subject to an additional levy of $0.1500.

For the fiscal year 2013-2014, property owners in Humboldt County were assessed an overlapping rate of $1.9109 per $100 in assessed valuation, among the lowest in the state. The County's levy is $0.7512, about 39 percent of the total. The Humboldt County School District's levy is $0.885. Other levies are a state-mandated levy of $0.17 to support health care for indigent persons and $0.1047 to support the County's hospital district. In addition to the countywide levies, taxable property in Winnemucca is subject to a municipal levy of $0.970 per $100 in valuation.

Table 3-32
Ad Valorem Tax Rates in Pershing and Humboldt Counties: Fiscal Year 2013-2014

Taxing Entity	Pershing County	Humboldt County
General county	1.3568	0.7512
School district	1.150	0.8850
State of Nevada	.1700	.1700
Other countywide levies	.420 (Hospital District)	0.1047 (Hospital District)
Total	**3.0968**	**1.9109**

Source: Nevada Department of Taxation 2013e
Note: Rates are in dollars per $100 of assessed valuation.

Pershing County's budgeted revenues of $9.8 million for fiscal year 2013-2014 were more than $600,000 less than the $10.4 million in 2011-2012. Declines in intergovernmental transfers are responsible for most of the change. Budgeted expenditures increased by more than $3.0 million during the same three-year period, such that net current revenues for Pershing County, defined as total revenues less total expenditures, have risen dramatically over the past three years, ranging from a small deficit of $1,813 in 2011-2012 to more than $3.7 million in 2013-2014 (see **Table 3-33**). The net deficit in the current year is to be funded by drawing on the County's reserve balance. As a result, its budgeted year-end general fund reserve balance is $3,303,319, equivalent to approximately one-third of its recent general fund operating expenditures.

Table 3-33
Pershing County Fiscal Summary: Fiscal Years 2010-2011 to 2012-2013

	2011-2012 (Actual)	2012-2013 (Estimated)	2013-2014 (Budgeted)
Total revenues	$10,415,378	$9,458,710	$9,772,374
Total expenditures	10,417,191	11,608,149	13,486,620
Net current revenue (deficit)	(1,813)	(2,149,439)	(3,714,246)
Other financing sources	17,489	475,000	0
Net transfer to/use of reserve fund balance	15,676	(1,674,439)	(3,714,246)
Reserve fund balance (ending)	$8,692,004	$7,107,565	$3,303,319

Source: Pershing County 2013c

A summary of Humboldt County's budget for the current and past two years is presented in **Table 3-34**. As shown, budgeted total revenues in 2013-2014 were 25 percent less than in 2011-2012, primarily the result of lower sales taxes and conservative estimates of ad valorem taxes on net proceeds. Higher than expected net proceeds could lead to substantially higher than anticipated revenues. Budgeted expenditures in the 2013-2014 fiscal year exceed those of the two years before and are also $9.8 million in excess of current revenues. The net result is a budgeted decrease of $9.8 million in reserves. This comes on the heels of a $10.9 million decline the previous year as the County undertook and completed several large capital improvement projects.

Table 3-34
Humboldt County Fiscal Summary: Fiscal Years 2011-2012 to 2013-2014

	2011-2012 (Estimated)	2012-2013 (Budget)	2013-2014 (Budget)
Total revenues	$32,636,345	$22,193,104	$24,142,056
Total expenditures	27,568,309	33,128,918	33,946,531
Net current revenue (deficit)	5,068,036	(10,935,814)	(9,804,475)
Other financing sources	—	—	—
Net Transfer to/use of reserve fund balance	5,068,036	(10,935,814)	(9,804,475)
Reserve fund balance (ending)	$39,621,682	$28,685,868	$18,881,303

Source: Humboldt County 2013

Despite the two years of capital spending, Humboldt County is budgeting a reserve balance of $18.9 million, nearly equivalent to a full year of its general fund revenue. That reserve can provide the County with a cushion to adjust to future changes in revenues generated by the mining industry.

Social Conditions

The foregoing sections of this assessment have described the relationship between mining and the economic, population, and fiscal aspects in the counties and communities in the study area. Additional information for this section was obtained from interviews with local service administrators in Pershing and Humboldt Counties and from a review of secondary sources.

Mining has long had an important economic presence in both Pershing and Humboldt Counties. Each of the counties and communities potentially affected by the activities associated with POA 10 is economically tied to mining. The counties and communities count mining and businesses that depend in whole or in part on mining as a substantial part of its employment base. Employment, earnings, population, and local government revenues typically increase in conjunction with increases in mining activity and decrease when mining declines or mines close.

The CRI Mine has been in operation since 1986, and Pershing County residents are familiar with their mining and reclamation operations. They have in the past been supportive of those activities (Bloyd 2012;[8] Giles 2012).

Mining's tax revenue payments to local and state governments have helped fund public facility and service expansions in the affected communities. All of these factors, coupled with the outdoor amenities available in Pershing and Humboldt Counties, have contributed positively to the quality of life for residents.

[8] Darin Bloyed. Chairman, Pershing County Board of Commissioners. Personal communication with G. Blankenship, Blankenship Consulting LLC. June 26, 2012.

At the same time, communities in the study area are very familiar with the economic contractions associated with falling commodity prices and mine closures. Both counties have voiced concern about the dependence on the mining sector and community sustainability in light of a finite resource base. Both counties have also initiated economic diversification efforts.

While there is general support for mining and new mining ventures in communities in the study area, there can also be concern and opposition. This would come from some individuals, groups, and organizations when mining occurs in or near areas that are important to other interests because of their use for agriculture, grazing, or outdoor recreation or if wildlife habitat, cultural/historic sites, or other important environmental resources are in or near the area.

Social Cost of Carbon

The SCC is an estimate of the anticipated future damages from GHG emissions. The SCC is addressed in the environmental impacts discussion in **Section 4.6**, Social Values and Economic Conditions.

3.11 SOILS

3.11.1 Soils: Regulatory Framework

Overarching federal law, BLM policy, and procedural guidance is found in the FLPMA and the BLM NEPA Handbook (H-1790-1). The BLM manages surface-disturbing activities from mineral development under the General Mining Law of 1872 and 43 CFR, Part 3809. Specifically, 43 CFR, Part 3809.420, requires mining-related activities to minimize impacts on soil resources.

Guidance for reclamation is provided in BLM Handbook H-29 3042-1. Additionally lands disturbed by mining operations are ensured to be reclaimed to safe and stable conditions, including soil conservation through erosion control, by following statutes NAC 445A.350-.447 (Mining Facilities) and NAC 519A.010-.415 (Regulation of Mining Operations). These statutes were developed to implement the requirements of the NRS 445A.300-.730 (Water Pollution Control) and NRS 519A.010-.290 (Reclamation of Land Subject to Mining Operations).

Soil erosion is governed by EPA stormwater management regulations, derived as part of the Clean Water Act (CWA). Under the CWA, the National Pollution Discharge Elimination System (NPDES) stormwater program requires authorization to discharge stormwater under a NPDES permit. It also requires the development and implementation of a SWPPP, with appropriate erosion control features designed to meet BMP and Natural Resources Conservation Service (NRCS) performance standards. In Nevada, the NPDES program is implemented by NDEP. A current SWPPP is in effect at the CRI Mine (Coeur 2014).

3.11.2 Soils: Affected Environment

Of the 4,339 acre project area, 4,122 acres are on BLM-administered land and 217 acres are on private land owned or controlled by CRI. The primary land use in and next to the project area is locatable mineral development. The project area is in a mountainous area, with soils that are primarily shallow and provide limited quantities for stockpiling. Approximately 63 acres at the Packard Mine have been disturbed by previous operators and are now inactive. CRI has taken responsibility for these disturbed acres and has continued mining methods that include typical open pit techniques where ore and waste rock are drilled, blasted, loaded, and hauled to either leach pads (ore) or waste RDSs.

Existing disturbance in the project area includes seven RDSs estimated, at a total of 245.5 million tons, which are currently being mined as ore sources. There are four heap leach facilities: one is inactive, another is planned to be leached through 2014, a third is stacked and planned for leaching for another seven to nine years, and the fourth is also being stacked and planned for leaching for an additional three to five years.

Table 3-35 illustrates the surface disturbance by facility and land status associated with the authorized POA. Under the POA, 1,930 acres have been approved for disturbance, 188.6 acres of which are on private lands and 1741.5 are on BLM-administered lands.

Table 3-35
Surface Disturbance

Mine Facilities	Acres		Total
	Private	Public	
Exploration roads/drill pads			
Rochester and Packard areas	0.7	78.5	79.2
Total acres	0.7	78.5	79.2
Roads			
North w/stage IV ROM haul	2.6	11.5	14.1
Southwest/stage III haul corridor		36.7	36.7
Ancillary roads		18.2	18.2
Packard haul road		31.8	31.8
Total acres	2.6	98.2	100.8
Open pits			
Rochester	45.3	272.5	317.8
Packard	68.6	33	101.6
Total acres	113.9	305.5	419.4
Process ponds			
Plant area process ponds		3.1	3.1
Stage III process/closure pond		3.9	3.9
Stage II conceptual closure pond		12.4	12.4
Stage III conceptual closure pond		1.1	1.1
Stage IV conceptual closure pond	5.8	4.6	10.4
Evaporation test pond		1.0	1.0
Total acres	5.8	26.1	31.9

Table 3-35
Surface Disturbance

Mine Facilities	Acres		
	Private	Public	Total
Heap leach			
Stage I		85.0	85.0
Stage II		107.3	107.3
Stage III		159.1	159.1
Stage IV		215.4	215.4
Total	0.0	566.8	566.8
Waste rock			
North RDS	2.7	94.0	96.7
South RDS		207.1	207.1
Charlie RDS		50.7	50.7
East RDS		46.1	46.14
West RDS	19.2	89.2	108.4
Packard RDS	7.2	3.0	10.2
Low-grade stockpile		37.2	37.2
Total acres	29.1	527.3	556.4
Yards Etc.			
Entrance parking		5.0	5.0
Rochester plant site		94.3	94.3
Growth medium stockpiles		19.4	19.4
Miscellaneous disturbance	36.5	4.8	41.3
Total acres	36.5	123.5	160.0
Sediment and drainage control			
American Canyon closure diversion		8.7	8.7
South American Canyon closure diversion		4.1	4.1
Packard conceptual channels		2.8	2.8
Total acres	**0.0**	**15.6**	**15.6**
Grand total acres	**188.6**	**1,741.5**	**1,930.1**

Source: Reclamation Permit 0087, amended by BLM decision letters dated February 7 and August 8, 2013

Soils

The project area includes seven soil map units, as mapped by an NRCS soil survey (NRCS GIS 2014) (see **Figure 3-12,** Soil Map Units). The most extensive soil in the project area is the Roca-Reluctan association (NRCS Soil Map Unit 901), which occurs in most of the central and western portions of the project area. The second most extensive soil is the Slaven-Iver-Cleavage association (Soil Map Unit 750), which occurs in most of the north-central part of the project area. **Table 3-36** identifies the seven NRCS soil units in the project area. These soils are typical of the steep mountain slopes and gently sloping alluvial valleys of the north-central Great Basin. Slopes vary from gently sloping piedmonts and fan skirts, with moderate runoff, to steep foothills and side slopes, with moderate to rapid runoff.

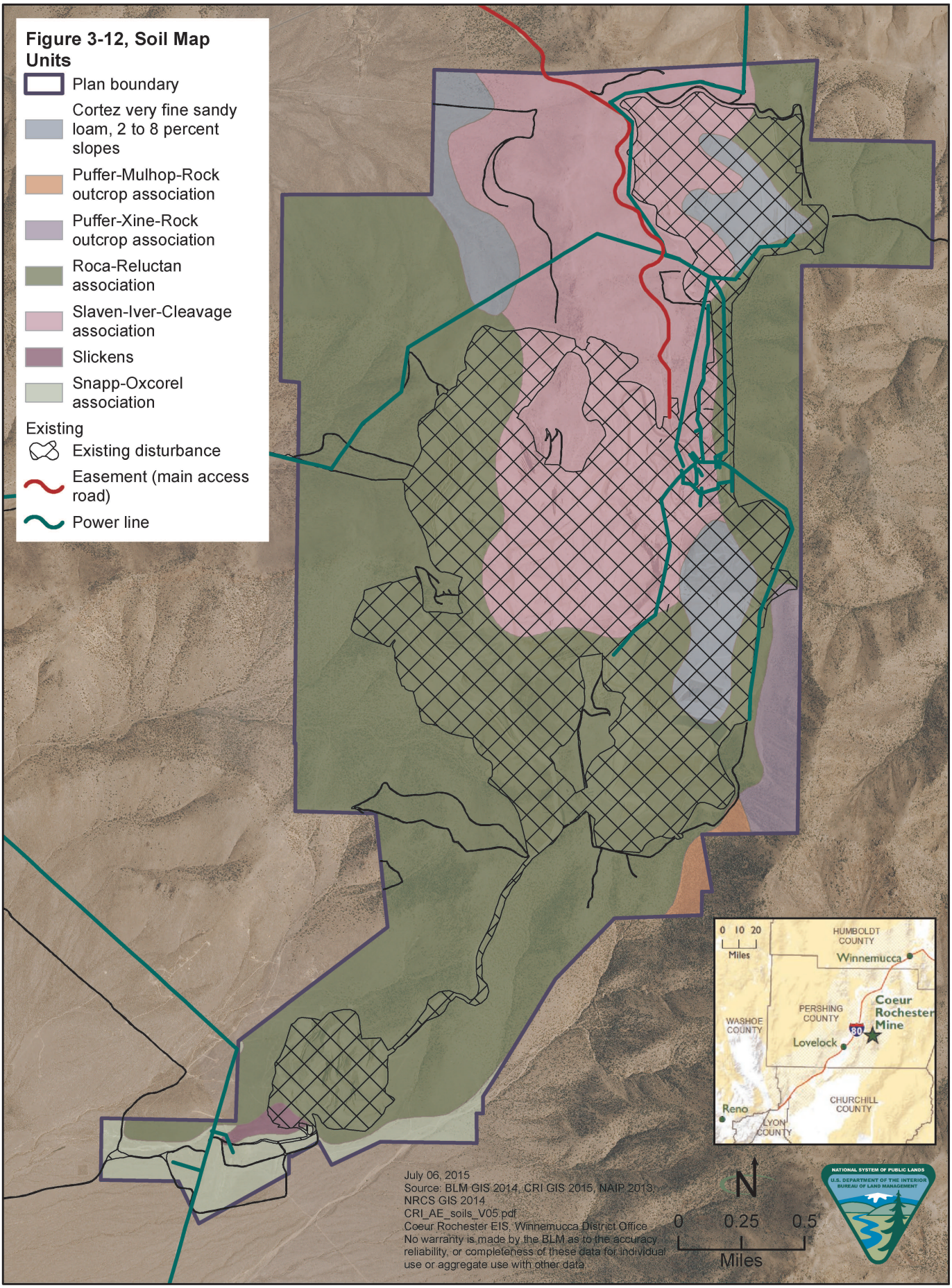


Figure 3-12, Soil Map Units
Plan boundary
Cortez very fine sandy loam, 2 to 8 percent slopes
Puffer-Mulhop-Rock outcrop association
Puffer-Xine-Rock outcrop association
Roca-Reluctan association
Slaven-Iver-Cleavage association
Slickens
Snapp-Oxcorel association
Existing
Existing disturbance
Easement (main access road)
Power line
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
Coeur Rochester Mine
PERSHING COUNTY
WASHOE COUNTY
Lovelock
80
Reno
CHURCHILL COUNTY
LYON COUNTY
July 06, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013; NRCS GIS 2014
CRI_AE_soils_V05.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy reliability, or completeness of these data for individual use or aggregate use with other data.
N
0 0.25 0.5
Miles
NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Table 3-36
Soil Units

NRCS Soil Map Unit Number	Soil Unit Name	Percent of Project Area
003	Slickens	0.4
750	Snap-Oxcorel association	3.1
901	Roca-Reluctan association	62.6
1291	Slaven-Iver-Cleavage association	25.2
1500	Cortez very fine sandy loam, two to eight percent slopes	6.0
954	Puffer-Xine-Rock outcrop association	2.1
955	Puffer-Mulhop-Rock outcrop association	0.6

Source: NRCS GIS 2014

Soil associations typically consist of one or more major soils and some minor or miscellaneous areas. Most of the soil map units in the project area are composed to two to three major soils. During the NRCS mapping process it was not considered practical or necessary to separate individual soil types, so associations are shown as one unit on the NRCS soil maps. Each major soil type (soil series) in the soil map units in **Table 3-36** is summarized below (JBR 2014).

