U.S. Department of the Interior
Bureau of Land Management
Humboldt River Field Office

February 2020

Coeur Rochester and Packard Mines Plan of Operations, Amendment 11

Final EIS: Volume 1

Costs:

BLM: $237,060 (through cost recovery from proponent)

Proponent: $6,200,000

MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/NV/WN/ES/19-06+1793

DOI-BLM-NV-W010-2019-0008-EIS

TABLE OF CONTENTS

Chapter | Page

TABLES

Page

FIGURES *(see Appendix A)*

APPENDICES

This page intentionally left blank.

ACRONYMS AND ABBREVIATIONS

Acronyms and Abbreviations	Full Phrase
ABA	acid-base accounting
Afa	acre feet per annum
amsl	above mean sea level
APE	area of potential effect
ARD	acid rock drainage
AUMs	animal unit months
BAPC	Bureau of Air Quality Planning
BLM	Bureau of Land Management
BMPs	best management practices
BMRR	Bureau of Mining Regulation and Reclamation
BRF	Black Ridge Fault
CEQ	Council on Environmental Quality
CESA	cumulative effects study area
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_{2e}	carbon dioxide equivalent
CRI	Coeur Rochester, Inc.
dBA	a-weighted decibels
e-cell	evaporation cell
EIS	environmental impact statement
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
FLPMA	Federal Land Policy and Management Act
GHGs	greenhouse gases
GHMA	General Habitat Management Area
GIS	geographic information system
gpm	gallons per minute
HAP	hazardous air pollutant
HLP	heap leach pad
HQT	Nevada Greater Sage-Grouse Habitat Quantification Tool
HRFO	Humboldt River Field Office
KOP	key observation point
kV	kilovolt
LOAEL	lowest observed adverse effect level
LOS	Level of Service
LQG	large quantity generator
LTT	long-term trust
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NBAPC	Nevada Bureau of Air Pollution Control
NDEP	Nevada Department of Environmental Protection

NDOW	Nevada Department of Wildlife
NDWR	Nevada Department of Water Resources
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAEL	No Observed Adverse Effect Level
NOI	notice of intent
NOx	oxides of nitrogen
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NRVs	Nevada Reference Values
NV AAQS	Nevada ambient air quality standards
OHMA	Other Habitat Management Area
PA	programmatic agreement
PAG	potentially acid generating
PHMA	Priority Habitat Management Area
$PM_{2.5}$	particulate matter with a diameter less than or equal to 2.5 microns
PM_{10}	particulate matter with a diameter less than or equal to 10 microns
POA 10	Coeur Rochester Mine Plan of Operations Amendment 10 and Closure Plan
POA 11	Plan of Operations and Reclamation Permit # N-64629, Amendment 11
ppb	parts per billion
ppm	parts per million
RCD	Rochester Cultural District
RCRA	Resource Conservation and Recovery Act
RDS	rock disposal site
RFFAs	reasonably foreseeable future actions
RIBs	Rapid Infiltration Basins
RMP	Resource Management Plan
RMZ	recreation management zone
ROWs	rights-of-way
RV	recreational vehicle
SETT	Sagebrush Ecosystem Technical Team
SHPO	Nevada State Historic Preservation Office
SO_2	sulfur dioxide
SRMA	special recreation management area
TDS	total dissolved solids
TRVs	toxicity reference values
$\mu g/m^3$	microgram per cubic meter
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
VRM	visual resource management
WPCP	water pollution control permit

Executive Summary

ES.1 Need for this Document

The Winnemucca District Office of the United States Department of the Interior, Bureau of Land Management (BLM) received a proposed modification to the Plan of Operations and Reclamation Permit #N-64629, Amendment #11 (POA 11), filed by Coeur Rochester, Inc. (CRI) in April 2017. The project proposes to expand CRI's precious metals mining operation, including reclamation.

The project is on public land administered by the BLM and private land controlled by CRI. It is in Pershing County, Nevada, approximately 18 miles northeast of Lovelock.

This environmental impact statement (EIS) discloses CRI's Proposed Action, the No Action Alternative; Alternative 1, Management of potentially acid generating (PAG) Material in the West Rock Disposal Site (RDS); and Alternative 2, Partial Backfill of Pit Lake. Potential direct, indirect, and cumulative effects on the environment are analyzed. Impacts described would form the basis for a BLM decision about the Proposed Action and the alternatives, as well as the selection of appropriate mitigation measures.

ES.2 Description of the Proposed Action

Under the Proposed Action, CRI would expand mining and reclamation activities on BLM-administered lands at its Coeur Rochester and Packard Mines (collectively called CRI Mine). CRI also proposes to expand facilities on private lands owned or controlled by CRI. The Proposed Action would expand the project boundary and create additional surface disturbance. The project area would be 12,350 acres. The project would include expanding the plan of operation boundary by 7,209 acres from 4,838 acres to 12,047 acres.

CRI proposes to disturb 3,105 acres for expanded mining activities (2,748 acres), an upgraded power line (341 acres), and improvements to Packard Flat Road (16 acres).

The Proposed Action would extend the life of the project for approximately 10 years, with active mining at full production and employment lasting until approximately 2033. The site would be closed and reclaimed approximately 5 years after each mining and processing facility is closed.