The Cleavage Series
The Cleavage series consists of shallow, well-drained, very gravelly loam. These soils formed in residuum or colluvium derived from rhyolite, welded tuff, chert, shale, quartzite, sandstone, or conglomerate and other igneous or sedimentary rocks. Cleavage soils occur on side slopes of mountains in the soil survey. Slopes range from 2 to 75 percent.

The Cortez Series
The Cortez series consists of moderately deep, well-drained, very fine sandy loam. These soils formed in thin loess deposits over mixed alluvium. Cortez soils occur on fan piedmonts and mountain valley fans in the soil survey. Slopes range from 2 to 8 percent.

The Iver Series
The Iver series consists of very deep, well-drained, stony silt loam. These soils formed in loess over residual material and colluvium weathered from quartz grit, sandstone, shale, and quartzite. Iver soils occur on side slopes of mountains in the soil survey, ranging from 30 to 75 percent.

The Mulhop Series
The Mulhop series consists of shallow, well-drained soils that formed in residuum and colluvium derived from dolostone and limestone. Mulhop soils are on the side slopes of mountains. Slopes are 30 to 75 percent.

The Oxcorel Series
The Oxcorel series consists of very deep, excessively drained, gravelly, very fine sandy loam. These soils formed in alluvium derived from mixed rocks with

surficial deposits of loess. Oxcorel series occur on fan remnants and plateaus in the soil survey. Slopes range from 2 to 8 percent.

The Puffer Series
The Puffer series consists of shallow and very shallow well-drained soils that formed in residuum derived from sedimentary rocks. Puffer soils are on mountains with slopes of 4 to 75 percent.

The Reluctan Series
The Reluctan series consists of moderately deep, well-drained, gravelly loam. These soils formed in residuum and colluvium derived from volcanic rocks. Reluctan soils occur on side slopes of mountains in the soil survey. Slopes range from 15 to 50 percent.

The Roca Series
The Roca series consists of moderately deep, well-drained, very cobbly loam. These soils formed in colluvium and residuum derived from volcanic and sedimentary rocks. Roca soils occur on south-facing side slopes of hills and mountains in the soil survey. Slopes range from 30 to 75 percent.

The Slaven Series
The Slaven series consists of moderately deep, well-drained, very fine sandy loam and gravelly clay loam. These soils formed in residuum and colluvium derived from chert, shale, and quartzite, with a small component of loess containing volcanic ash. Slaven soils occur on hills and mountain side slopes in the soil survey. Slopes range from 15 to 75 percent.

The Slickens Map Unit
The Slickens soils occur on bolson floors and lake plain terraces in the survey area. These soils are influenced by mine tailings and are classified as a miscellaneous land type. As such, the Slickens Map Unit has no or very limited soil properties or interpretations available.

The Snapp Series
The Snapp series consists of very deep, well-drained, gravelly, very fine sandy loam. These soils formed in alluvium derived from mixed rocks. Snapp soils occur on fan piedmont remnants and ballenas in the soil survey. Slopes range from 2 to 30 percent.

The Xine Series
The Xine series consists of moderately deep, well-drained soils formed in residuum and colluvium derived from limestone, dolomite, and calcareous shale. The Xine soils are on mountain side slopes. Slopes are 15 to 75 percent.

Sensitive Soils
Additionally there are sensitive soils in the project area, including soils that may have high potential to support biological soil crusts, or soils that are susceptible

to wind erosion and water erosion. In areas where sensitive soils exist, additional mitigation parameters may need to be applied, or the area may need to be avoided.

Biological soil crusts are a complex mosaic of mosses, liverworts, lichens, fungi, algae, and cyanobacteria that occur as a thin layer of living organisms on the soil surface. Biological soil crusts are common in arid and semiarid plant communities worldwide, and there is a potential for biological soil crusts in the project area (see **Figure 3-13**, Biological Soil Crusts). In areas where they occur, biological crusts have the potential to cover soil surfaces not occupied by vascular plants,[9] litter, or rock. In the project area, biological soil crust potential is highest in the interspaces between shrubs and perennial grasses in native shrubland, nonnative understory, native grassland, and nonnative perennial communities. In many cases, biological soil crusts create rough topography on the soil surface that contributes to the structural complexity of the plant community. Biological soil crusts are effective in reducing wind and water erosion of soil surfaces. This is especially important in shrub-steppe communities, where there is generally less vegetation cover than grasslands or forested areas. **Table 3-37** shows the acreage of potential for biological soil crusts in the project area. Acres presented in the table do not include areas of existing disturbance, as depicted in **Figure 3-13**.

Table 3-37
Biological Soils

Potential	Acres in the Project Area	Percent of the Project Area
High	440	9.1
Moderate	1,230	25.4
Low	3,170	65.5

Water erosion potential is a function of many factors, including soil erodibility, slope gradient, length of slope, rainfall amount, duration, and intensity, and vegetation cover. Water erosion potential is generally highest in steeper areas with high erodibility and exposed soil. On BLM-administered land in the project area, approximately 1,350 acres are highly susceptible to water erosion. The areas highly susceptible to water erosion in the project area are summarized in **Table 3-38** and on **Figure 3-14,** Areas of Potential Water Erosion.

Table 3-38
Soils with Water Erosion Potential

Potential	Acres in the Project Area	Percent of the Project Area
High	1,350	27.9
Medium	3,030	62.6
Low	460	9.5

[9] Flowering plants, ferns, and their relatives

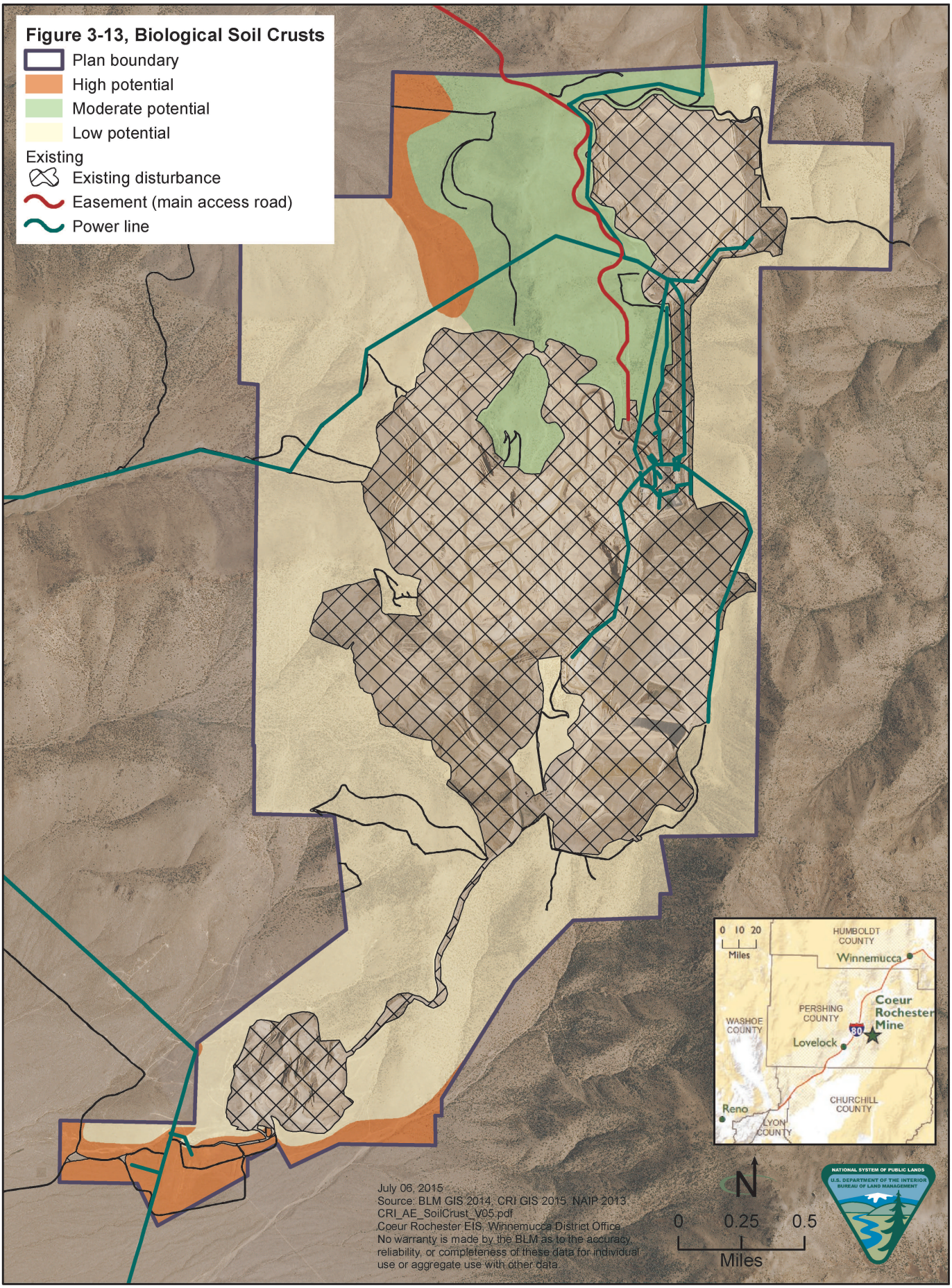


Figure 3-13, Biological Soil Crusts
Plan boundary
High potential
Moderate potential
Low potential
Existing
Existing disturbance
Easement (main access road)
Power line
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
PERSHING COUNTY
Coeur Rochester Mine
WASHOE COUNTY
80
Lovelock
CHURCHILL COUNTY
Reno
LYON COUNTY
July 06, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013.
CRI_AE_SoilCrust_V05.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
N
0 0.25 0.5
Miles
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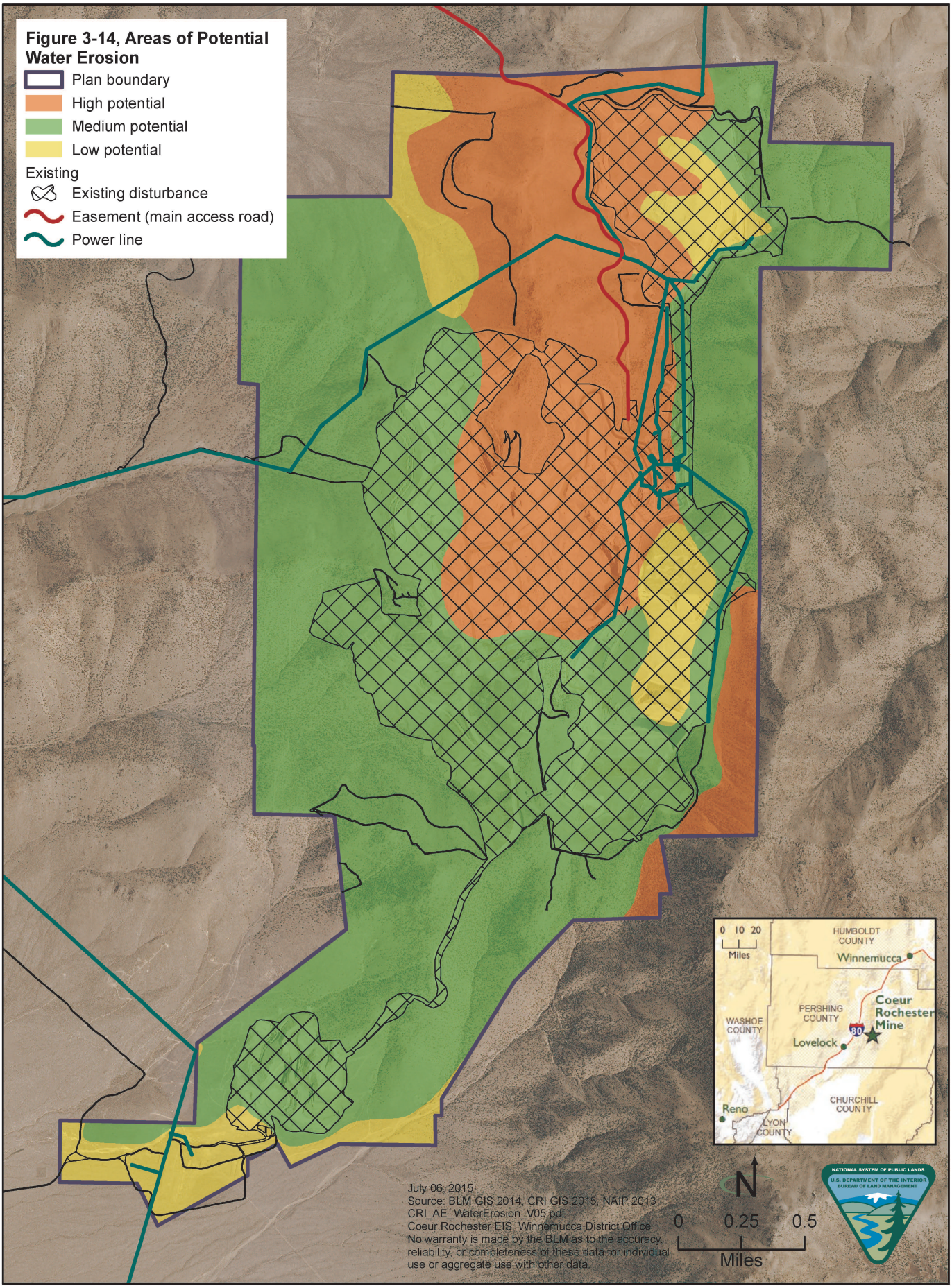
Figure 3-14, Areas of Potential Water Erosion
Plan boundary
High potential
Medium potential
Low potential
Existing
Existing disturbance
Easement (main access road)
Power line
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
Coeur Rochester Mine
PERSHING COUNTY
WASHOE COUNTY
80
Lovelock
Reno
CHURCHILL COUNTY
LYON COUNTY
July 06, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013
CRI_AE_WaterErosion_V05.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
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Wind erosion occurs after protective vegetation is removed. Erosion may displace or cause the loss of topsoil in some areas, increased sediment deposition in other areas, and impacts on ambient air quality from elevated dust levels. A close correlation exists between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, and organic matter. Soil moisture and frozen soil layers also influence wind erosion. On BLM-administered land in the project area, approximately 20 acres of soils are highly susceptible to wind erosion (see **Figure 3-15**, Areas of Potential Wind Erosion, and **Table 3-39**).

Table 3-39
Soils with Wind Erosion Potential

Potential	Acres in the Project Area	Percent of the Project Area
High	20	0.4
Medium	1,660	34.3
Low	3,160	65.3

Growth Medium and Reclamation

Growth medium is usually defined as the soil comprising the surface litter and organic components, the A horizon and parts of the B horizon. Growth medium is not present in the project area in significant quantities. There are four growth medium stockpiles on-site, totaling 903,000 cubic yards, and a proposed additional stockpile, the before Stage IV expansion stockpile. Growth medium is used in reclamation and closure activities.

Areas scheduled for disturbance are evaluated for the presence of suitable reclamation growth medium and soils. If suitable growth medium is not present, then the soil is disturbed without being pre-stripped. Three on-site potential cover material borrow areas have been identified to the east, west, and south of the Stage IV HLP. Growth medium may also be developed from an alternative source, such as inert overburden from the project area or designated borrow areas.

During stripping, growth medium would be stockpiled in designated areas. The stockpiles would be located such that mining operations would not disturb them. The surfaces of the stockpiles would be shaped during construction to reduce erosion. To further minimize wind and water erosion, the growth medium stockpiles would be seeded after shaping with a mix approved by the BLM. Diversions or berms would be constructed around the stockpiles as needed to prevent erosion from overland run-on or runoff. BMPs such as silt fences or certified weed-free straw bales would be used, as necessary, to contain sediment resulting from direct precipitation. **Table 3-40** summarizes the quantities contained in each potential borrow area and growth medium stockpile.

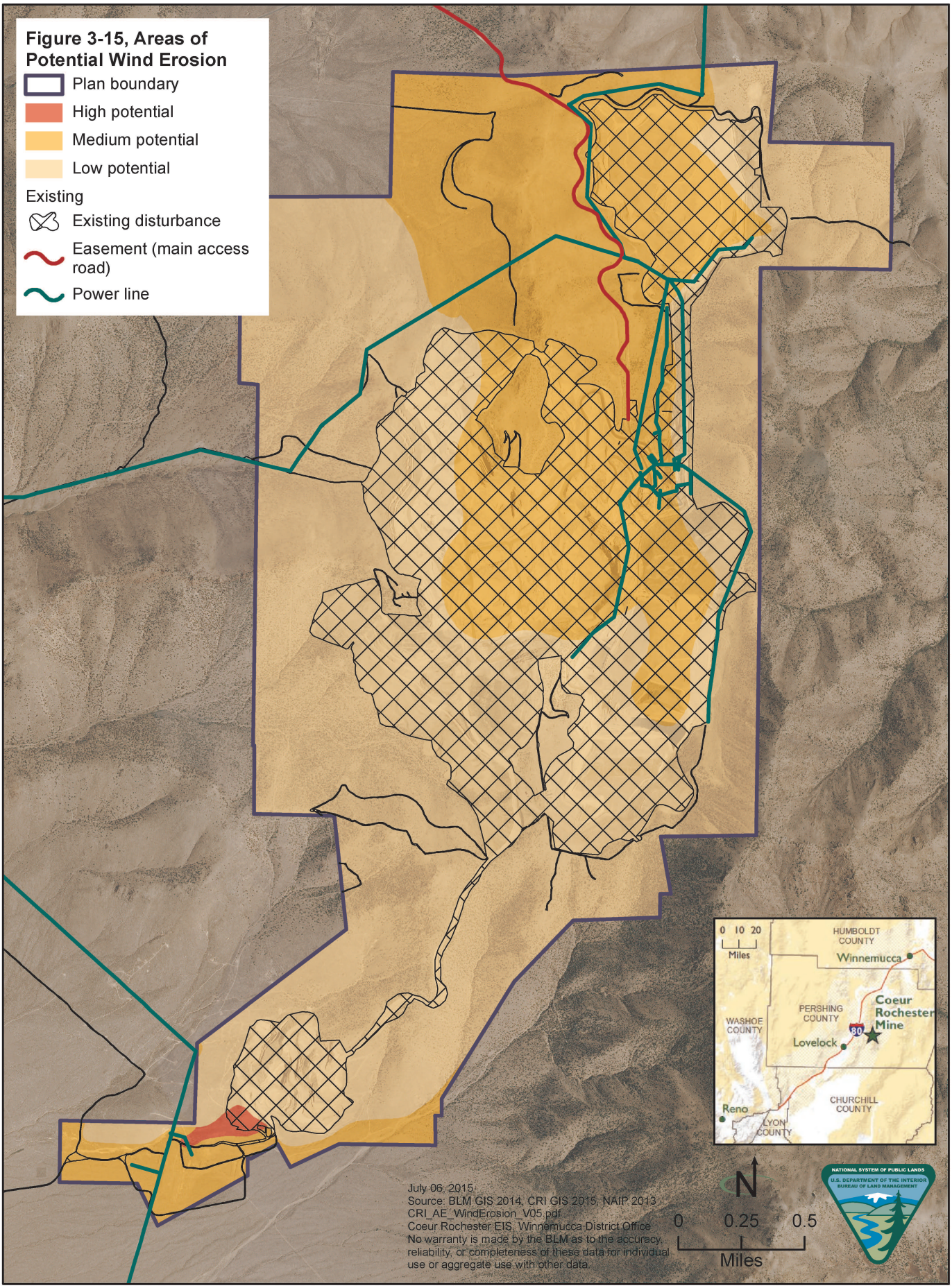
Figure 3-15, Areas of Potential Wind Erosion
Plan boundary
High potential
Medium potential
Low potential
Existing
Existing disturbance
Easement (main access road)
Power line
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
Coeur Rochester Mine
PERSHING COUNTY
WASHOE COUNTY
Lovelock
80
Reno
LYON COUNTY
CHURCHILL COUNTY
July 06, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013
CRI_AE_WindErosion_V05.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
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Miles
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Table 3-40
Available Growth Medium and Borrow Material Volumes

Facility	Surface Area (Acres)[1]	Average Depth (Feet)	Estimated Volume (Cubic Yards)
Stage II on-heap stockpile	8.2	17.1	226,000
Stage III off-heap stockpile	8.3	13.0	174,000
Stage IV off-heap stockpile	8.9	27.2	390,000
Stage IV expansion stockpile[2]	191.7	1.5-3	756,000
Parking lot stockpile	3.5	20.0	113,000
Growth medium stockpile total			1,659,000
Cover material borrow areas			
Stage IV borrow	13.6	6.0	132,000
Limerick Canyon borrow	43.9	6.0	425,000
Cover material borrow total			557,000
Grand total			**2,216,000**

Source: 2015 Final Permanent Closure Plan(Appendix C)
[1]Acres listed in this table are for engineering purposes and may not match acreages listed elsewhere in this plan amendment.
[2]This stockpile is estimated to contain approximately 171,000 cubic yards from the before Stage IV HLP expansion area and approximately 585,000 cubic yards from the before Stage V HLP construction.

Disturbance areas for which no growth medium or cover borrow material is available may be covered with alluvial waste rock or regraded, ripped, and directly seeded. CRI may use soil amendments, such as organic mulch, to enhance soil viability. This is frequently done during reclamation to provide better medium for plant growth by changing the rooting media. In order to ensure proper amendment application, growth medium, cover borrow material, and alluvial waste rock materials would be sampled and analyzed for specific parameters and nutrient levels. CRI would evaluate different soil amendments during concurrent reclamation activities and would monitor growth medium nutrient levels before final reclamation.

Once growth medium stockpiles and borrow areas have been used during reclamation, the underlying ground would be ripped and scarified to loosen compacted soil. Once that is done, stockpile and borrow areas would be regraded and contoured to blend with the local topography, to limit erosion, and to promote natural drainage. Following regrading and contouring, disturbed areas would be seeded with approved seed mix to establish vegetation.

3.12 SPECIAL STATUS SPECIES

Special status species are those that state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the ESA and those designated as sensitive by the BLM. In addition, there is a Nevada protected animal list (Nevada Administrative Code 501.100-503.104) that the BLM has incorporated, in part, into its sensitive species list.

In accordance with the ESA, the lead agency (BLM), in coordination with the USFWS, must ensure that any action that they authorize, fund, or carry out would not adversely affect a federally listed threatened or endangered species. In addition, as stated in Special Status Species Management Policy 6840 (6840 Policy, Rel. 6-125), it also is the BLM's policy "to conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA provisions are no longer needed for these species, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA."

The following discussion summarizes known data for the special status species identified for the proposed project by the applicable agencies. General wildlife species are addressed in **Section 3.15**, Wildlife, non-special status migratory birds are addressed in **Section 3.4**, Migratory Birds and non-special status plants in **Section 3.14**, Vegetation.

3.12.1 Regulatory Framework

BLM policy for managing special status species is in the BLM Manual Section 6840. Special status species are as follows:

- Federally Threatened or Endangered Species—Any species the USFWS has listed as an endangered or threatened species under the ESA throughout all or a significant portion of its range
- Proposed Threatened or Endangered Species—Any species the USFWS has proposed for listing as a federally endangered or threatened species under the ESA
- Candidate Species—Plant and animal taxa under consideration for possible listing as threatened or endangered under the ESA
- Delisted Species—Any species in the five years following their listing
- BLM Sensitive Species—Native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either 1) there is information that a species has undergone, is undergoing, or is predicted to undergo a downward trend such that its viability or that of a distinct population segment is at risk across all or a significant portion of the species range; or 2) the species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk (BLM 2008a)
- State of Nevada Listed Species—State-protected animals that have been determined to meet the BLM's Manual 6840 policy definition

Record of Decision and Approved Resource Management Plan Amendments
On September 22, 2015, BLM signed the Record of Decision (ROD) and Approved Resource Management Plan Amendments for the Great Basin Region, Including the Greater Sage-Grouse Sub-Regions of Idaho and Southwestern Montana, Nevada, and Northeastern California, Oregon, Utah, September 2015 (RMP Amendment and ROD).

The RMP Amendment and ROD addresses the specific threats identified in the 2010 USFWS "warranted, but precluded" greater sage-grouse listing decision and the USFWS 2013 Conservation Objectives Team Report. The RMP Amendment and ROD includes greater sage-grouse habitat management direction through land use allocations that apply to the species' habitat. In addition to protective land use allocations in habitat management areas, the RMP Amendment and ROD includes a suite of management actions, such as establishing disturbance limits, habitat objectives, mitigation requirements, monitoring protocols, and adaptive management triggers and responses.

Bald and Golden Eagle Protection Act
The Bald and Golden Eagle Protection Act (1940, as amended 1959, 1962, 1972, and 1978) prohibits the take or possession of bald and golden eagles, with limited exceptions. Take, as defined in the act, is "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, any of the following:

- Injury
- A decrease in its productivity by substantially interfering with normal breeding, feeding or sheltering behavior
- Nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior

An important eagle use area is defined in the act as an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles.

3.12.2 Affected Environment

The project area contains 4,838 acres of potential special status species habitat. The survey area for golden eagles is a ten-mile radius around the project area, and these data are also considered.

JBR prepared a comprehensive list of special status species with the potential to occur in the project area, including the rationale for determining each species' potential for occurrence (JBR 2013). Special status species with the potential to occur in the project area are summarized in **Table 3-41**.

Table 3-41
Special Status Species with Potential to Occur in the Project Area

Species	Status[1]	Habitat; Range in Nevada	Known or Potential Occurrence in the Project Area Vicinity	Survey Results
Plants				
Wind-loving buckwheat *Eriogonum anemophilum*	BLM S	Shallow, rocky soils on knolls and ridges, 4,750 to 9,800 feet; endemic to Nevada, in Churchill, Humboldt, Lander, Pershing, and Washoe Counties	Suitable habitat present	Not observed during dedicated surveys
Obscure scorpionflower *Phacelia inconspicua*	BLM S	Deep, organic-rich soils on concave north slopes in Humboldt Mountains; endemic to Nevada in Pershing County	Suitable habitat present; documented within 10 miles of the project area	Not observed during dedicated surveys
Birds				
Northern goshawk *Accipiter gentilis*	BLM S	Coniferous forest; in Nevada, often nests in aspens; statewide	Potential forager; nesting unlikely due to lack of aspen or closed-canopy evergreen forest	Not observed
Golden eagle *Aquila chrysaetos*	BLM S, BCC	Widespread; statewide	Active nest observed in Spring Valley	Multiple active nests observed within 10 miles of the project area
Burrowing owl *Athene cunicularia*	BLM S	Open country, nest sites usually include elevated perch; migratory, present in Nevada during warmer times of the year	Suitable habitat present	Observed in Packard Flat
Ferruginous hawk *Buteo regalis*	BLM S	Open country, often nests on outer edges of juniper forest; nests primarily in central and eastern Nevada	Suitable nesting and foraging habitat present in region	Active nest observed in Spring Valley (also see **Section 3.4**)
Swainson's hawk *B. swainsoni*	BLM S	Open country, plains, prairie, agricultural areas; statewide	Suitable nesting and foraging habitat present in region	Observed flying over Buena Vista Valley (also see **Section 3.4**)

Table 3-41
Special Status Species with Potential to Occur in the Project Area

Species	Status[1]	Habitat; Range in Nevada	Known or Potential Occurrence in the Project Area Vicinity	Survey Results
Greater Sage-Grouse *Centrocercus urophasianus*	BLM S	Sagebrush habitats; northern and central Nevada	One inactive lek in the Indian Creek region, approximately 4.3 miles north of the project area; project area includes suitable habitat, low value/transitional range, and nonhabitat as mapped by NDOW	No individuals or sign observed during focused surveys in project area
Pinyon jay *Gymnorhinus cyanocephalus*	BLM S, BCC	Pinyon-juniper forest; statewide	Suitable habitat present in project area and region	Not observed
Bald eagle *Haliaeetus leucocephalus*	BLM S	Usually near water bodies; may roost far from water; statewide	May occur as a migrant or winter resident; unlikely due to lack of water bodies near project area	Not observed
Loggerhead shrike *Lanius ludovicianus*	BLM S, BCC	Open country in greasewood, sagebrush, agricultural areas; statewide	Suitable habitat present	Multiple observations in project area, including during migratory bird transects (see **Section 3.4**)
Black rosy finch *Leucosticte atrata*	BLM S	High mountains in summer, may use lowlands in winter; eastern and central Nevada, particularly Ruby Mountains and eastern Humboldt Range	Unlikely potential winter visitor	Not observed
Sage thrasher *Oreoscoptes montanus*	BLM S, BCC	Intact, usually dense sagebrush habitat; central and northern Nevada	Suitable habitat present	Multiple observations in project area, including during migratory bird transects (see **Section 3.4**)
Brewer's sparrow *Spizella breweri*	BLM S, BCC	Sagebrush habitats; nearly statewide	Suitable habitat present	Multiple observations in project area including during migratory bird

Table 3-41
Special Status Species with Potential to Occur in the Project Area

Species	Status[1]	Habitat; Range in Nevada	Known or Potential Occurrence in the Project Area Vicinity	Survey Results
				transects (see **Section 3.4**)
Small Mammals, including Bats				
Pygmy rabbit *Brachylagus idahoensis*	BLM S	Dense sagebrush with friable soils; northern and central Nevada	Potential habitat exists in upper Limerick Valley	No evidence of occurrence found during dedicated surveys
Preble's shrew *Sorex preblei*	BLM S	In Nevada, benches along perennial and ephemeral streams dominated by shrubs; also sagebrush openings in forested habitats, marshes, aspen; northern tier of Nevada	Potential habitat present	Surveys not conducted; however, priority potential habitat exists in the project area
Bats				
Pallid bat *Antrozous pallidus*	BLM S	Varied habitats, including arid environments; statewide	Probable in region	Not detected during surveys
Townsend's big-eared bat *Corynorhinus townsendii*	BLM S	Desert scrub, pinyon-juniper; roosts in caves, abandoned mines; statewide	Known resident at sites south of mine; recorded at Gold Mountain, Spring Valley Pass	Present in project area; calls recorded at Packard Flat
Big brown bat *Eptesicus fuscus*	BLM S	Diverse habitats; statewide	Probable resident in region; calls recorded at workings on Gold Mountain and Spring Valley Pass	Not detected during dedicated surveys
Spotted bat *Euderma maculatum*	BLM S	Varied habitats; widespread but occurs in low numbers; roosts in crevices of tall cliffs; statewide	Potential in region	Not detected during dedicated surveys
Silver-haired bat *Lasionycteris noctivagans*	BLM S	Forested habitats, including pinyon-juniper; statewide	Potential in juniper forest, higher elevations of project area	Not detected during dedicated surveys

Table 3-41
Special Status Species with Potential to Occur in the Project Area

Species	Status[1]	Habitat; Range in Nevada	Known or Potential Occurrence in the Project Area Vicinity	Survey Results
Hoary bat *Lasiurus cinereus*	BLM S	Typically in forested habitats; roosts in trees; statewide	Potential in juniper forest; one call recorded north of Spring Valley Pass	Not detected during dedicated surveys
California myotis *Myotis californicus*	BLM S	Varied habitats, including arid areas; statewide	Known resident in the region; calls recorded on Gold Mountain and north of Spring Valley Pass	Not detected during dedicated surveys
Western small-footed myotis *M. ciliolabrum*	BLM S	Varied habitats; most common in pinyon-juniper; statewide	Known resident in the region; calls recorded on Gold Mountain and Spring Valley pass and at pond in Spring Valley	Not detected during dedicated surveys
Long-eared myotis *M. evotis*	BLM S	Varied habitats, most common in coniferous forest; statewide	Potential forager in or near juniper habitat in region; calls recorded at Gold Mountain and at pond in Spring Valley	Not detected during dedicated surveys
Little brown myotis *M. lucifugus*	BLM S	Wide-ranging; typically found in mesic or forested habitats; statewide	Known resident in the region; many calls recorded at workings on Gold Mountain and Spring Valley Pass and at pond in Spring Valley	Present in project area; calls recorded at Packard Flat
Small-footed dark-nosed myotis *M. melanorhinus*	BLM S	Found in mesic habitats and conifer forests; statewide	Potential in region	Present in project area; calls recorded at Limerick Basin
Fringed myotis *M. thysanodes*	BLM S	Oak and pinyon-juniper habitats may be favored; statewide	Potential forager in region	Not detected during dedicated surveys
Long-legged myotis *M. volans*	BLM S	Most common in forested habitats but does occur in arid areas; statewide	Known resident in the region; many calls recorded at working on Gold Mountain	Present in project area; calls recorded at Packard Flat
Yuma myotis *M. yumanensis*	BLM S	Often associated with water; west and central Nevada	Known resident in the region; calls recorded at workings on Gold Mountain and pond at Spring Valley	Present in project area; calls recorded at Packard Flat
Western pipistrelle *Parastrellus hesperus*	BLM S	Wide-ranging, often near water; statewide	Present in the region; call recorded at pond in Spring Valley	Not detected during dedicated surveys

Table 3-41
Special Status Species with Potential to Occur in the Project Area

Species	Status[1]	Habitat; Range in Nevada	Known or Potential Occurrence in the Project Area Vicinity	Survey Results
Brazilian free-tailed bat *Tadarida braziliensis*	BLM S	Varied habitat; often forms large colonies; southern, central, western Nevada	Potential forager; two calls recorded at Spring Valley Pass workings	Not detected during dedicated surveys
Amphibians				
Northern leopard frog *Rana pipiens*	BLM S	Usually associated with permanent water and emergent aquatic vegetation; breeds in slow moving to still permanent water; localized in northern Nevada	Potential habitat where permanent water exists	No frogs, tadpoles, or egg masses detected during biological surveys
Mollusks				
Springsnails Genus *Pyrgulopsis*	Varies	*Pyrgulopsis* springsnails occur in persistent aquatic environments; often associated with watercress (*Nasturtium officinale*); statewide	Springs in project area do not provide suitable habitat for springsnails	No springsnails were found in any of the springs in the project area during focused surveys

Sources: JBR 2013; Bertrando and Tiehm 2014; Tiehm 2014

[1]Special Status Species Codes:
BLM S—BLM Sensitive Species
BCC—USFWS Bird of Conservation Concern. BCCs are migratory, nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA.