The Proposed Action consists of the following:

- Expand the existing permitted disturbance area
- Expand the Rochester and Packard Pits, with the bottom of the Rochester Pit extending below the historic groundwater elevation
- Remove the Stage I heap leach pad (HLP) and a portion of the Stage II HLP; relocate spent ore to the Stage V HLP
- Relocate solution pipelines and utilities from the Stage III HLP to the existing processing plant
- Expand the South and West RDSs to provide 326 million tons of additional storage capacity and expand the Packard RDS to add 45 million tons of capacity
- Disposal of PAG waste would be determined by the Waste Rock Management Plan (SRK 2018c). This would require additional PAG waste rock from the Rochester Pit to be placed in dedicated PAG material storage areas, which includes unsaturated portions of the Rochester Pit.
- As outlined in the Waste Rock Management Plan (SRK 2018c), PAG waste would be managed as follows:
  - In-pit storage of PAG waste would be in unsaturated portions of the Rochester Pit and encapsulated with 50 feet of non-PAG material, consistent with the encapsulation thickness from Coeur Rochester Mine Plan of Operations Amendment 10 and Closure Plan (POA 10).

  - PAG waste located at RDSs would be placed on a 50-foot-thick base, composed of non-PAG waste rock material and at a minimum of 20 internal feet from any final (regraded) dump face. Final regraded slopes of the RDSs, which would encapsulate the PAG, would consist of non-PAG material with a minimum thickness of 20 feet.
  - Growth media cover would be placed over the non-PAG material used to encapsulate the PAG waste in order to enhance revegetation and reduce infiltration.
- Construct and operate the following:
  - Limerick Canyon Stage VI HLP and the Packard HLP, which would accommodate 300 and 60 million tons, respectively, and application rates would be 13,750 and 5,000 gallons per minute (gpm), respectively
  - Stage VI and Packard Merrill-Crowe process facilities
  - Stage VI crushing and screening facility; it would be designed to handle 60,000 tons of ore or run-of-mine material per day; supporting infrastructure would be built, including the Stage VI HLP conveyor system, truck loadout, and ore stockpile
  - Ancillary facilities associated with Limerick Canyon and Packard Pit operations
- Relocate the N-pit crusher to Packard Flat; construct and operate the conveyor system, associated loadout, and ore stockpile
- Construct four new growth media stockpiles
- Construct and maintain stormwater diversions and sediment collection basins to meet the 100-year, 24-hour storm criteria
- Construct and maintain new roads, including haul roads and light vehicle access roads, and partially relocate and improve a section of the Packard Flat Road to Pershing County road standards
- Install a new water conveyance pipeline from an existing tank fed by wells near the Rochester Pit to the Limerick Canyon facilities and install a new production water well to support the Packard Flat operations
- Install a pipeline connection from the Stage IV HLP barren solution distribution pipeline to Stage VI for process solution demands, reduce the drain-down in existing HLPs, and improve closure efficiency
- Upgrade the electrical utility system to support the proposed infrastructure at Limerick Canyon and Packard Flat, including an upgraded power line
- Engineer the closure and reclamation of the proposed POA 11 facilities including the open pits. Some of the facilities and associated components would not be reclaimed including the open pits, main access road to the mine, and public access roads. The contingency ponds (process ponds during operation), closure evaporation cells (e-cells), and closure stormwater diversion structures would persist long-term until final closure is completed
- Fence off the boundary of the Limerick Canyon and Packard Flat process areas, including HLPs and ponds, with an 8-foot-high chain-link (wildlife) fence, and fence the Stage VI HLP with a combination of range and wildlife fencing

ES.3 PROJECT ALTERNATIVES

The alternatives analyzed in detail in this EIS are the Proposed Action, the No Action Alternative; Alternative 1, Management of PAG in the West RDS; and Alternative 2, Partial Backfill of Pit Lake. Alternative 1 differs from the Proposed Action only with respect to management and permanent storage of the in-pit waste rock PAG material. Under Alternative 1, CRI would remove in-pit PAG material and any newly encountered PAG material. Then CRI would permanently store the material in the West RDS (this is also the temporary PAG material storage area described in the Proposed Action). Three other alternatives were considered but were eliminated from detailed analysis; they are discussed in **Section 2.2**.

ES.3.1 No Action Alternative

Under the No Action Alternative, the CRI Mine would close in approximately 2023. Reclamation, closure, and mining to access precious metals reserves would continue, based on current authorizations in previously approved plans of operation and reclamation and closure plans (see Section 2.5 of the POA 11 for more details); existing groundwater pumping rates would continue. Mining would continue to allow up to 2,203.1 acres of authorized disturbance within the existing mine plan boundary of 4,838.0 acres.

ES.3.2 Alternative 1—Management of PAG in the West RDS

Under Alternative 1, proposed mining expansion operations and long-term reclamation and closure actions would be the same as those under the Proposed Action. The only change under Alternative 1 is that mined PAG material would be placed at the West RDS only (**Figure 2-4**). In-pit storage and encapsulation of PAG material would be the same as under the Proposed Action.

The Alternative 1 layout would include up to two cells in the West RDS. As under the Proposed Action, PAG material would be placed on a 50-foot-thick base, composed of non-PAG waste rock material, and at a minimum of 20 internal feet from any final (regraded) dump face. Final regraded slopes of the West RDS, which would encapsulate the PAG, would consist of non-PAG material with a minimum thickness of 20 feet. Growth media cover would be placed over the non-PAG material used to encapsulate the PAG material in order to enhance revegetation and reduce infiltration.