The project area is within the range of the BLM sensitive species greater sage-grouse (*Centrocercus urophasianus*). Dedicated surveys for evidence of greater sage-grouse use were conducted.

Springs in the project area were surveyed for springsnails. No springsnails were found in any of the springs in the project area (JBR 2013); thus springsnails are not considered further in the EIS.

There is no suitable fish habitat in the project area (JBR 2013).

Survey methods for special status species are summarized below and comprehensive survey protocols are included in the baseline biological report (JBR 2013).

Special Status Plant Species Survey Methods

JBR Environmental Consultants conducted special status plant species surveys between June 20 and 24 and September 3 and 4, 2011. They surveyed additional areas on June 20, 21, 27 and July 10 and 11, 2012. Surveys to cover a 67-acre addition to the project area were conducted on June 5, 2014 (Tiehm 2014). A survey to cover a 120-acre addition to the project area for the American Canyon Road realignment were conducted on July 9, 2014 (Bertrando and Tiehm 2014). The method for special status plant surveys is described below.

In developing a list of special status plant species as targets for the surveys, JBR contacted the Nevada Natural Heritage Program (NNHP) and the USFWS, requesting information on federally or state-listed threatened, endangered, proposed or candidate species and BLM sensitive species known to occur, or that have a potential to occur, in the project area.

This information was used to develop a list of target special status plant species. The primary list was developed from the 2003 Nevada BLM sensitive species list (BLM 2003); however, during the three-year survey, the Winnemucca Field Office issued a new special status species list. Species on this list were incorporated into the surveys.

The NNHP identified potential habitat for windloving buckwheat (*Eriogonum anemophilum*), a BLM sensitive species, in the project area (NNHP 2011). The USFWS did not identify occurrences or potential habitat in the project area for special status plant species (USFWS 2011b), as there are no federally listed plant species known to occur in Pershing County (USFWS 2011a).

In addition to agency consultation, JBR reviewed the Nevada Rare Plant Atlas (NNHP 2001) to determine special status plants that may occur in the project area. The atlas includes known special status species locations throughout the state. Other resources, such as USGS topographic maps, 2011 color aerial photography, and NRCS soil survey reports, were used as a starting point. This was to establish vegetation communities and identify potential habitat for special status plants in the project area. The Southwest Regional Gap Analysis Project land cover files (USGS 2007) were also reviewed, although they are generally not accurate and should be used only as a guide.

Based on this background research, JBR determined that a search for the obscure scorpionflower (*Phacelia inconspicua*), a BLM sensitive plant, would be appropriate. This was primarily based on the fact that the obscure scorpionflower had been documented within ten miles of the project area. JBR also concurred with the NNHP that windloving buckwheat could occur in the project area (NNHP 2011).

JBR prepared an assessment of the potential occurrence of special status plant species in the project area. The BLM accepted the assessment before JBR

performed the botanical field surveys to ensure its concurrence on the target special status plant species.

Surveys for targeted special status plant species followed the "intuitive controlled survey" that has been accepted by the BLM and in accordance with Survey Protocols for NEPA/ESA Compliance for BLM Special Status Plant Species (BLM 2014b). The intuitive controlled surveys were conducted by surveyors familiar with the plant species and associated habitats.

Surveyors traversed the project area on foot. If high potential habitat was encountered, these areas were examined closely to determine if special status plant species occur there. If found, occurrence locations were recorded, then similar habitat types were surveyed more intensely.

Special Status Plant Species Results

Obscure scorpionflower is known from a limited area of the Humboldt Mountains in Pershing County. There are four known occurrences in Nevada, three of which are found along a transect 2.7 miles long. This species is known to grow in relatively deep, undisturbed, organic-rich soils on fairly steep, concave, north-northeast-facing slopes where snow drifts persist well into spring; its habitat also includes small otherwise barren soil terraces in small clearings in shrub fields dominated by mountain sagebrush (*Artemisia tridentata* var. *vaseyana*), in association with oceanspray (*Holodiscus discolor*), desert snowberry (*Symphoricarpos rotundifolius*), and Great Basin wildrye (*Leymus cinereus*; NNHP 2001).

Obscure scorpionflower is an annual, but it can be identified past its flowering stage. After seed set, the plants keep their shape, leaf outlines, and flowering structures until winter's precipitation breaks them down. Obscure scorpionflower was not identified in the project area.

Windloving buckwheat, a Nevada endemic,[10] is found in Churchill, Humboldt, Lander, Pershing, and Washoe Counties. It occupies both lower elevations and higher elevations (4,750 to 9,800 feet amsl). It is found on dry, exposed, relatively barren and undisturbed, gravelly, limestone or volcanic ridges and ridgeline knolls and on outcrops or shallow rocky soils over bedrock. It grows along with low sagebrush (*Artemisia arbuscula*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), Sandberg bluegrass, bottlebrush squirreltail (*Elymus elymoides*), and similar species.

At lower elevations, windloving buckwheat is found on dry, relatively barren, and undisturbed knolls and slopes of light-colored, platy, volcanic tuff weathered to form stiff clay soils, on all aspects, with gray horsebrush (*Tetradymia canescens*), rubber rabbitbrush (*Ericameria nauseosa*), shadscale (*Atriplex*

[10] Native or restricted to a certain area

confertifolia), bottlebrush squirreltail, Great Basin wildrye, and similar species (NNHP 2001).

Windloving buckwheat is a herbaceous perennial, with a rosette of basal leaves and a leafless flowing stalk capped with a ball of flowers. It can be identified by an experienced botanist who is familiar with the windloving buckwheat's characteristic leaves, which are persistent and evident year-round. Although the flowers are gone by fall, the flowing stalks persist into winter and, in years with low precipitation, will persist into the following growing season. Windloving buckwheat was not identified in the project area.

Golden Eagle Survey Methods

JBR surveyed nesting golden eagles in accordance with USFWS protocols (JBR 2013) in 2011 and 2013. The survey was performed by helicopter in potential golden eagle nesting habitat (e.g., cliffs, rock outcrops, the upper third of deciduous and conifer trees, and along artificial structures such as windmills, power transmission towers, and nesting platforms). The 2011 survey area included a five-mile buffer during the nesting season. After the nesting season, Section 31, T28N R34E, in the Packard Flat area was added to the survey area, which expanded the five-mile buffer around the project area. The additional buffer area was surveyed on foot and by vehicle on October 11 through 14, 2011, for golden eagle nests.

No region-wide golden eagle nesting surveys were conducted in 2012. However, ground observations were made of a golden eagle nest in Spring Valley (nest ID GE-478), north of the project area, on April 24 and May 1, 2012, to monitor nest success. In 2013, the USFWS increased the required survey buffer to ten miles and recommended two rounds of surveys. Accordingly, JBR conducted two aerial surveys on May 27 to 29 and July 9, 2013, in areas previously surveyed, as well as a ten-mile buffer around the project area.

During the surveys, cliffs, outcrops, and riparian areas were examined in greater detail to permit a more refined search of these potential nesting habitats. The locations of confirmed and potential nests and the helicopter's flight lines were recorded using GPS, and all nest sites were photographed. The active or inactive status of each nest at the time of the survey was recorded, as was the species of bird, if known. GPS waypoints were recorded for observations of all golden eagles, including those not clearly associated with a nearby nest. All raptor species were recorded as part of the surveys, and those other than golden eagles are discussed in **Section 3.4**, Migratory Birds.

Golden Eagle Results

JBR conducted aerial and ground surveys for golden eagle nests in 2011 and 2013. During the 2011 aerial survey, three active golden eagle nests were found within the five-mile buffer surrounding the project area: one on a cliff near Limerick Canyon, approximately two miles west of the project area, a second in the Spring Valley watershed, approximately three miles north of the project

area (GE-479), and a third in the southern Humboldt Range, approximately two miles east of the project area (GE-592).

Another nine inactive golden eagle nests or potential golden eagle nests in approximately three to five territories were located during the 2011 surveys (nests close to each other may represent alternate nests in a single territory). Birds found nesting within five miles of the project area may forage in the survey area.

Although a comprehensive survey was not performed outside the five-mile survey area in 2011, additional golden eagle nests were discovered. Two active nests are in canyons on the western side of the Humboldt Mountains, north of Limerick Canyon. One was approximately six miles from the project area (GE-518), and the other was nearly seven miles from the project area (GE-517). Golden eagles were observed near one group of three inactive nests, over five miles north of the project area.

All golden eagle nests found were on cliffs or outcrops. A golden eagle nest in northwestern Spring Valley (GE-478) was monitored in 2012. One downy young was observed on April 24 and May 1, 2012. Nest GE-478 is believed to be an alternate nest to GE-479, which was active in 2011.

In 2013, within the expanded ten-mile buffer surrounding the project area, 8 active and 32 inactive golden eagle nests were identified. Of the 8 active nests recorded, GE-479/478 and GE-592 were found active in previous surveys.

Greater Sage-Grouse Survey Methods

To assess the use of the project area by greater sage-grouse, JBR biologists walked suitable habitat in a series of transects, searching the area for greater sage-grouse or greater sage-grouse sign (JBR 2013). They searched areas of potential habitat, including a reclaimed area in the mine that now supports big sagebrush shrubland. Juniper savanna vegetation communities that contained open areas of sagebrush and areas of low Utah juniper density could support greater sage-grouse; these areas were considered suitable habitat requiring survey. Surveys were performed from June through October 2011.

In addition to the transect surveys, two wildlife detection dogs trained in tracking greater sage-grouse and locating greater sage-grouse sign were used in 2011. The dogs were used in areas outside of the active (fenced) mine area to increase the probability of detection. Disturbed areas lacking sagebrush and areas that included relatively dense juniper were not searched because they do not represent potential greater sage-grouse habitat.

The 2012 survey included an additional search for greater sage-grouse in relatively sparse juniper stands and sagebrush habitat in Weaver Canyon (Section 21, T28N, R34E) and new areas added to the project area (Sections 3, 4, 8-10, and 27-29, T28N, R34E, and Section 5, T27N, R34E). Habitat on both

sides of the road in American Canyon was also surveyed. Surveys were conducted on June 27 and July 10 and 11, 2012, using the same search method as was used in 2011. A supplemental survey for the presence or absence of greater sage-grouse was conducted on July 8 through 12, 2013, in potential habitat areas that needed additional coverage.

In addition to field surveys, JBR consulted the NDOW about the potential presence of greater sage-grouse leks[11] in the vicinity of the project area.

Greater Sage-Grouse Results

The project area is in the Humboldt Population Management Unit. Most of the project area contains nonhabitat or low value habitat/transitional range (NDOW category 4) for greater sage-grouse (NDOW 2012a, 2013; JBR 2013; **Figure 3-16**, Greater Sage-Grouse Habitat). Habitat of moderate importance (NDOW category 3; NDOW 2012a, 2013) is mapped in the northern portion of the project area, although the area is disturbed and fragmented by more than 25 years of mining.

Low value habitat/transitional range naturally contributes very little value to greater sage-grouse other than transitional range from one seasonal habitat to another or minimal foraging use (e.g., salt desert scrub communities, natural pinyon/juniper woodlands, aspen stands, and mountain mahogany stands; NDOW 2012a, 2013). This habitat category may also contribute very little value due to fire, land use development, pinyon/juniper encroachment, or other impacts that would require restoration beyond an acceptable cost/benefit ratio.

Habitats of moderate importance (NDOW category 3) are those that are not meeting their full potential but serve some benefit to greater sage-grouse populations. These habitats can serve as nesting, brood-rearing, winter or transitional habitat but are marginal (NDOW 2013). Habitat in this category may also include areas that are higher quality but lack bird survey and inventory data to support higher habitat ranking. It could also include areas recently burned that have not sufficiently recovered or sagebrush communities with pinyon-juniper encroachment (NDOW 2012a).

BLM Instruction Memorandum (IM) 2012-044 (December 27, 2011; now expired) recognizes two primary greater sage-grouse habitat categories: preliminary priority habitat (PPH) and preliminary general habitat (PGH).

PPH is nesting, brood-rearing, and winter habitat. These habitats, which correspond to NDOW categories 1 and 2 have been identified as having the highest conservation value to maintain sustainable greater sage-grouse populations. No PPH occurs in the project area.

[11] A patch of ground used for communal display in the breeding season by male greater sage-grouse.

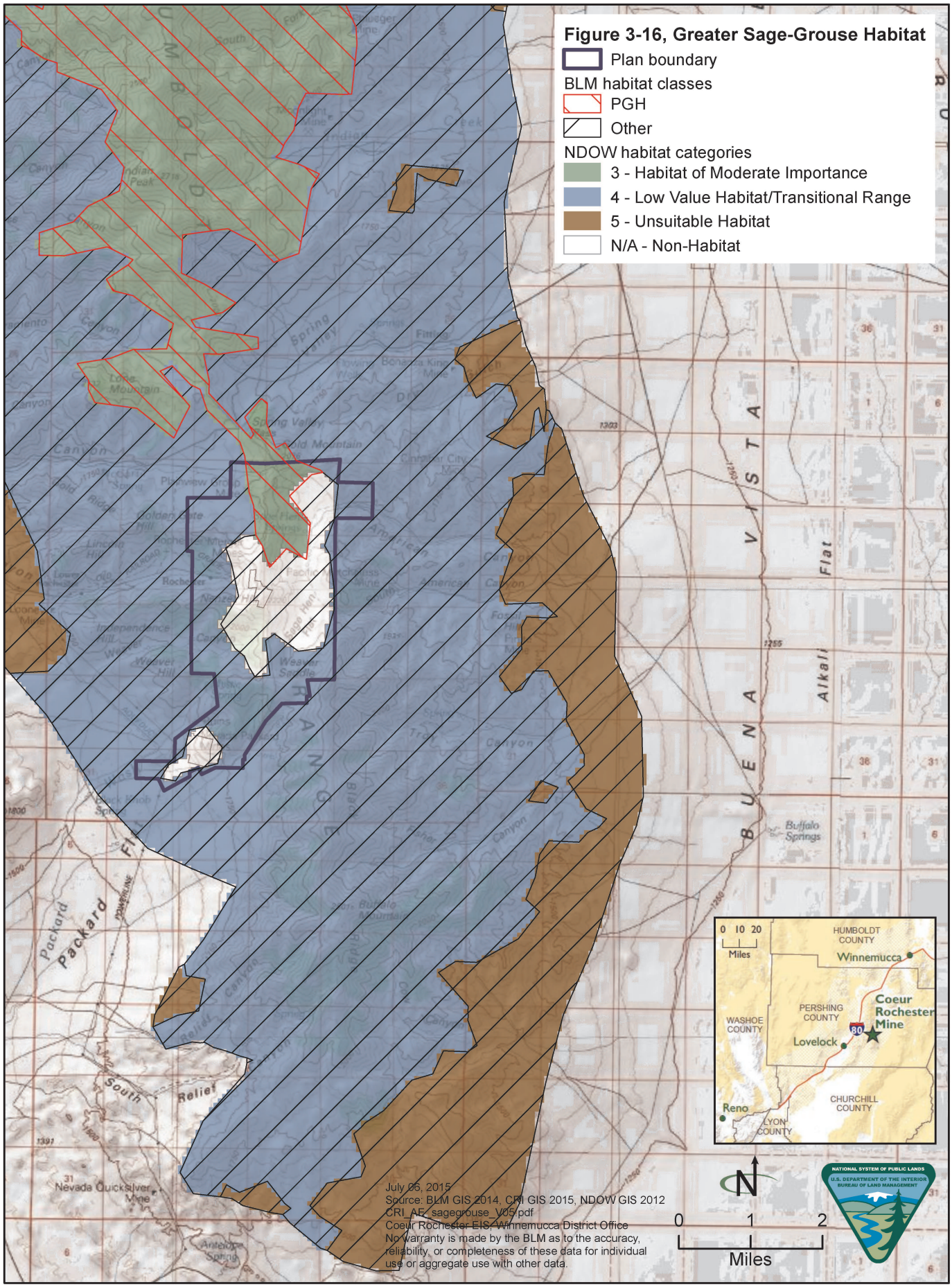
Figure 3-16, Greater Sage-Grouse Habitat
Plan boundary
BLM habitat classes
PGH
Other
NDOW habitat categories
3 - Habitat of Moderate Importance
4 - Low Value Habitat/Transitional Range
5 - Unsuitable Habitat
N/A - Non-Habitat
July 06, 2015
Source: BLM GIS 2014, CRI GIS 2015, NDOW GIS 2012
CRI_AE_sagegrouse_V05.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
0 1 2
Miles
N
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
PERSHING COUNTY
WASHOE COUNTY
Coeur Rochester Mine
Lovelock
80
Reno
CHURCHILL COUNTY
LYON COUNTY
NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

PGH is occupied seasonal or year-round habitat outside of PPH; it corresponds to NDOW's mapped category 3 habitat. Category 3 or PGH habitat exists in the north-central portion of the project area, where some mapped habitat abuts the main road and the Stage IV HLP. Additionally, ancillary mine facilities are found throughout the area mapped as PGH habitat. Approximately 600 acres of PGH (NDOW Category 3 habitat) occur in the project area.

The September 2015 RMP Amendment and ROD replaced BLM IM 2012-044. In the RMP Amendment and ROD, greater sage-grouse habitat nomenclature has been changed to priority habitat management area (PHMA), general habitat management area (GHMA), and other habitat management areas (OHMA). These designations correspond to PPH, PGH, and other habitat, as shown on **Figure 3-16**. Habitats that do not support greater sage-grouse are referred to as nonhabitat. Updated greater sage-grouse habitat following this nomenclature is shown in **Figure 3-17**. Approximately 360 acres of GHMA and 2,300 acres of OHMA are present in the project area; the rest is nonhabitat. The project area does not contain PHMA.

Consultation with NDOW indicated two historical leks and one inactive lek in the vicinity of the project area (JBR 2013). The historical leks are both over 6.5 miles north of the plan boundary; no greater sage-grouse have been observed on the leks since 1992, including during monitoring in 2012, 2013, and 2014. The inactive lek is in the Indian Creek region, approximately 4.3 miles north of the project area. This distance is beyond the 3.1 miles of the lower end of the interpreted range of lek buffer distances for surface disturbance associated with this type of activity, in accordance with the USGS Report *Conservation Buffer Distance Estimates for Greater Sage-Grouse*—A Review (Manier et al. 2014). Greater sage-grouse have been observed using the lek in 2008, 2009, 2012, 2013, and 2014. An existing ambient noise characterization and noise modeling for purposes of impact analysis was conducted at the inactive lek site (JC Brennan & Associates 2014).

No greater sage-grouse or their sign were detected in the project area during the pedestrian surveys conducted in summer and fall 2011, summer 2012, and summer 2013. Two trained wildlife detection dogs used during the 2011 survey did not point or flush any greater sage-grouse or detect greater sage-grouse sign.

The project area is at the southern end of the range of greater sage-grouse distribution in the Humboldt Range and may receive only incidental use. The project area provides marginal habitat for greater sage-grouse , primarily in the Limerick Basin area and Packard Flat. Based on field surveys, most of the available habitat consists of monotypic even-age stands of sagebrush lacking understory diversity and canopy cover. These stands do not provide suitable nesting, brood-rearing, or summer habitat. The stands of sagebrush that lack

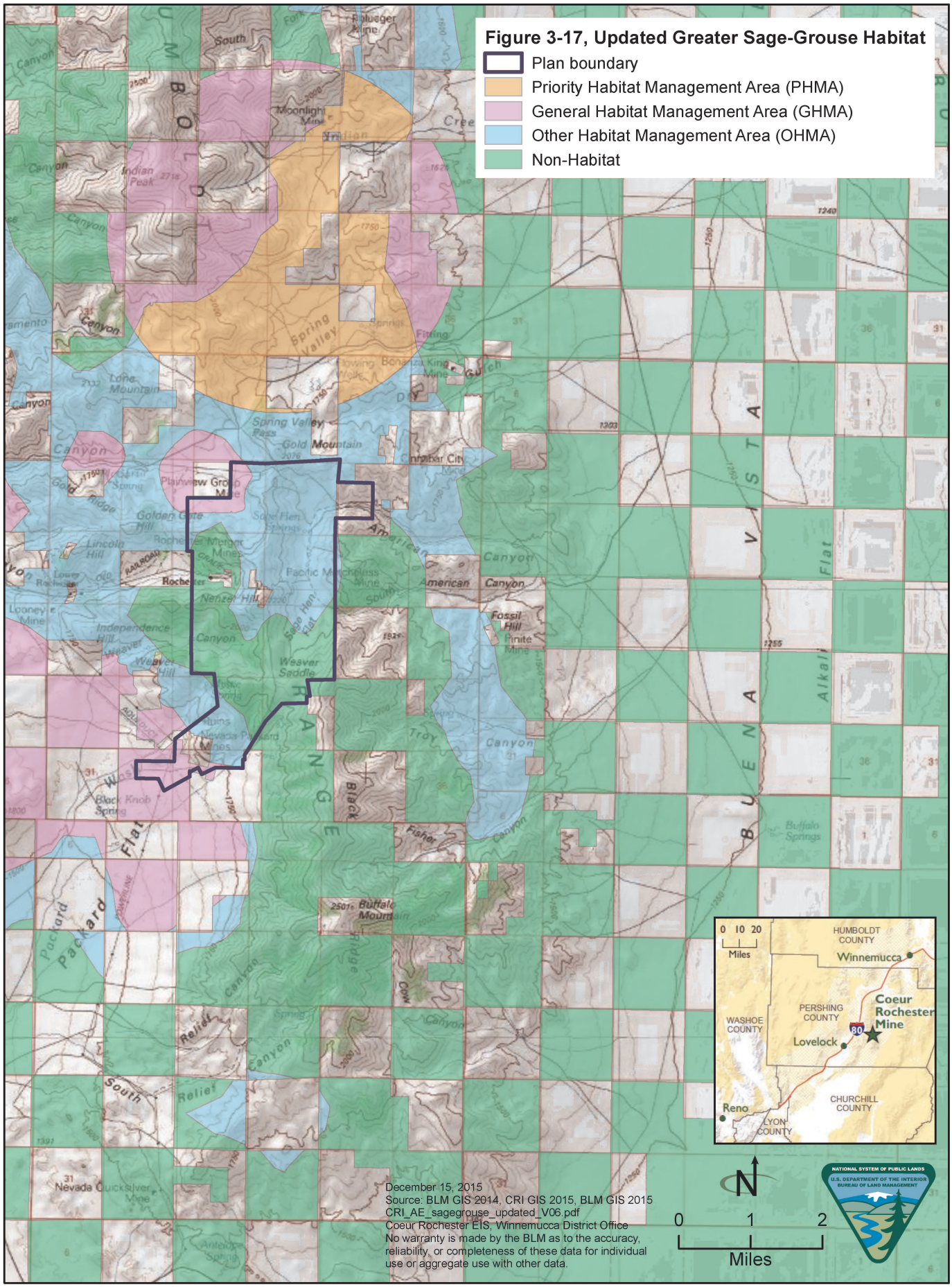
Figure 3-17, Updated Greater Sage-Grouse Habitat
Plan boundary
Priority Habitat Management Area (PHMA)
General Habitat Management Area (GHMA)
Other Habitat Management Area (OHMA)
Non-Habitat
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
PERSHING COUNTY
WASHOE COUNTY
Coeur Rochester Mine
80
Lovelock
Reno
CHURCHILL COUNTY
LYON COUNTY
N
0 1 2
Miles
NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT
December 15, 2015
Source: BLM GIS 2014, CRI GIS 2015, BLM GIS 2015
CRI_AE_sagegrouse_updated_V06.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

canopy cover do not qualify as suitable winter habitat. Where sagebrush is dense, shrubs have little to no leaves near their base and provide little thermal cover for greater sage-grouse in the winter.

Habitat in Packard Flat is largely fragmented from past wildfires and existing surface disturbance. Juniper trees are encroaching on areas of sagebrush that remain in Packard Flat. The same can be said of the habitat in Limerick Basin, where juniper encroachment, roads, and historical and modern mining have fragmented the landscape.

The mountains east of Limerick Basin roughly cover the area that NDOW mapped as habitat of moderate importance. Based on field surveys, this classification appears fitting. The sagebrush community in the mountain areas and in Limerick Basin have sufficient height and canopy cover; however, it lacks a diverse understory suitable for hens with young for summer habitat.

Areas of available sagebrush habitat in Weaver Canyon exhibited better sagebrush habitat for summering greater sage-grouse. These areas have diverse species understory (grasses and forbs) and suitable sagebrush canopy cover for roosting. However, the Weaver Canyon area is heavily impacted from mining, and the intact sagebrush habitat is extremely small and isolated, surrounded by a waste-rock dump and dense juniper habitat. The likelihood that this habitat could support summering greater sage-grouse is extremely low.

Weaver Canyon and Packard Flat fall within the area that NDOW mapped as low value habitat (NDOW category 4). The most suitable habitat for greater sage-grouse in the project area, based on vegetation characteristics, is that reclaimed before the Stage 1 HLP in the northern portion of Sage Hen Flat. Greater sage-grouse have not been observed in this location.

Western Burrowing Owl Survey Methods

Potential western burrowing owl habitat consists of open habitat with good visibility. In the project area, suitable habitat consists of the invasive annual and biennial forb land community and open (low density) big sagebrush shrubland and mixed desert scrub communities described in **Section 3.14.2**. Potential western burrowing owl habitats were searched for the presence of individuals or burrows that might be used by the species. Multiple biologists walked transects, and when they encountered burrows, they tightened the survey transect spacing to thoroughly search these areas for western burrowing owls. Burrows used by western burrowing owls may be marked by whitewash (droppings), feathers, pellets, and prey remains, including insect parts and small mammal bones.

In 2011, western burrowing owl surveys were conducted concurrently with greater sage-grouse surveys wherever western burrowing owl habitat overlapped greater sage-grouse habitat. Supplemental surveys for western burrowing owl were conducted in 2013 in Packard Flat. Potential habitat was

searched for the presence of western burrowing owls and for burrows marked by western burrowing owl sign. Where active and potentially active nests were found, biologists returned to confirm nest status and monitor nesting success. The 2013 survey for western burrowing owls were not conducted in conjunction with other species surveys (JBR 2013).

Western Burrowing Owl Results

No active or inactive burrowing owl burrows were observed in the project area during surveys in 2011 or 2013. All active and inactive burrows observed during surveys were outside of the project area.

In 2011, six active and two inactive western burrowing owl burrows were found outside the project area. These were in open habitats in the invasive annual and biennial forb land vegetation community in Packard Flat. Biologists conducting surveys in 2013 found five additional active and three inactive burrows in Packard Flat. The nearest active burrowing owl burrow was approximately 0.5 mile west of the project area (JBR 2013).

Pygmy Rabbit Survey Methods

Potential pygmy rabbit habitat in the project area was surveyed according to methods outlined in Surveying for Pygmy Rabbits, Fourth Draft June 3, 2004, Boise District, Idaho BLM (Ulmschneider 2004). Habitats were searched for pygmy rabbits and their sign (burrows, pellets, tracks, runways, and digging). The footprint of the focused survey was defined by a pre-survey analysis of soils and vegetation.

Potential pygmy rabbit habitat was identified as having appropriate soils (loamy soils deeper than 20 inches with 13 to 30 percent clay content) and slope aspect (flat to moderate slopes) in the elevation range of 4,500 to 8,000 feet amsl. The pre-field assessment was refined in the field based on field observation (ground truthing). These surveys identified potential pygmy rabbit habitat in American Canyon just east of the project area, in upper Limerick Canyon, and in the Packard Flat area, particularly near drainages. American Canyon, Limerick Canyon, and Packard Flat were surveyed in 2011 and 2012 (JBR 2013).

The pygmy rabbit survey was concentrated in areas with dense sagebrush islands using closely spaced transects. Sagebrush communities that were not identified as potential habitat during the pre-field assessment were searched for evidence of pygmy rabbits and their sign, in conjunction with the greater sage-grouse transects and western burrowing owl surveys.

Pygmy Rabbit Results

Areas of tall dense sagebrush are limited in the project area. GIS analysis identified potential pygmy rabbit habitat in American Canyon, just east of the project area, in upper Limerick Canyon and Limerick Basin, and in Packard Flat, particularly near drainages. Approximately 500 acres in the project area, not including existing authorized disturbance areas, are considered potential pygmy

rabbit habitat. These areas were intensively searched. No evidence of past or present pygmy rabbit use was found in the project area. Pygmy rabbit is not analyzed further in this EIS.

Preble's Shrew Survey Methods

The BLM completed a delineation of high potential habitat for Preble's shrew in the POA 10 boundary. Potential habitat was delineated by vegetation that could support Preble's shrew, as follows (Hendricks and Roedel 2012; NDOW 2012b; Rickart et al. 2011):

- Sagebrush-grass communities dominated by big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), threetip sagebrush (*A. tripartita*), and rabbitbrush
- Grasses, including Idaho fescue (*Festuca idahoensis*), prairie junegrass (*Koeleria macrantha*), Sandberg bluegrass (*Poa secunda*), needle and thread (*Hesperostipa comate*), and thickspike wheatgrass (*Elymus lanceolatus*)

Existing disturbed areas were not included in potential shrew habitat.

High potential Preble's shrew habitat was delineated where ephemeral streams, perennial streams, springs, and wetland and riparian areas occur in suitable vegetation. A 75-meter (246-foot) buffer, which is the average home range for breeding shrews, was placed around areas that contained water sources and optimal vegetation (Hawes 1977).

Due to the limited literature and survey protocols available for shrews, NDOW and the BLM collaborated to create the May 2015 "*Sorex* capture and handling protocol." Baseline surveys for Preble's shrew following the NDOW/BLM protocol were not conducted, because this protocol was not available during preparation of the draft EIS.

Preble's Shrew Results

No surveys to determine distribution of Preble's shrew in the project area have been conducted; nevertheless, delineation of Preble's shrew habitat conducted by BLM indicated that potential Preble's shrew habitat exists throughout the project area on undisturbed lands. Suitable habitats for Preble's shrew in the project area include cold perennial springs and spring brooks, Inter-Mountain Basins Big Sagebrush Shrubland, and Inter-Mountain Basins Juniper Savanna. Approximately 760 acres in the project area, not including existing authorized disturbance areas, are considered high potential Preble's shrew habitat. These areas were modeled as 75-meter (246-foot) buffers surrounding water sources (cold perennial springs and spring brooks) and suitable vegetation.

Bats Survey Methods

JBR reviewed available bat studies in the project area vicinity. Dr. Rick Sherwin, Associate Professor of Biology at Christopher Newport University, studied abandoned mine workings in the vicinity of the project. His study was done in connection with CRI's expansion of the Nevada Packard Mine Project in the early 2000s (Sherwin and Gannon 2000; Sherwin and Haymond 2000, 2001a, 2001b, and 2002). According to Dr. Sherwin's studies, a variety of bat species use underground mines in the area. These include Townsend's big-eared bats (*Corynorhinus townsendii*), a BLM sensitive species and a species considered to be particularly sensitive to disturbance. Both Townsend's big-eared bat maternity and hibernation sites were documented in workings that have since been impacted by expansion of the Nevada Packard Mine Project. Other species detected during Dr. Sherwin's surveys were at least two species of myotis bats (California myotis [*Myotis californicus*] and western small-footed myotis [*M. ciliolabrum*]), western pipistrelles (*Parastrellus hesperus*), big brown bats (*Eptesicus fuscus*), and evidence of pallid bats (*Antrozous pallidus*).

JBR deployed Anabat recorders in 2011 and 2012 to assess bat use of the project area and vicinity.[12] In 2011, JBR assessed bat use at workings in the Packard Flat area and in American Canyon, both outside of the project area. Sites were selected for surveys based on their apparent extent, the presence of detectable air flow, and the results of previous investigations conducted in the area. Shallow workings and workings that clearly did not continue to any depth were not surveyed. Anabat recorders were placed near several workings near Packard Flat that had been identified in extensive previous surveys as supporting bat use (JBR 2013).