ES.3.3 Alternative 2—Partial Backfill of Pit Lake

Under Alternative 2, proposed mining expansion operations and long-term reclamation and closure would be the same as those under the Proposed Action. Management of the Rochester Pit lake differs in Alternative 2. Under Alternative 2, CRI would manage the pit lake projected for the Rochester Pit by placing non-PAG backfill in sub-pits 2 and 3 to 25 feet above the saddle elevation where the pits coalesce. No backfill would be placed in sub-pit 1. Sub-pit 4 would be backfilled with 25 feet of material, similar to the Proposed Action; however, sub-pit 4 would be amended with lime to raise the acid neutralization potential.

ES.4 Issues

As a result of the public and internal scoping process, issues were identified concerning the following topics:

- Alternatives
- Cumulative Impacts
- Mitigation and monitoring
- Air quality and climate
- Cultural resources
- Geology and minerals
- Migratory birds
- Soil resources
- Solid and hazardous waste
- Special status species
- Vegetation
- Water
- Wildlife
- Native American religious concerns
- Socioeconomics
- Rangeland management
- Public access
- Night skies

Additional information concerning scoping comments is provided in the scoping report (EMPSi 2019).

ES.5 Summary of Potential Impacts

The table below is a summary of the direct and indirect effects for the Proposed Action and alternatives. The effects summary is based on implementing the environmental protection measures that CRI is committed to and adhering to operating plans and local, state, and federal laws and regulations.

Table ES-1
Summary of Impacts

Resource	Proposed Action	Alternative 1—Management of PAG in West RDS	Alternative 2—Partial Backfill of Pit Lake	No Action Alternative
Air resources	Atmospheric pollutant concentrations would result from the direct emissions of pollutants under the Proposed Action. Estimated emissions would be: • PM_{10}: 481 tons per year • $PM_{2.5}$: 58 tons per year • Oxides of nitrogen (NOx): 732 tons per year • Volatile organic compound (VOC): 60 tons per year • CO: 671 tons per year • SO_2: 3.8 tons per year • Hazardous air pollutants (HAPs): 1.05 tons per year Only criteria pollutant concentrations were modeled due to the limited amount of HAP (including mercury) emissions generated. Modeled concentrations of criteria pollutants would be below National Ambient Air Quality Standards (NAAQS) and Nevada ambient air quality standards (NV AAQS) for all modeled scenarios under the Proposed Action. Thus, the Proposed Action would not result in impacts on air quality that exceed the NAAQS or NV AAQS. In addition to direct atmospheric pollutant concentrations, the Proposed Action could have indirect effects from changes in the atmosphere due to the emission of	Estimated criteria pollutant and hazardous pollutant emissions would be similar to those described for the Proposed Action because proposed mining expansion and long-term reclamation and closure actions would be similar. The level of activity from emission-generating sources would be within the bounds of the modeled operational scenario for placing waste rock in the West RDS, which showed modeled pollutant concentrations below the NAAQS and NV AAQS for all pollutants. Thus, Alternative 1 would not result in impacts on air quality that exceed the NAAQS or NV AAQS. Nevertheless, the increased truck trips needed to transport PAG material under this alternative would result in increased emissions compared to the Proposed Action or Alternative 2.	Estimated criteria pollutant and hazardous pollutant emissions would be similar to those described for the Proposed Action because proposed mining expansion and long-term reclamation and closure actions would be similar. The level of activity from emission-generating sources would be within the bounds of the modeled operational scenario for placing waste rock in the Rochester Pit, which showed modeled pollutant concentrations below the NAAQS and NV AAQS for all pollutants. Thus, Alternative 2 would not result in impacts on air quality that exceed the NAAQS or NV AAQS. GHG emissions and the resulting indirect impacts would be similar to those described for the Proposed Action.	Atmospheric pollutant concentrations would result from the continued direct emissions of pollutants. Estimated emissions would be: • PM_{10}: 285 tons per year • $PM_{2.5}$: 36 tons per year • NOx: 612 tons per year • VOC: 50 tons per year • CO: 600 tons per year • SO_2: 3.7 tons per year • HAPs: 0.87 tons per year Air dispersion modeling performed in support of the Coeur Rochester Mine Plan of Operations Amendment 10 and Closure Plan Final EIS (POA 10 EIS; BLM 2016) indicated that CRI Mine operations under POA 10 (which is representative of No Action Alternative operations) would be below the NAAQS and NV AAQS for all criteria pollutants. Thus, the No Action Alternative would not result in impacts on air quality that exceed the NAAQS or NV AAQS.

Resource	Proposed Action	Alternative 1—Management of PAG in West RDS	Alternative 2—Partial Backfill of Pit Lake	No Action Alternative
Air resources *(continued)*	greenhouse gases (GHGs). GHG emissions in the form of carbon dioxide equivalents (CO_{2e}) are estimated at 2,851 tons per year from construction and 44,976 tons per year from operation. This would increase national CO_{2e} emissions by 0.0007 percent and state emissions by 0.11 percent.	GHG emissions and the resulting indirect impacts would be similar to those described for the Proposed Action.	*(see above)*	GHG emissions in the form of CO_{2e} are estimated at 40,688 tons per year. This would increase national CO_{2e} emissions by 0.00062 percent and state emissions by 0.09 percent.
Cultural resources	Of the known cultural resources in the direct and indirect effects areas, there are eligible sites, unevaluated sites, and sites that contribute to the National Register of Historic Places eligibility of the Rochester Cultural District. The Proposed Action would affect some of these cultural resources directly, indirectly, and cumulatively. In accordance with the National Historic Preservation Act, any adverse impacts on cultural resources that would alter the characteristics that qualify them for inclusion in the National Register of Historic Places would be resolved through BLM-proposed mitigation, which would include implementation of a historic properties treatment plan.	Same as the Proposed Action.	Same as the Proposed Action.	Activities would affect only those historic properties that have been previously mitigated or that have been identified as needing treatment before impact.