The 2012 Anabat surveys included a handful of mine workings in the Limerick Basin, known as the Plainview Group Mines, in the northern portion of the project area. The Anabat recorder was placed at an adit that appeared to be relatively deep, with intact ore car rails and a relatively deep deposit of spoils. The other workings were either collapsed or did not appear deep enough to be important habitat for bat species, though low numbers of individual bats could use these workings (JBR 2013).

As part of Anabat surveys, characteristics of abandoned mine workings found in the area were recorded. The type of feature (shaft, adit, or decline), the dimensions of the entrance, and any detected presence of air flow were documented. The location of the feature was recorded with a handheld GPS receiver. Anabat recorders were not used in the active mine site because no

[12]Anabat is a system designed to help users identify and survey bats by detecting and analyzing their echolocation calls without human interference. Anabat recorders record audible output from the ultrasonic sounds that bats generate to locate prey and obstacles.

suitable habitat is present. The greatest potential roosting, hibernacula,[13] and maternity roost habitats are in Packard Flat and American Canyon.

Bat Survey Results

Bat use of several workings in Packard Flat and in American Canyon were assessed, and bat calls were detected at two of three sites surveyed in the Packard Flat area (JBR 2013). All the species of bats recorded at these sites appear on the BLM's sensitive species list. Only small numbers of bat calls were recorded at sites surveyed; however, Townsend's big-eared bats were recorded at two of the three sites.

Anabat recorders were also placed at the three largest workings in American Canyon. At least four bat species use the workings in American Canyon, and bats were recorded at all of the workings surveyed. Western small-footed bats and Yuma myotis were the two species most commonly recorded at the American Canyon sites. The many small shafts in American Canyon appear to have limited potential as bat roosting sites. However, use of these workings, particularly the deeper sites, by small numbers of bats is possible.

The 2012 survey included mine workings in Limerick Basin. The small-footed dark-nosed myotis was the only bat species recorded at this location.

Table 3-42 summarizes special status bats detected in the project area and the general location of observations.

Table 3-42
Special Status Bats Detected in the Project Area

Species	Packard Flat	American Canyon	Limerick Basin
Townsend's big-eared bat *Corynorhinus townsendii*	x		
Little brown bat *Myotis lucifugus*	x	x	
Long-legged bat *M. volans*	x	x	
Yuma myotis *M. yumanensis*	x	x	
Small-footed dark-nosed myotis *M. melanorhinus*		x	x

Source: JBR 2013

Additional Special Status Species

Several loggerhead shrikes, a BLM sensitive species and USFWS BCC, were observed throughout the project area in both 2011 and 2012. A family group of two adult and three young shrikes was found in tall sagebrush habitat. This was

[13]Places of refuge for wildlife, such as caves, where bats may overwinter.

near the end of transect 1 avian bird (point count) in Packard Flat in early July 2011, outside of the project area. Loggerhead shrikes typically nest in large shrubs or small trees; in the project area, larger sagebrush borders some drainages and roads and may provide suitable nesting habitat.

A number of sage thrashers, BLM sensitive species and USFWS BCC, were observed in the Inter-Mountain Basins Big Sagebrush Shrubland habitat in the Packard Flat area. In 2012 sage thrashers, including a family group, were recorded in the Limerick Basin area. Sage thrashers typically nest in intact, fairly dense stands of sagebrush, but they favor big sagebrush (Holmes and Barton 2003; Reynolds et al. 1999). However, Floyd et al. (2007) describe sage thrashers also nesting in shrublands dominated by greasewood and bitterbrush.

Brewer's sparrows, a BLM sensitive species and USFWS BCC, were recorded in the Inter-Mountain Basins Big Sagebrush Shrubland habitat in the project area. In the *Atlas of the Breeding Birds of Nevada*, Floyd et al. (2007) state that Brewer's sparrows occur wherever sagebrush habitat is present, "from basin bottoms to mountain meadows."

3.13 TRANSPORTATION, ACCESS, AND PUBLIC SAFETY

3.13.1 Regulatory Framework

Code of Federal Regulations, Title 49, Subtitle B

Title 49, Subtitle B, regulations govern the transportation of hazardous materials. The Department of Transportation's Office of Hazardous Materials Safety is the federal safety authority for the transportation of hazardous materials by air, rail, highway, and water. The Federal Motor Carrier Safety Administration is responsible for the issuing, administering, and enforcing safety regulations for commercial motor vehicles.

Nevada Department of Transportation

The Nevada Department of Transportation is responsible for planning, constructing, operating, and maintaining its state highways. There are three administrative districts in the state, and Pershing County is in Districts 2 and 3; the project area is entirely in District 2.

State Regulations

The NRS contain regulations governing highways, roads, and bridges in the state. Chapter 403 establishes a board of county highway commissioners, the classification system for county roads, and the process by which roads are constructed and improved.

Pershing County Regulations

Title 10 of the Pershing County Code regulates vehicles, bicycles, pedestrians, and traffic in the county in order to protect and promote the public health, safety, and general welfare (Pershing County 2012a).

Pershing County Master Plan

The Pershing County Master Plan was adopted in 2012 and establishes a vision and framework for land use and development. It includes guidelines and policies for the county's road network, approximate alignments and functional classifications of major roads needed to serve planned development, and a road classification map (Pershing County 2012b). There is no stand-alone county transportation plan.

Pershing County Road Department

The Pershing County Road Department is responsible for maintaining all county roads. It oversees road maintenance annually on 948.3 miles of county gravel roads and 95 miles of paved county roads (Pershing County 2014).

3.13.2 Affected Environment

Road Network and Access

I-80 is approximately nine miles west of the project area. Vehicles accessing the Rochester Mine use Exit 119.

Lovelock-Unionville Road is the primary point of access to the project area. It originates at Exit 119 on I-80 and travels east for approximately nine miles until the turnoff onto the mine's main entrance road. Lovelock-Unionville Road then turns to the north toward Unionville and eventually terminates in Mill City at I-80 mile marker 149. Lovelock-Unionville is a two-lane paved road for the first eight miles from Exit 119 to its intersection with Rochester Canyon Road (approximately one mile west of the project area). To the east of this intersection, the road has a natural graded surface. Lovelock-Unionville Road is considered a major collector road in that it connects larger arterial roads to smaller local roads.

The only other road in the project area is the main entrance road for the mine itself. It has a natural graded surface with no center line. Nearby, there are several smaller two-track roads on BLM-administered lands that are used primarily for hunting and recreation.

CRI maintains strict security procedures to prevent unauthorized access to the project area, which is surrounded by a standard three-strand barbed wire fence. The main access route into the project area is controlled by a security gate that is staffed 24 hours. Speed limits are posted on access routes and on roads throughout the project area.

Traffic Counts

Traffic on Lovelock-Unionville Road consists primarily of residents, regional travelers, and operators of commercial vehicles, including light and heavy trucks from nearby mineral extraction activities. Based on 2013 data from the Nevada Department of Transportation, the annual average daily traffic (AADT) is 350 for a 0.5-mile segment of Lovelock/Unionville Road, from I-80 Exit 119 approximately 8.5 miles west of the project area (NDOT 2014). AADT is a

measure of total traffic volume for a full year for a given location, as counted by a traffic counter, divided by 365 days.

AADT is also available for two nearby segments along I-80. Between miles 112 and 119 and between miles 119 and 128, AADT was 7,600 in 2013. AADT for the east-bound ramp at Exit 119 used to access Lovelock-Unionville Road was 200 in 2013 (NDOT 2014).

3.14 VEGETATION

This section addresses the affected environment for vegetation communities, including noxious weeds, in the project site. A vegetation community is an assemblage of individual plant species that grow together in the same general geographic location. Individual special status plant species are addressed in **Section 3.12**, Special Status Species.

3.14.1 Regulatory Framework

Federal Noxious Weed Act

The Federal Noxious Weed Act of 1974 provides for the control and management of nonindigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or public health. It prohibits importing or moving any identified noxious weeds identified and allows for inspection and quarantine to prevent their spread.

Executive Order 13112, Invasive Species

Signed in 1999, Executive Order 13112 directs federal agencies to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause. To accomplish this, the Executive Order established the National Invasive Species Council; currently there are 13 departments and agencies represented on the council.

Nevada Revised Statutes 555, Control of Insects, Pests, and Noxious Weeds

This law advises that the control of noxious weeds is the responsibility of every landowner or occupant. The statute includes the laws by which noxious weeds and other pests are designated and regulated by the Nevada Department of Agriculture. It administers the current noxious weed list for the State of Nevada and creates weed control districts to help control and eradicate noxious weeds.

3.14.2 Affected Environment

The study area for vegetation and noxious weeds is the project area (**Figure 1-2**).

Methodology (Surveys)

Vegetation, Floristic, Special Status Plant, and Noxious Weed Surveys

JBR conducted focused floristic surveys between June 20 and 24 and September 3 and 4, 2011. JBR surveyed areas added to the project area in 2012, on June 20,

21, and 27 and July 10 and 11, 2012. Further floristic surveys to cover a 67-acre addition to the project area were conducted on June 5, 2014 (Tiehm 2014). Another floristic survey to cover a 120-acre addition to the project area in support of the American Canyon Road realignment was conducted on July 9, 2014 (Bertrando and Tiehm 2014). All floristic surveys included vegetation community mapping, a floristic inventory, including surveys for target special status plant species, and an inventory of noxious and invasive, nonnative weeds. The method used for each facet of the surveys is outlined below.

Vegetation community mapping was completed by traversing the project area on foot, noting species associations and community characteristic, and recording individual plant species observed. Vegetation community boundaries were drawn on 1-inch to 400-foot scale, color and infrared aerial photography field maps. Boundaries between communities were extrapolated, based on field notes and characteristic tonal patterns visible on the field maps. Vegetation in the project area was categorized into 10 primary vegetation communities, based on land cover communities described by the Southwest Regional Gap Analysis Project (USGS 2007).

A floristic inventory was completed concurrently with vegetation community mapping, as described above. The floristic inventory was compiled by developing a list of plant species encountered during the surveys.

Noxious weeds and invasive, nonnative species were also inventoried during the floristic surveys. Occurrences of noxious weeds on the State of Nevada Noxious Weed List (NDA 2014) were recorded with a Trimble Geo XT or Garmin GPSmap60CSx hand-held GPS receiver. Additional, invasive, nonnative weed species were recorded as vegetation community components but were not recorded on GPS receivers.

Surveys for targeted special status plants were conducted concurrently with floristic surveys, as described above. Special status plant surveys are discussed in **Section 3.12**, Special Status Species.

Jurisdictional Wetlands and Other Waters of the United States

JBR conducted a jurisdictional determination of Waters of the United States in the project area June 26 to 29, July 26 and 27, August 1 to 4, and September 20 and 21, 2011 (JBR 2011). The purposes of the field investigation were to re-verify existing jurisdictional determinations (USACE 2000, 2006) and to document the presence of any wetlands or Waters of the United States not identified in previous studies. A record of previous fieldwork and consultation with the USACE is detailed in JBR (2011). The 2011 field investigation covered the project area and isolated springs outside the project area. Results of the jurisdictional determination are discussed in **Section 3.7**, Water Resources.

Wetlands were delineated in accordance with the criteria contained in *US Army Corps of Engineers Technical Report Y-87-1, Corps of Engineers Wetland Delineation*

Manual (Corps 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0; USACE 2008). The *National List of Plant Species that Occur in Wetlands, Intermountain Region 8* (Reed 1988) was used to determine wetland indicator status for vegetation. Where wetlands were found, paired sample sites were used to delineate the wetland boundary.

Seep and Spring Inventory

Baseline biological data on seeps and springs in the project area was collected by JBR (JBR 2012b) to complement surface and groundwater baseline data collected by Schlumberger Water Service (SWS 2012). A number of springs analyzed by SWS are beyond the project area boundary. In order to avoid data gaps in the resource analysis, JBR surveyed biological resources at these "gap" springs (JBR 2012a). Spring data was recorded according to a modified level II protocol of the Inventory and Monitoring Protocols for Spring Ecosystems (Stevens et al. 2011). This protocol involves recording such factors as the spring's vegetation, wildlife, flow, and water quality.

Additional biological surveys for special status and non-special status wildlife and special status plants were conducted in 2012 and 2013. These surveys are discussed in **Section 3.12**, Special Status Species, and **Section 3.15**, Wildlife.

Survey Results

Regional and Project Site Vegetation Communities

The project area is in the Intermountain Region, Great Basin Division, Central Great Basin Section floristic zone (Cronquist et al. 1972). The Central Great Basin Section floristic zone includes elevated valleys that are generally higher than 5,000 feet amsl. Vegetation in this section is dominated by sagebrush on the valley bottoms and a narrow belt of shadscale and halophytic vegetation in saline playas. Pinyon-juniper woodland occurs in the higher elevations where moisture is slightly higher, except for the portion of this section north of the Humboldt River, which is beyond the range of singleleaf pinyon (Cronquist et al. 1972). Vegetation in the project area, including ephemeral drainages and seeps and springs, is described in the following sections.

Vegetation Communities

Generally, the project area includes a combination of native vegetation and disturbance in the form of two-track roads. Mining disturbance where natural vegetation no longer exists was not surveyed. The vegetation communities in the project area are described below and are as follows (**Figure 3-18**, Vegetation Communities):

- Cold Perennial Springs/Spring Brooks
- Disturbed
- Recently Burned

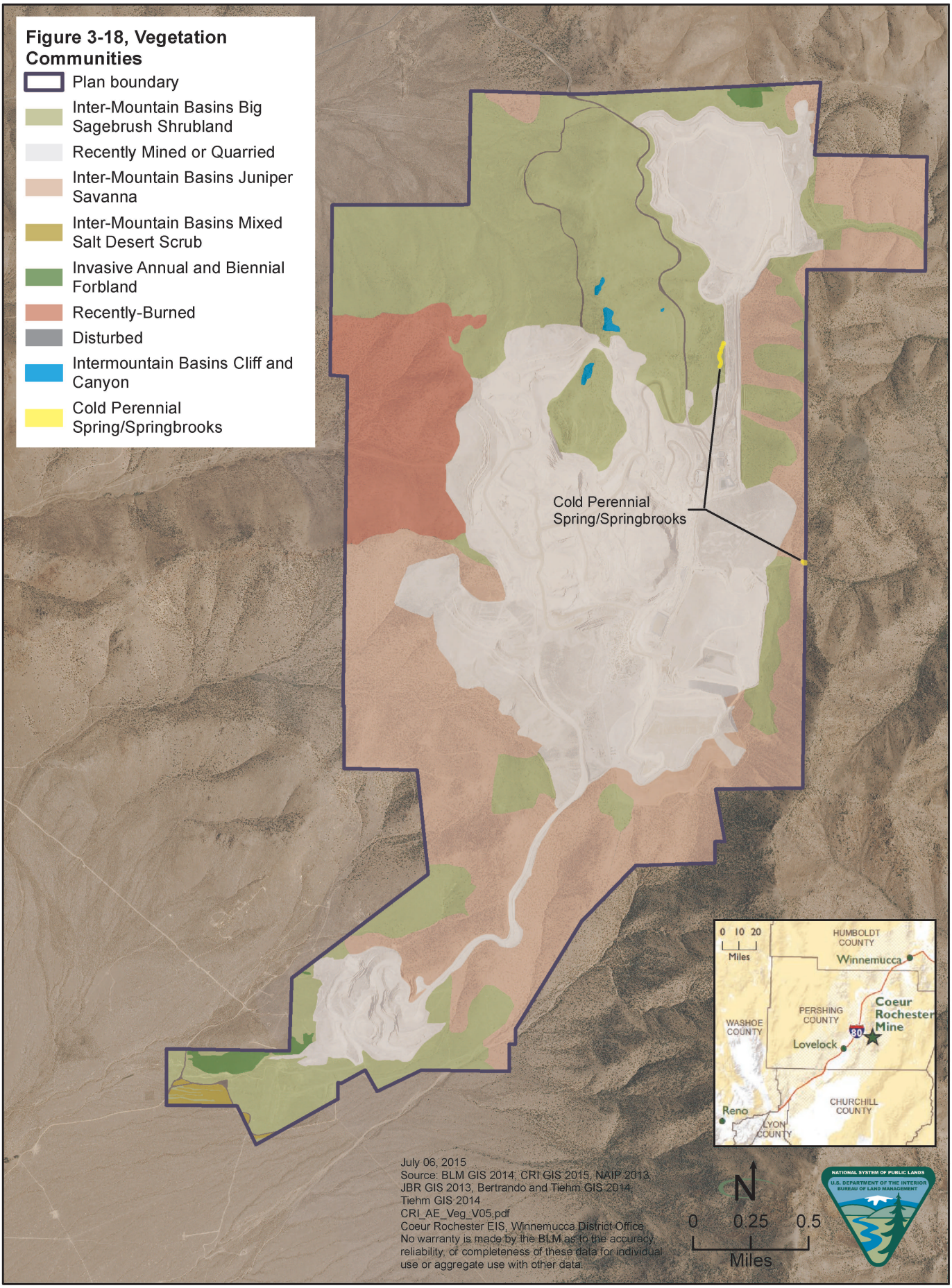
Figure 3-18, Vegetation Communities
Plan boundary
Inter-Mountain Basins Big Sagebrush Shrubland
Recently Mined or Quarried
Inter-Mountain Basins Juniper Savanna
Inter-Mountain Basins Mixed Salt Desert Scrub
Invasive Annual and Biennial Forbland
Recently-Burned
Disturbed
Intermountain Basins Cliff and Canyon
Cold Perennial Spring/Springbrooks
Cold Perennial Spring/Springbrooks
0 10 20
Miles
HUMBOLDT COUNTY
Winnemucca
Coeur Rochester Mine
PERSHING COUNTY
WASHOE COUNTY
80
Lovelock
Reno
CHURCHILL COUNTY
LYON COUNTY
July 06, 2015
Source: BLM GIS 2014, CRI GIS 2015, NAIP 2013, JBR GIS 2013, Bertrando and Tiehm GIS 2014, Tiehm GIS 2014
CRI_AE_Veg_V05.pdf
Coeur Rochester EIS, Winnemucca District Office
No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.
N
0 0.25 0.5
Miles
NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

- Recently Mined or Quarried
- Invasive Annual and Biennial Forb Land
- Inter-Mountain Basins Cliff and Canyon
- Inter-Mountain Basins Big Sagebrush Shrubland
- Inter-Mountain Basins Mixed Salt Desert Scrub
- Inter-Mountain Basins Juniper Savanna

Vegetation communities are described in detail below. **Table 3-43** lists the acres of each vegetation community in the project area and each community's associated Southwest Regional Gap Analysis Project identification code.