Resource	Proposed Action	Alternative 1—Management of PAG in West RDS	Alternative 2—Partial Backfill of Pit Lake	No Action Alternative
Migratory birds	The Proposed Action would affect migratory birds by removing vegetation used for foraging and breeding. Though the Proposed Action would result in a net loss of potential habitat, it would not contribute to a loss of viability for any migratory bird species. Further, it is unlikely that implementing the Proposed Action would result in a decline in local or regional migratory bird populations. Mining, drilling, human presence, and construction noise could disturb birds nesting in the vicinity of the proposed project, resulting in nest abandonment. Direct impacts would be the loss of 3,105 acres of vegetation. There also would be a potential for injury or mortality from vehicular traffic, construction, or other project components associated with the Proposed Action. Most of the disturbed acres would be reclaimed, and the disturbance would be temporary.	Same as the Proposed Action.	Partially backfilling sub-pits 2 and 3 and using lime amendments would improve the water quality of the Rochester Pit lake. This would reduce the risk of toxicity for migratory birds ingesting pit lake water.	The No Action Alternative would continue to directly affect migratory birds by removing vegetation in areas authorized for surface disturbance, up to 2,203 acres. Most of the disturbed acres would be reclaimed, and the disturbance would be temporary.
Wastes and materials (hazardous and solid)	The Proposed Action would include increased cyanide solution volumes; however, cyanide management practices would greatly reduce the risk of release. The major risk of release is associated with fuel and reagent quantities during transport, and the risk increases under the Proposed Action in accordance with the quantities used.	Alternative 1 may increase consumption of fuel and could increase the potential for a release due to increased fuel consumption.	Alternative 2 would not significantly affect hazardous and solid waste management. Additional fuel and lime would be consumed during fill placement.	Under the No Action Alternative, operations would continue, based on current authorizations under the previously approved mining plans of operation and reclamation and closure. Materials would be handled according to the approved POA 10.

Resource	Proposed Action	Alternative 1—Management of PAG in West RDS	Alternative 2—Partial Backfill of Pit Lake	No Action Alternative
Water quality and quantity (surface and ground)	Modeling predicts the Rochester Pit would form a pit lake. Models predict that the maximum extent of drawdown due to POA 11 would occur approximately 30 years after the end of mining. Drawdown could result in less groundwater discharge to shallow alluvium and to springs, thus decreasing spring discharge and surface water flows. Uncertainties in predicted groundwater flow rates and directions leave open the possibility that in some portions of the Rochester Pit lake there could be groundwater flow-through. POA 11 includes development of several facilities onto previously undeveloped land; these include the Stage VI HLP and expansions of the West, South, and Packard RDSs. These facilities would reduce recharge to groundwater, which would result in lower groundwater levels. Springs and surface riparian systems that depend on groundwater discharges could be reduced as a result. Groundwater quality would not likely be affected if the Rochester Pit lake is a terminal sink, as is predicted under the Proposed Action. The Proposed Action is not expected to affect water quality of springs, seeps, and wetlands outside the Project Area.	Groundwater quantity and quality are anticipated to be the same as for the Proposed Action; however, the West RDS could leak water that would recharge the underlying aquifers and increase groundwater levels or alter water quality in that area. Nevertheless, the proposed design of a 50-foot-thick base composed of non-PAG material and surface cover to reduce infiltration would reduce the likelihood of groundwater recharge from this RDS. Surface water flows would likely be the same as under the Proposed Action. Surface water quality would likely be the same as or better, compared with the Proposed Action. Alternative 1 is similar to the Proposed Action, except that the PAG waste rock from the Rochester Pit would be encapsulated in two cells on the West RDS.	Groundwater levels, drawdown, and their projected impacts are anticipated to be similar to those of the Proposed Action, except in the immediate vicinity of the Rochester Pit. The potential that the pit lake would become a flow-through system would be higher than under the Proposed Action, since pit water levels would rise more quickly through and above the partial backfill and would experience less evaporation. Water would be of better quality with respect to the Nevada Division of Environmental Protection Profile III constituents, due to reactions with the lime amendments placed in pit backfill materials. Surface water flows would be expected to be the same as under the Proposed Action.	Operations would continue, based on current authorizations and existing pumping rates, and groundwater levels predicted for POA 10 would continue. The PAG mined under POA 10 would be encapsulated in a relatively large amount of non-acid-generating oxide. Additionally, the Rochester Pit surface under POA 10 did not produce a pit lake. As such, minimal effects would result from the pit or RDS facilities in POA 10.

Resource	Proposed Action	Alternative 1—Management of PAG in West RDS	Alternative 2—Partial Backfill of Pit Lake	No Action Alternative
Water quality and quantity (surface and ground) *(continued)*	Mining into more sulfidic material would result in potential impacts on water quality in the pit lake and potential release of constituents from the RDSs.	*(see above)*	Surface water quality would be similar to that of the Proposed Action, except in the Rochester Pit lake, where backfilling sub-pits 2 and 3 would increase the pH and reduce elevated metal levels prior to coalescing with the main pit lake. Alternative 2 would reduce PAG-related impacts compared with the Proposed Action because sub-pits 2 and 3 would be backfilled with limes amended oxide.	*(see above)*
Geology and minerals	The Proposed *Action* would effectively make underlying minerals unfeasible to access for future open pit mining.	Same as the Proposed Action.	Same as the Proposed Action.	Under the No Action Alternative, operations would continue, based on current authorizations under the previously approved mining plans of operation and reclamation and closure. Materials would be handled according to the approved POA 10. No pit lake occurs under POA 10.

Resource	Proposed Action	Alternative 1—Management of PAG in West RDS	Alternative 2—Partial Backfill of Pit Lake	No Action Alternative
Social values and economics	Employment for mine workers would be extended 10 years, and there would be an increase of temporary workers for construction. There would be temporary impacts on housing and public services. The population would increase due to workforce expansion, but this would be temporary. CRI anticipates that project operations under the Proposed Action would sustain the revenue contributions for up to 10 years beyond those that would accrue under the presently approved mine plan.	Same as the Proposed Action.	Same as the Proposed Action.	There would be no new impacts from the No Action Alternative.
Soils	Direct impacts on soil resources in the Project Area would result from the additional surface disturbance of 2,748 acres for proposed mining activities, 341 acres of temporary disturbance for power line construction, and 16 acres of disturbance for realigning and widening Packard Flat Road. Approximately 1,445 acres of soils with high potential for biological soil crusts, wind erosion, or water erosion would be affected during construction. CRI would reclaim up to 2,063 acres by replacing growth media over the stabilized surfaces of these features before revegetation	Same as the Proposed Action.	Same as the Proposed Action.	The No Action Alternative would continue to disturb soils in areas authorized for surface disturbance, up to 2,203 acres.

Resource	Proposed Action	Alternative 1—Management of PAG in West RDS	Alternative 2—Partial Backfill of Pit Lake	No Action Alternative
Special status species	Implementing the Proposed Action would result in direct and indirect impacts on vegetation used as habitat by special status species. The extent of habitat for individual special status species that would be affected would vary by species; this is because not all special status species have the same habitat requirements. Additional habitat fragmentation and behavioral effects may occur as a result of the noise created during the construction and operation of the Proposed Action.	Same as the Proposed Action.	Partial backfill of sub-pits 2 and 3 and lime amendments would improve the water quality of the Rochester Pit lake. This would reduce the risk of toxicity for bats and other special status species ingesting pit lake water.	The No Action Alternative would continue to directly affect special status species by removing vegetation in areas authorized for surface disturbance, up to 2,203 acres.
Vegetation	Implementing the Proposed Action would result in direct and indirect impacts on vegetation from vegetation removal, temporary modification of vegetation structure, and increased potential for invasive plant spread. Reclamation and revegetation would minimize direct impacts on vegetation communities in the Project Area.	Same as the Proposed Action.	Same as the Proposed Action.	The No Action Alternative would continue to have a direct effect by removing vegetation in areas authorized for surface disturbance, up to 2,203 acres.
Visual resources	The Proposed Action would result in a moderate to strong degree of contrast during construction and operation. After reclamation, the remaining degree of contrast would be weak.	Same as the Proposed Action.	Same as the Proposed Action.	There would be no change to existing conditions; therefore, there would be no new impacts on visual resources. Ongoing impacts, such as changes in landforms and vegetation cover, from mining and reclamation would continue.

Resource	Proposed Action	Alternative 1—Management of PAG in West RDS	Alternative 2—Partial Backfill of Pit Lake	No Action Alternative
Wildlife	In general, the Proposed Action would directly affect wildlife and wildlife habitat by removing vegetation in areas proposed for surface disturbance and by increasing human and equipment presence in habitat areas. These impacts would remove or reduce the quality of available breeding, foraging, or other habitat. The Proposed Action would remove up to 3,105 acres of wildlife habitat, representing approximately 25 percent of available habitat in the Project Area. These impacts would occur over time, and most would be temporary. Additional direct and indirect impacts on wildlife are risk of injury and mortality.	Same as the Proposed Action.	Partially backfilling sub-pits 2 and 3 and using lime amendments would improve the water quality of the Rochester Pit lake. This would reduce the risk of toxicity for wildlife ingesting pit lake water.	The No Action Alternative would continue to directly affect wildlife by removing vegetation and habitat in areas authorized for surface disturbance, up to 2,203 acres.

Chapter 1. Introduction

1.1 INTRODUCTION

The Bureau of Land Management (BLM), Winnemucca District, Humboldt River Field Office (HRFO) is preparing this environmental impact statement (EIS). The EIS is the subject of a proposed modification to the Plan of Operations and Reclamation Permit # N-64629, Amendment 11 (POA 11), which Coeur Rochester, Inc. (CRI) filed and submitted to the BLM in April 2017. The amendment would modify the existing authorized plan of operations at the Coeur Rochester and Packard Mines, herein referred to as the CRI Mine, and would include a proposed mine expansion, including a long-term reclamation (closure) plan. The history of mining at the CRI Mine and the permitting background dating back to 1986 are discussed in the Coeur Rochester Mine Plan of Operations Amendment 10 (POA 10) and Closure Plan Final EIS (BLM 2016).