Table 3-43
Vegetation Communities in the Project Area

Vegetation Community	Acres in Project Area
A013—Cold Perennial Springs/Springbrooks	Less than 1
D01—Disturbed	20
D02—Recently Burned	320
D03—Recently Mined or Quarried	1,810
D09—Invasive Annual and Biennial Forb Land	30
S009—Inter-Mountain Basins Cliff and Canyon	6
S054—Inter-Mountain Basins Big Sagebrush Shrubland	1,410
S065—Inter-Mountain Basins Mixed Salt Desert Scrub	20
S075—Inter-Mountain Basins Juniper Savanna	1,230
Total[1]	**4,838**

Sources: JBR 2013; Bertrando and Tiehm 2014; Tiehm 2014
[1]Acres of each vegetation community do not add exactly to the total acres in the project area due to rounding.

A013—Cold Perennial Springs/Springbrooks. This vegetation community occurs where deep or shallow groundwater flows from bedrock or natural fill onto the land surface and results in surface flow or a body of water. Springbrooks are the areas of flowing water linked to the spring source. Cold springs are springs with water temperatures near or below mean annual air temperature (NDOW 2006). For more detail refer to JBR's seep and spring survey reports (JBR 2012a, 2012b).

Vegetation at the springs is trees and shrubs, such as white poplar (*Populus alba*), Fremont cottonwood (*P. fremontii*), golden currant (*Ribes aureum*), snow currant (*R. niveum*), and coyote willow (*Salix exigua*).

Grasses and grass-like plants observed in this vegetation community are Douglas sedge (*Carex douglasii*), slender hairgrass (*Deschampsia elongata*), fewflower spikerush (*Eleocharis quinqueflora*), foxtail barley (*Hordeum jubatum*), Torrey's rush (*Juncus torreyi*), scratch grass (*Muhlenbergia asperifolia*), timothy (*Phleum pratense*), annual bluegrass (*Poa annua*), Kentucky bluegrass (*P. pratensis*),

rabbitsfoot grass (*Polypogon monspeliensis*), common threesquare (*Schoenoplectus pungens*), and narrowleaf cattail (*Typha angustifolia*).

Forbs observed in this community are aster (*Symphyotrichum* sp.), desert centaury (*Centaurium exaltatum*), fringed willowherb (*Epilobium ciliatum*), black medic (*Medicago lupulina*), alfalfa (*Medicago sativa*), common monkeyflower (*Mimulus guttatus*), watercress (*Nasturtium officinale*), slender cinquefoil (*Potentilla gracilis* var. *fastigiata*), white water crowfoot (*Ranunculus aquatilis*), alkali buttercup (*R. cymbalaria*), common dock (*Rumex crispus*), Nevada goldenrod (*Solidago spectabilis*), short-rayed alkali aster (*Symphyotrichum frondosum*), American speedwell (*Veronica americana*), water speedwell (*V. anagallis-aquatica*), and horned pondweed (*Zannichellia palustris*).

D01—Disturbed. This vegetation community occurs in areas mostly devoid of vegetation where past mining-related activities occurred or where dirt roads exist in the project area. Trees and shrubs in the Disturbed area are ornamental maple (*Acer* sp.), fourwing saltbush (*Atriplex canescens*), rubber rabbitbrush, white poplar, and Lombardy poplar (*Populus italica*).

Grasses in this community are desert wheatgrass (*Agropyron desertorum*), smooth brome (*Bromus inermis*), rye brome (*B. secalinus*), cheatgrass (*B. tectorum*), orchard grass (*Dactylis glomeratus*), bottlebrush squirreltail, Italian ryegrass (*Lolium perenne* var. *multiflorum*), and intermediate wheatgrass (*Thinopyrum intermedium*).

Forbs found in this community include Russian knapweed (*Acroptilon repens*), pale madwort (*Alyssum alyssoides*), bristly fiddleneck (*Amsinckia tessellata*), littlepod false flax (*Camelina microcarpa*), hairy whitetop (*Cardaria pubescens*), crossflower (*Chorispora tenella*), tansy mustard (*Descurainia sophia*), filaree (*Erodium cicutarium*), saltlover (*Halogeton glomeratus*), prickly lettuce (*Lactuca serriola*), coyote tobacco (*Nicotiana attenuata*), and bur buttercup (*Ranunculus testiculatus*).

D02—Recently Burned. On June 17, 2012, an arcing electrical line started a wildfire in the Rochester Canyon historic mine site. This wildfire burned most of the canyon, though patches of unburned Inter-Mountain Basins Juniper Savanna remain. Waste-rock dumps and other unvegetated disturbed lands created a fire break along the eastern edge of the wildfire.

D03—Recently Mined or Quarried. This vegetation community is an altered or disturbed land cover type for open pit mines and quarries that lack vegetation and are visible on aerial imagery. The Nevada Packard Open Pit and the Rochester Open Pit and their associated disturbances are included in this community. Vegetation is limited and generally includes rabbitbrush or other colonizing species, except where areas are seeded with reclamation seed mixes. One exception is the southern tip of the waste rock facility in the southeast corner of Section 21 and northeast corner of Section 28, where Wyoming big

sagebrush has become reestablished on approximately 25 acres. The area is somewhat discernible on aerial imagery. The revegetation appears to be from natural recolonization rather than from seeding.

D09—Invasive Annual and Biennial Forb Land. This community type is widely distributed across the southern project area; it resembles post-fire effects. JBR performed a GIS analysis with BLM wildland fire data and found that no fires had burned in this area since 1999, the year of oldest dataset; however, the vegetation in this area resembles the vegetation in Spring Valley to the north, which burned in 1999 (BLM 2011, in JBR 2013). This vegetation community occurs in the southwestern portion of the project area, on south- and southwest-facing slopes on fan piedmonts, fan remnants, and ballenas.[14] This vegetation community also occurs in Buena Vista Valley, in the eastern portion of the project area on east-facing slopes on fan remnants (this area was outside the project area and was not mapped).

The Invasive Annual and Biennial Forb Land vegetation community is dominated by cheatgrass, interspersed with a substantial amount of Sandberg bluegrass. Shrubs in this vegetation community are sparsely scattered and include rubber rabbitbrush and big sagebrush (*Artemisia tridentata* ssp. *tridentata*). Grasses are desert wheatgrass, Great Basin wildrye, and intermediate wheatgrass. Dominant forbs are filaree, forage kochia (*Kochia prostrata*), clasping pepperweed (*Lepidium perfoliatum*), Russian thistle (*Salsola tragus*), and tumble mustard (*Sisymbrium altissimum*).

S009—Inter-Mountain Basins Cliff and Canyon (Including Rock Outcrop). This vegetation community is barren to sparsely vegetated, with less than 10 percent plant cover. Areas of shelves, cracks, and crevices accumulate materials and allow soils to develop enough to support vegetation.

S054—Inter-Mountain Basins Big Sagebrush Shrubland. This is the largest vegetation community in the project area. It is composed primarily of big sagebrush and Wyoming big sagebrush on alluvial fans, fan remnants, ballenas, hills, and summits. Scattered green rabbitbrush and rubber rabbitbrush occur throughout and dominate the drainages. Scattered shrubs, such as low sagebrush, spiny hopsage (*Grayia spinosa*), antelope bitterbrush (*Purshia tridentata*), desert gooseberry (*Ribes velutinum*), mountain snowberry (*Symphoricarpos oreophila*), and littleleaf horsebrush (*Tetradymia glabrata*), occur throughout this community.

The understory of this vegetation community is composed of several perennial grasses and forbs. Sandberg bluegrass is typically the dominant perennial grass, and the steeper slopes are dominated by bluebunch wheatgrass (*Pseudoroegneria*

[14]Round-topped ridgeline fan remnants

spicata ssp. *spicata*); however, cheatgrass is the dominant grass in this vegetation community throughout the project area.

Dominant forbs are Anderson larkspur (*Delphinium andersonii*), buckwheat (*Eriogonum* spp.), silvery lupine (*Lupinus argenteus*), spreading phlox (*Phlox diffusa*), longleaf phlox (*P. longifolia*), penstemon (*Penstemon* spp.), and milkvetch (*Astragalus* spp.). During the 2012 surveys, this community in Limerick Basin appeared to be heavily impacted by a Lepidoptera species (likely a species of micro-moth). Small larvae were seen in the sagebrush, and their feeding appeared to also affected the shrubs by desiccating leaves. Some stands were nearly entirely desiccated. That year was exceptionally dry, and the natural defenses of plants may have been limited by stress from drought conditions.

S065—Inter-Mountain Basins Mixed Salt Desert Scrub. This vegetation community occurs on basin floors, alluvial fans, and alluvial flats in the southwestern portion and in the eastern portion of the project area, in the lower elevation corridor from American Canyon to the playa in Buena Vista Valley. Soils in this community have high a salinity content and vegetation is sparse.

Shrubs are shadscale, Nevada ephedra (*Ephedra nevadensis*), bud sagebrush (*Picrothamnus desertorum*), Bailey greasewood (*Sarcobatus baileyi*), big greasewood, and shortspine horsebrush (*Tetradymia spinosa*).

Grasses recorded in this vegetation community include Indian ricegrass (*Achnatherum hymenoides*), Thurber's needlegrass (*A. thurberianum*), desert wheatgrass, smooth brome, bottlebrush squirreltail, rock melicgrass (*Melica stricta*), and Sandberg bluegrass.

Forbs observed in this vegetation community include bristly fiddleneck, Humboldt River milkvetch (*Astragalus iodanthus*), Indian paintbrush (*Castilleja chromosa*), bighead dusty maiden (*Chaenactis macrantha*), paradise tansymustard (*Descurainia paradisa*), manybranched iopmopsis (*Ipomopsis polycladon*), shortstem lupine (*Lupinus brevicaulis*), bushy blazingstar (*Mentzelia dispersa*), longleaf phlox, and Nuttall's crinklemat (*Tiquilia nuttallii*).

S075—Inter-Mountain Basins Juniper Savanna. This is the second largest vegetation community in the project area. It is found on xeric[15] sites on lower mountain slopes, plateaus, ridges, upper slopes, and side slopes, mainly in the central portion of the project area. The vegetation composition is an open savanna, dominated by Utah juniper (*Juniperus osteosperma*) with high cover of perennial bunchgrasses and forbs. This vegetation community is encroaching into the Inter-Mountain Basins Big Sagebrush Shrubland vegetation community.

[15]Very dry

Shrubs in this community are Wyoming big sagebrush, green rabbitbrush, and prickly phlox (*Leptodactylon pungens*). Grasses include cheatgrass, Sandberg bluegrass, Idaho fescue, and rock melicgrass. Forbs include silver rockcress (*Arabis puberula*), Humboldt River milkvetch, arrowleaf balsamroot (*Balsamorhiza sagittata*), sego lily (*Calochortus bruneaunis*), Douglas dustymaiden (*Chaenactis douglasii*), roundspike cryptantha (*Cryptantha humilis*), Nevada biscuitroot (*Lomatium nevadense*), and death camas (*Zigadenus paniculatus*).

Isolated Wetlands (Seeps and Springs)

JBR mapped seeps and springs in and next to the project area (JBR 2011, 2012a, 2012b). These springs support wetlands that ranged in size from 0.01 acre to 1.41 acres. Vegetation community A013 (Cold Perennial Springs/Springbrooks) is typical in these springs. **Table 3-44** provides a list of seeps and springs mapped in and next to the project area, and **Figure 3-3** is a map of their locations.

Table 3-44
Isolated Wetlands (Seeps and Springs) in and next to the Project Area

Wetland Feature	Adjacent Tributary	Size (Acres)
South American Canyon Spring	South American Canyon	0.16
American Canyon Spring	American Canyon	0.14
Lower American Canyon Spring	American Canyon	0.04
Packard Flat Artesian	Packard Wash	0.25
Packard Flat Spring	Packard Wash	0.04
Black Knob Spring II	Packard Wash	0.05
Packard Flat Wash Spring	Packard Wash	1.41
Cole Canyon Wash Spring	Packard Wash	Combined with Packard Flat Wash Spring
Marker Spring	Woody Canyon (tributary of Packard Wash)	0.01
Keath Spring	Woody Canyon (tributary of Packard Wash)	0.05
Limerick Canyon Spring 4	Limerick Canyon	0.70
McCarty Spring	Limerick Canyon	0.01
Limerick Canyon Spring 3	Limerick Canyon	1.04
Limerick Canyon Spring 2	Limerick Canyon	1.00
Limerick Canyon Spring 1	Limerick Canyon	1.39
Total		**4.23**

Source: JBR 2011, 2012a, 2012b

Noxious and Nonnative, Invasive Weeds

Noxious and nonnative, invasive weeds have economic impacts because they are expensive to control and they can reduce agricultural production, property values, and water availability. Invasive plants are estimated to cause about $123 billion in damages and losses to the US economy annually. Agriculture interests spend approximately $5 billion annually to control weeds (BLM 2013b). Impacts from noxious weeds and nonnative, invasive weeds include reducing

biodiversity, altering hydrologic, soil, and fire conditions, and increasing competition with native vegetation communities.

The Nevada Noxious Weed List (NDA 2014) is maintained by the Nevada Department of Agriculture. It contains forty-seven species of noxious weeds, defined as "any species of plant which is, or likely to be, detrimental or destructive and difficult to control or eradicate" in Nevada. In addition to noxious weeds, there are also nonnative, invasive plants that are not listed that can also be problematic. Both noxious and nonnative invasive plants have the potential to impact the ecological integrity of the region, thus both noxious and nonnative, invasive plants are discussed in this section.

Weeds on the Nevada Noxious Weed List are organized by category. Generally, categories reflect the level of potential threat provided by the particular weed; thus weeds in Category A provide the greatest risk of ecological and economic impact (**Table 3-45**).