The CRI Mine is in Pershing County, approximately 18 miles northeast of Lovelock, Nevada. It is in the Humboldt Mountain Range, and the mine elevation ranges from 4,960 to 7,300 feet above mean sea level (amsl). A paved county road provides year-round access. POA 11 would allow the expansion of existing mining operations, reclamation, and ultimate closure of the CRI Mine. The proposed expansion (Proposed Action) would extend the life of the mine for approximately 10 years, with active mining at full production and employment lasting until 2033. POA 10 extended mining through 2023. The mine would be closed and reclaimed approximately 5 years after each mining and processing facility is closed. Reclamation would occur concurrently with mining operations as facilities or mining areas are closed.

The proposed project area includes the POA 11 boundary and the corridors for an upgraded power line and Packard Flat Road improvements, for a total of 12,350 acres (see **Figure 1-1**). The project area includes 12,047 acres within the proposed POA 11 boundary; 8,654 acres are on BLM-administered lands, and 3,393 acres are on private lands owned or controlled by CRI. The project area also includes 316 acres outside the POA 11 boundary for the upgraded power line and Packard Flat Road improvements.

CRI proposes to expand the plan of operations boundary for POA 11. The authorized POA 10 (BLM 2016) and proposed POA 11 plan boundaries are shown on **Figure 1-2**; the existing CRI Mine facilities are shown on **Figure 1-3**.

A geographic information system (GIS) has been used in developing all figures and calculations. Figures and calculations are for illustrative purposes and may be updated without notice. The BLM makes no warranty as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

1.2 PURPOSE AND NEED FOR ACTION

The purpose of the Proposed Action and alternatives is to provide CRI the opportunity to expand operations to continue extracting economically recoverable silver and gold reserves and to provide reclamation and closure management following mining. The need for the action is established by the BLM's responsibility under its 2008 Energy and Mineral Policy, the Federal Land Policy Management Act (FLPMA), and BLM Surface Management Regulations at 43 Code of Federal Regulations (CFR) 3809. Specifically, it is to respond to a plan of operations and to take any action necessary to prevent unnecessary or undue degradation of the lands.

1.3 LAND USE PLAN CONFORMANCE

The Proposed Action is in conformance with the Record of Decision and Resource Management Plan for the Winnemucca District Planning Area, approved May 21, 2015, by the BLM as amended by the 2015 and

2019 greater sage-grouse amendments. The Proposed Action is in accordance with the mineral resources goal in the Record of Decision (BLM 2015) which states:

- "Make federal mineral resources available to meet domestic needs. Encourage responsible development of economically sound and stable domestic minerals and energy production, while assuring appropriate return to the public. Ensure long-term health and diversity of the public lands by minimizing impacts on other resources, returning lands disturbed to productive uses, and preventing UUD."
- "Public lands will remain open and available for mineral exploration and development subject to the provisions of FLPMA Section 204." (Mineral Resources Objective 1.5)
- "Manage locatable mineral operations to provide for the mineral needs of the nation while assuring compatibility with and protection of other resources and uses." (Locatable Mineral Objective 9)

1.4 BLM and Non-BLM Policies, Plans, and Programs

The CRI Mine is on BLM-administered lands and private lands owned or controlled by CRI. Mining on BLM-administered lands is conducted in accordance with the following:

- General Mining Law of 1872, as revised
- The FLPMA
- The BLM's Surface Management regulations at 43 CFR 3809
- The Mining and Mineral Policy Act of 1970
- BLM 2008 Energy and Mineral Policy

Mining is regulated in Nevada on both federal and private lands through the Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation (BMRR). The BMRR is composed of the regulation, reclamation, and closure branches. These branches regulate mining under the authority of the Nevada Revised Statutes (NRS) 445A.300-445A.730 and the Nevada Administrative Code (NAC) 445A.350-445A.447 (water quality regulations). The BMRR reclamation branch administers land reclamation in accordance with NRS 519A.010-519A.290 and NAC 519.010-519A.415.

A financial guarantee (e.g., bond) and long-term trust (LTT) are in place for CRI's authorized plan of operations. The LTT would be updated to address activities under POA 11. The reclamation and LTT cost estimates are a financial backup if the operator fails to comply with the reclamation requirements. (Those estimates are not part of the environmental impact analysis.) CRI also maintains other permits as required by applicable federal, state, and local laws and regulations, see Table 2-11 in POA 11 and **Section 1.5** for additional detail.

Proposed and new rights-of-way (ROWs) for Packard Flat Road, the power line expansion and relocation, and the new substation, including relinquishing established ROWs, would be subject to the FLPMA and associated ROW regulation under 43 CFR 2800. Pershing County has zoned the area of the CRI Mine as agricultural-mining-recreation. The activities proposed for POA 11 are consistent with the Pershing County Regional Master Plan (Pershing County 2012).

1.5 Authorizing Actions

CRI has the permits and approvals to operate the CRI Mine (**Table 1-1**), which cover ongoing operations and expansion, as outlined in POA 10. Implementing the Proposed Action or alternatives would require amending some of the existing permits.

Table 1-1
Permits and Approvals

Agency	Permit or Approval
United States (US) Department of the Interior, Bureau of Land Management, Winnemucca District Office, in Winnemucca, Nevada	• Rochester Mine Plan of Operations Case file – #NVN-064629 • Reclamation Bond #NVN-064629 • ROW—Microwave Communication Site #NVN-050235 • ROW—Access Road #NVN-042727 • Notice—Mystic Springs Exploration #NVN-089745 • Notice—Buena Vista Playa Exploration #NVN-089944 • Notice – Limerick Canyon #NVN-094931 • Programmatic Agreement (BLM et al. 1992)
Nevada Department of Environmental Protection (NDEP) Bureau of Air Pollution Control	• Class II Air Permit #AP1044-0063 • Mercury Control Program #AP1044-2242
NDEP Bureau of Air Quality Planning	• Open Burn Variances
NDEP Bureau of Mining Regulation and Reclamation	• Reclamation Permit #0087 • Water Pollution Control Permit #NEV0050037
NDEP Bureau of Safe Drinking Water	• Public Water System #PE-3076-12NTNC • Fe and Mn Removal System, Permit # PE-3076-TP02-12NTNC
NDEP Bureau of Waste Management	• Hazardous Waste ID #NVD-986767572 • Solid Waste Class III Landfill Waiver #SWMI-14-30
NDEP Bureau of Water Pollution Control	• General Stormwater Permit #NVR300000-MSW166 • General Septic Permit #GNEVOSDS09-L0028
Nevada Department of Wildlife	• Industrial Artificial Pond Permit #S37974
Nevada Division of Water Resources	• Water Right #48785 (Well PW-2A)—Proven • Water Right #81864 (Well PW-4A) • Water Right #49613 (Well PW-3A) • Water Right #49614 (C-4 Corridor) • Water Right #58449 (SAC) • Water Right #58450 (CBC) • Water Right #61762 (Well PW-1A)—Proven • Water Right #81235 (Packard Well) • Water Right #85015 (Stage V Underdrain) • Water Right #85016 (Stage IV Underdrain) • Stage III Contingency Pond Dam Safety Permit #J-721
State of Nevada Liquefied Petroleum Gas	• Class 5 License #5-3875-01
Nevada State Fire Marshall	• Hazardous Materials Permit #FDID 14000
Nevada State Business License	• Business License #NV19851018129
Pershing County Business License	• Business License #5270
US Bureau of Alcohol, Tobacco, Firearms and Explosives (BATFE)	• Explosives Permit #9-NV-027-33-3E-92862
US Department of Transportation	• Hazardous Materials Transportation General Permit—HM Company ID #051785
US Environmental Protection Agency	• Toxic Release Inventory #89419CRRCH180EX—Form R • Toxic Substances Control Act—Form U • RCRA #NVD-986767572—Biennial Report
US Federal Communications Commission	• Radio Station Authorization—Call sign #WNFH594 • Radio Station Authorization—Call sign #KB77195

Sources: CRI 2015a and CRI 2017a

1.6 Scoping

The scoping report summarizes the public scoping process and identifies the issues and concerns brought forward during the scoping process (EMPSi 2019). On March 6, 2019, the BLM published a notice of intent (NOI) to prepare this EIS in the *Federal Register*. The NOI invited public participation and scoping comments for a 30-day scoping period ending on April 5, 2019.

The BLM initiated the following additional steps as part of the scoping process:

- Sent letters to federal, state, and local agencies, affected tribal governments, and other interested parties, informing them about and inviting participation and comments on the Proposed Action
- Issued news releases to local news sources
- Updated the ePlanning website to inform the public of the project and to invite comments
- Held public scoping meetings on March 19, 2019, at the Winnemucca Convention Center in Winnemucca, Nevada, and on March 21, 2019, at the Lovelock Community Center in Lovelock, Nevada.

1.7 Issues

The BLM received a total of 10 public scoping letters, containing 56 individual comments. Commenters ranged from individuals to state and federal agencies and environmental groups. (Additional information concerning scoping comments is provided in the Scoping Report [EMPSi 2019]). Comments relating to the Proposed Action were identified and have been consolidated into the issues outlined below.

1.7.1 Alternatives

- What reasonable alternatives will be analyzed and how will they be compared? How does each alternative comply with state water quality standards and water permits, including reasonably foreseeable permit requirements?

1.7.2 Cumulative Impacts

- What water features are included in the cumulative effects study area?
- How do the mercury emissions from the mine add to the impacts of other mercury sources in the region?
- How is mine disturbance cumulatively affecting the regional ecosystem and cultural traditions?

1.7.3 Mitigation and Monitoring

- What mitigation measures are necessary during operations, closure, and post-closure and which ones are CRI, the BLM, or other agencies responsible for?
- What are the steps for the mining decommissioning process?
- What monitoring is required for surface water and groundwater quality and how do mitigation measures ensure zero discharge to water resources?
- What mitigation measures are required to minimize criteria air pollutant emissions from the mine and how will the BLM monitor hazardous air pollutants?
- What mitigation plan is in place for habitat replacement?
- What are the BLM and Nevada Division of Environmental Protection reclamation bonding requirements and how are funds ensured for the completion of reclamation and closure activities?
- How is long-term monitoring and management enforced?
- How are drain-down fluids from the heap and leach pile captured, treated, and controlled, including the fate and transport of cyanide and other constituents, over the closure and post-closure period?

1.7.4 Air Quality and Climate

- How are criteria air pollutant emissions analyzed for each alternative and what are their possible contributions to greenhouse gas emissions?
- How are hazardous air pollutants analyzed? Will the BLM provide a mercury capture plan?
- What monitoring measures will the BLM implement to ensure that emissions comply with state and federal air quality standards?
- What is the expected amount of airborne dust and how is dust controlled to minimize impacts on health, water resources, and wildlife?
- What design and operation measures are in place to minimize air pollutant emissions?