Table 3-45
State of Nevada Noxious Weed List

Common Name	Scientific Name	State Category[1]
African rue	*Peganum harmala*	A
Austrian fieldcress	*Rorippa austiraca*	A
Austrian peaweed (Swainsonpea)	*Sphaerophysa salsula*	A
Black henbane	*Hyoscyamus niger*	A
Camelthorn	*Alhagi camelorum*	A
Common crupina	*Crupina vulgaris*	A
Dalmatian toadflax	*Linaria dalmatica*	A
Dyer's woad	*Isatis tinctoria*	A
Eurasian water-milfoil	*Myiophyllum spicatum*	A
Fountain grass	*Pennisetum setaceum*	A
Giant reed	*Arundo donax*	A
Giant salvinia	*Salvinia molesta*	A
Goats rue	*Galega officinalis*	A
Hounds tongue	*Cynoglossum officinale*	A
Hydrilla	*Hydrilla verticillata*	A
Iberian star thistle	*Centaurea iberica*	A
Klamath weed (common St. John's wort)	*Hypericum perforatum*	A
Malta starthistle	*Centaurea melitensis*	A
Mayweed chamomile	*Anthemis cotula*	A
Mediterranean sage	*Salvia aethiopis*	A
Purple loosestrife	*Lythrum salicaria,* L. *vigatum*	A
Purple starthistle	*Centaurea calicitrapa*	A
Rush skeletonweed	*Chondrilla juncea*	A
Sow thistle	*Sonchus arvensis*	A
Spotted knapweed	*Centaurea masculosa*	A
Squarrose starthistle	*Centaurea virgata Lam.* spp. *squarrose*	A
Sulfur cinquefoil	*Potentilla recta*	A
Syrian bean caper	*Zygophyllium fabago*	A

Table 3-45
State of Nevada Noxious Weed List

Common Name	Scientific Name	State Category[1]
Yellow starthistle	*Centaurea solstiltialis*	A
Yellow toadflax	*Linaria vulgaris*	A
Carolina horse nettle (horsenettle)	*Solanum carolinense*	B
Diffuse knapweed	*Centaurea diffusa*	B
Leafy spurge	*Euphorbia esula*	B
Medusahead	*Taeniatherum caput-medusae*	B
Musk thistle	*Carduus nutans*	B
Russian knapweed	*Acroptilon repens*	B
Sahara mustard (African mustard)	*Brassica tournefortii*	B
Scotch thistle	*Onopordum acanthium*	B
White horse nettle (silverleaf nightshade)	*Solanum elaeagnifolium*	B
Canada thistle	*Cirsium arvense*	C
Hoary cress	*Cardaria draba*	C
Johnson grass	*Sorghum halepense*	C
Perennial pepperweed (tall whitetop)	*Lepidium latifolium*	C
Poison hemlock	*Conium maculatum*	C
Puncture vine	*Tribulus terrestris*	C
Saltcedar (tamarisk)	*Tamarix* spp.	C
Water hemlock	*Cicuta maculata*	C

Source: NDA 2014

[1]**Category A**

- Weeds not found or limited in distribution throughout the state
- Actively excluded from the state and actively eradicated wherever found
- Actively eradicated from nursery premises
- Control required by the state in all infestations

Category B

- Weeds established in scattered populations in some counties of the state
- Actively excluded where possible
- Actively eradicated from nursery premises
- Control required by the state in areas where populations are not well-established or previously unknown to occur

Category C

- Weeds currently established and generally widespread in many counties of the state
- Actively eradicated from nursery premises
- Abatement at the discretion of the State Quarantine Officer

Historical Weed Inventory

CRI contracted with Western Weed Services (WWS) to complete the site's first comprehensive noxious and invasive plant inventory in August 2000 (Cannon Environmental Assistance, LLC [CEA] 2014). WWS surveyed the Rochester weed management area and 12 miles of the access roads (10 miles on Limerick Road and two miles on the Unionville Road). Additional areas in view of the road, but not growing next it, were not included in the original survey; however, a variety of noxious weeds were observed along Limerick Road.

The lower elevation and drainage areas had the highest concentration of noxious weeds; however, the reclaimed areas and upper elevation facilities were relatively weed free. The eight noxious or nonnative, invasive weeds observed during the August 2000 inventory are as follows:

- Squarrose starthistle (knapweed; *Centaurea virgata*), noxious weed, NDA Category A
- Diffuse knapweed (*C. diffusa*), noxious weed, NDA Category B
- Musk thistle (*Carduus nutans*), noxious weed, NDA Category B
- Russian knapweed (*Centaurea repens*), noxious weed, NDA Category B
- Hoary cress (*Cardaria draba*), noxious weed, NDA Category C
- Perennial pepperweed (*Lepidium latifolium*), noxious weed, NDA Category C
- Saltcedar (tamarisk; *Tamarix ramosissima*), noxious weed, NDA Category C
- Bull thistle (*Cirsium vulgare*), nonnative, invasive weed

CRI implemented an informal weed management plan, which began with the 2000 inventory, and areas inventoried in August 2000 were treated by SRK Consulting during May and June 2001. The weed management plan became more robust starting in 2005 when CRI contracted with PurChem Environmental and Supply Company LLC. A seasonal program was instituted that year, which included spring and fall applications of herbicides. The twice yearly schedule of treatment over the last eight years has had a major impact on the weed population and has effectively deterred the spread of the invasive species (CEA 2014).

Contemporary Weed Inventory (JBR 2013)

JBR biologists found three noxious weed species during biological baseline surveys (JBR 2013):

- Russian knapweed, noxious weed, NDA Category B
- Perennial pepperweed, noxious weed, NDA Category C
- Saltcedar (tamarisk), noxious weed, NDA Category C

Russian knapweed was found in the north-central portion of the project area and near the entrance to American Canyon. Perennial pepperweed was found in the southwestern portion of the project area in a riparian area and in American Canyon. Saltcedar was found in the southwestern portion of the project area, in a riparian area and in Woody Canyon.

In addition to the three noxious weed species observed by JBR, 15 additional nonnative, invasive weed species were observed in the project area. Cheatgrass was the most extensively established and occurred on all aspects of slopes, ranging from gentle to steep. All of the nonnative, invasive species tended to occur most regularly in disturbed open areas, along roadsides and other clearings, near springs, and in other similar areas where native vegetation was sparse or previously disturbed. Nonnative, invasive weed species observed in the project area by JBR, including the vegetation community or communities each weed was typically observed in, are listed in **Table 3-46**.

Table 3-46
Nonnative, Invasive Weeds in the Project Area

Species	Vegetation Communities[1]
Cheatgrass (*Bromus tectorum*)	D01, D09, S054, S075
Littlepod false flax (*Camelina microcarpa*)	D01, D09, S054
Hairy whitetop (*Cardaria pubescens*)	A013, D01, S054
Bull thistle (*Cirsium vulgare*)	A013, D01
Tansy mustard (*Descurainia sophia*)	D01, S054
Filaree (*Erodium cicutarium*)	D01, D09, S054,
Spreading wallflower (*Erysimum repandum*)	D01, D09, S054
Saltlover (*Halogeton glomeratus*	D01
Forage kochia (*Kichia prostrata*)	D01, D09, S054
Clasping pepperweed (*Lepidium perfoliatum*)	D01, D09, S054,
Prickly Russian thistle (*Salsola tragus*)	D01, D09
Tumble mustard (*Sisymbrium altissimum*)	D01, D09, S054
Spiny sowthistle (*Sonchus asper*)	A013
Dandelion (*Taraxacum officinale*)	A013
Common mullein (*Verbascum thapsus*)	D01, S054

Source: JBR 2013

[1]A013—Cold Perennial Springs/Springbrooks
D01—Disturbed
D09—Invasive Annual and Biennial Forb land
S054—Inter-Mountain Basins Big Sagebrush Shrubland

Contemporary Weed Inventory

PurChem inventoried and treated the Rochester and Packard Weed Management Areas on May 15, 16, 17, and 18, 2013 (CEA 2014) PurChem observed and treated the following noxious weeds identified during the May 2013 inventory:

- Leafy spurge (*Euphorbis esula*), noxious weed, NDA Category B
- Musk thistle (*Carduus nutans*), noxious weed, NDA Category B
- Russian knapweed (*Acroptilon repens*), noxious weed, NDA Category B
- Canadian thistle (*Cirsium arvense*), noxious weed, NDA Category C
- Hoary cress (*Cardaria draba*), noxious weed, NDA Category C

Weeds were identified primarily in areas of disturbance and next to roads; however, there also remain patches of noxious weeds in locations that have been previously treated. Approximately 54 acres of infestations were treated during May 2013. PurChem has noted a steady decrease in the acreage and density of the noxious weeds. Other positive indicators are the increase in native vegetation, beneficial insect populations, and bird populations (CEA 2014).

PurChem inventoried and treated the Rochester and Packard WMAs from September 25 through 28, 2013 (CEA 2014). In addition to the five species treated during May 2013, PurChem also observed and treated the following two noxious weeds during September 2013:

- Perennial pepperweed, noxious weed, NDA Category C
- Saltcedar, noxious weed, NDA Category C

Saltcedar was identified and treated in only two areas, the historical tailings pond area at the Packard Mine and the east perimeter access road. Approximately 45 acres of infestations were treated. Although the small stand of saltcedar discovered along the access road was unexpected, in general, PurChem has noted a steady decrease in the acreage and density of the noxious weeds. However, an increase in invasive weed cover in the following areas was noted in the following locations:

- The drainage ditch by the trailers and blue storage container
- At and near the water stand
- The pond area behind the administration building
- Behind the truck shop and wash bay, next to berms and in the drainage ditch
- The lower bench road below the radio towers
- The county road

These areas are monitored twice a year and would continue to be inventoried and treated.

3.15 WILDLIFE

This section describes the affected environment and existing conditions in the 4,838-acre project area related to wildlife species. (Migratory birds are discussed in **Section 3.4**; special status wildlife species are addressed in **Section 3.12**.) There is no fish habitat in the project area.

3.15.1 Regulatory Framework

Section 102.8 of the FLPMA states that the policy of the United States is to manage public land in a manner that would protect the quality of multiple

resources and provide food and habitat for fish, wildlife, and domestic animals. The Public Rangelands Improvement Act directs the BLM to improve rangeland conditions, with due consideration given to the needs of wildlife and their habitats.

3.15.2 Affected Environment

Survey Method

The assessment area for wildlife is the 4,838-acre project area, with the exception of the survey area for the golden eagle, which is a ten-mile radius around the project area. Golden eagles are discussed in **Section 3.12**, Special Status Species.

General Wildlife and Game Species

JBR identified general wildlife habitats based on the vegetation characterization conducted in the project area in 2011 and 2012. JBR searched for wildlife and their sign in areas with topographic features that would be of particular importance to wildlife. Examples of this are rock outcrops, cliffs, drainages, water sources, and man-made features, such as developed springs. Based on a review of aerial photographs (1 inch = 1,500 feet; color aerial photography), JBR identified surface disturbance throughout large portions of the project area. Areas with existing surface disturbance were visited, but JBR focused primarily on natural habitat. The biologists used topographic and color aerial maps (1 inch = 400 feet) in the field.

General wildlife and game species were observed during surveys for special status wildlife, including raptors, and during surveys of springs and seeps. All wildlife and sign (e.g., scat, tracks, feathers, nests, burrows, prey remains, and carcasses) detected in the project area were recorded, and a species list was developed (JBR 2013).

Survey Results

JBR conducted general wildlife, migratory bird, and special status wildlife species surveys in 2011, 2012, and 2013. The biologists recorded all wildlife and wildlife sign observed in the area and developed a species list (JBR 2013). General wildlife species observed in the project area are summarized in **Table 3-47**, migratory birds observed in the project area are discussed in **Section 3.4**, and special status wildlife species observed in the project area are discussed in **Section 3.12**.

Pellets from pronghorn antelope were observed in the area during the 2011, 2012, and 2013 surveys; however, the animal itself was not observed. Two mule deer were observed by helicopter approximately one mile east of the project area during the June 3, 2011, golden eagle nesting survey. Three adult mule deer were observed at Sage Hen Springs in the north-central portion of the project area in July 2011. A doe mule deer was observed on the mine site near American Canyon Spring in early August 2011. During the 2012 survey significant deer pellets and tracks were recorded throughout the Limerick Basin

Table 3-47
General Wildlife and Game Species Observed in the Project Area

Species	Year Observed or Detected	Type of Observation or Detection	Habitat
Game Birds			
Chukar *Alectoris chukar*	2011, 2012	Direct observation, heard calling	Sagebrush and unreported habitats in American, Weaver, and Woody Canyons and Limerick Basin
California quail (*Callipepla californica*)	2011	Direct observation	Unreported habitat in American Canyon
Mourning dove[1] (*Zenaida macroura*)	2011	Direct observation	Sagebrush near water sources
Mammals			
Antelope ground squirrel *Ammospermophilus leucurus*	2012, 2013	Direct observation	Unreported habitat in American Canyon, Packard Flat
Pronghorn antelope *Antilocapra americana*	2011, 2012, 2013	Pellets	Unreported
Coyote *Canis latrans*	2012, 2012	Direct observation, tracks, and scat	Unreported throughout project area
Kangaroo rat *Dipodomys* spp.	2011, 2013	Direct observation, found dead, burrows	Unreported habitat in American Canyon, Limerick Basin, Packard Flat (burrows)
Sagebrush vole *Lemmiscus curtatus*	Unreported	Direct observation	Sagebrush slopes
Black-tailed jackrabbit *Lepus californicus*	2012, 2013	Direct observation	Sagebrush, open habitats
Vole *Macrotis* spp.	Unreported	Direct observation	Wet areas associated with American Canyon Spring
Yellow-bellied marmot *Marmota flaviventris*	Unreported	Direct observation	Outcrops north, east, and west of mine
Desert packrat *Neotoma lepida*	2011, 2012	Pellets, nest	Abandoned mine workings, abandoned buildings
Mule deer *Odocoileus hemionus*	2011, 2012, 2013	Direct observation, tracks, and pellets	Unreported habitats near American Canyon Spring, Limerick Basin, Packard Flat
Mountain cottontail *Sylvilagus nuttallii*	2012	Direct observation	Dense vegetation in Upper Limerick, Woody, and Weaver Canyons
Least chipmunk *Tamias minimus*	2011, 2012	Direct observation	Unreported habitats in American, Upper Limerick, and Weaver Canyons
Reptiles			
Leopard lizard *Crotaphytus wislezenii*	2011, 2013	Direct observation	Unreported habitat in Packard Flat
Collared lizard *C. collaris*	2013	Direct observation	Unreported habitat on slopes above Packard Flat

Table 3-47
General Wildlife and Game Species Observed in the Project Area

Species	Year Observed or Detected	Type of Observation or Detection	Habitat
Western fence lizard *Sceloporus occidentalis*	Unreported	Direct observation	Outcrops, rocky areas, timbers on abandoned mine workings
Sagebrush lizard *S. graciosus*	2011	Direct observation	Sagebrush habitat
Great Basin whiptail *Cnemidophorus tigris tigris*	2012	Direct observation	Unreported habitats in American Canyon, Limerick Basin
Western whiptail *C. tigris*	2013	Direct observation	Unreported habitat in Packard Flat
Spiny lizard *Sceloporus* spp.	2013	Direct observation	Unreported habitat in Packard Flat
Great Basin rattlesnake *Crotalus oreganus lutosus*	2013	Direct observation	Unreported habitat in Packard Flat
Gopher snake *Pituophis melanoleucus*	2013	Direct observation	Mine access road, unreported habitat in Packard Flat
Amphibians			
None observed			
Insects			
Mormon metalmark *Apodemia mormo*	2012	Direct observation	On rabbitbrush (*Chrysothamnus* spp.)
Great Basin woodnymph *Cercyonis sthenele*	2012	Direct observation	Nectaring on tamarisk (*Tamarix* spp.) and buckwheat (*Eriogonum* spp.) in American Canyon
Checkerspot *Chlosyne* sp.	2012	Direct observation	Nectaring on tamarisk (*Tamarix* spp.) in American Canyon
Skipper *Hesperia* sp.	2012	Direct observation	Nectaring on tamarisk (*Tamarix* spp.)
Tarantula hawk wasp *Pepsis* sp.	2012	Direct observation	Nectaring on tamarisk (*Tamarix* spp.) in American Canyon

Sources: JBR 2013; Bertrando and Tiehm 2014; Tiehm 2014

[1]Game birds that are below desired condition are species whose populations are below long-term averages or management goals or for which there is evidence of declining population trends (MBTA [16USC, Section 703-711])

area up to the ridge above Rochester Canyon. The ridge also exhibited signs of heavy deer use, from what appeared to be late autumn, winter, or spring. Small numbers of mule deer pellet groups and tracks were found in mountainous parts of the project area.

There are two NDOW wildlife guzzlers in the project area, one of which is at the head of Limerick Canyon below the north rock disposal site (Section 9, T28N, R34E). As reported, this guzzler has not been maintained and is not functional (JBR 2013). A second big game guzzler was installed in the saddle between the Stage III HLP and Woody Canyon (Section 22, T28N, R34E), which is reportedly in use and functional (JBR 2013). There are reportedly a variety of other temporary guzzlers around the project area as well.

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