1.7.5 Cultural Resources

- What historic and archaeological artifacts are in the area and how will impacts on these be avoided?

1.7.6 Geology and Minerals

- What is the mineralogy and acid generation/neutralization potential of waste rock, spent ore, and pit walls and how are these sources isolated?
- Are there adequate materials available to neutralize all acid-generating waste rock?

1.7.7 Migratory Birds

- How are migratory routes, migratory bird nesting sites, and raptors affected by land disturbance at the mine?

1.7.8 Soil Resources

- What are the permeabilities, infiltration rates, and thickness estimates for growth material and cover material? How is infiltration of contaminated water avoided?
- What is the land restoration plan? What soil amendments are needed for reclamation and revegetation?

1.7.9 Solid and Hazardous Waste

- How will petroleum-contaminated soil be managed?
- How will accidental releases of hazardous materials be handled?

1.7.10 Special Status Species

- What listed threatened and endangered species and critical habitat is there in the project area? How are impacts on these quantitatively analyzed?
- How is Greater Sage-Grouse habitat affected?

1.7.11 Vegetation

- What plants will be used for revegetation and how long will the BLM monitor revegetation success?

1.7.12 Water Resources

- What are the impacts on surface water and groundwater quality during operations and through post-closure?
- What are the sources of water for the project and what quantity is required? How does groundwater pumping affect water quantity?
- What drainage patterns are there at the mine site and across the project area?
- Are any components of the project in 25-year and 100-year floodplains? What water design requirements are in place for a probable maximum flood?

- What is the potential for contaminating meteoric water? How are treatment facilities for this water designed and controlled?
- How is potential acid-generating rock managed and will the mine require perpetual management due to perpetual water pollution?
- What is the expected water quality of the pit lakes over time? Do any pit lakes abut public land and limit public access?
- Would the pit lake be accessible for public use and recreation activities after closure?
- What wetland and riparian habitats are next to or in the project area? How does the project add to past and present degradation of these resources?
- How is degradation of the recharge source to basin #4-73A avoided to ensure clean and affordable potable water for the Lovelock community? What other possible water rights are affected?
- How is the source of the contamination plume removed to provide space for the new heap leach pad? Is it currently affecting springs in the area?

1.7.13 Wildlife

- What affected riparian areas and springs are on wildlife migratory routes and how are migrations affected?
- How many plant and animal species are estimated to be affected or lost due to land disturbance and waste rock coverage?

1.7.14 Native American Religious Concerns

- How will sacred and spiritual sites and traditional food and medicine gathering locations be affected?

1.7.15 Socioeconomics

- Does the loss of scenic views affect the economic viability of the area and, if so, how?

1.7.16 Rangeland

- Would livestock grazing trailing operations be disrupted directly, indirectly, or cumulatively?

1.7.17 Public Access

- Would there be changes in the way the public is able to access through the project area?

1.7.18 Night Skies

- What are the anticipated impacts on adjacent land and dark skies from portable and permanent lighting proposed for the project, including lights from the existing facilities needed for expanded operations after the mine life of the currently authorized operations?

Chapter 2. Proposed Action and Alternatives

CRI proposes to amend the existing plans of operations and to expand the plan of operation boundary by 7,209 acres (**Figure 1-2**). The total POA 11 boundary acreage, including public and private lands, would be revised, from 4,838 acres to 12,047 acres (3,393 private acres and 8,654 public acres). The project area would include an additional approximately 303 acres for the upgraded power line and Packard Flat Road ROWs for a total project area of 12,350 acres (**Figure 2-1** and **Figure 2-2**).

CRI proposes to disturb 3,105 acres for expanded mining activities (2,748 acres), an upgraded power line (341 acres), and improvements to Packard Flat Road (16 acres; see **Table 2-1** and **Table 2-2**).

Table 2-1
Proposed Disturbance Acres by Mining Activities

Mine Component[1]	Proposed Surface Disturbance (Acres)	
	Private	Public
Exploration	0	-21.8[2]
Roads	1.6	95.2
Rochester Pit	3.1	290.6
Packard Pit	1.4	8.2
Process ponds/Evaporation cells (E-cells)	0	96.5
Heap leach pads	163.7	456.1
Waste rock disposal sites	74.2	404.5
Foundations and buildings	0	0
Growth media stockpiles	10.4	42.9
Borrow areas	0	-29.8[2]
Ancillary miscellaneous areas[3]	124.3	930.8
Sediment and drainage control structures	10.4	79
Total[4]	389.1	2,352.2

Source: CRI 2017a

1 For a breakdown of facilities or structures for each mine component, see Section 2.6 of POA 11 (CRI 2017a) and **Figure 2-1**.

2 Negative values include areas approved under POA 10 that are included under different mine components for POA 11.

3 Ancillary miscellaneous areas include other infrastructure necessary for POA 11.

4 The total of individual elements is less than the 2,748 acres of proposed surface disturbance for mining activities due to rounding and variations in GIS data and conversions.

Table 2-2
POA 11 Improvement Projects and Disturbance Acres

POA 11 Improvement Project	Disturbance Within the POA 11 Boundary (Acres)		Disturbance Outside of POA 11 Boundary (Acres)		Total Disturbance (Acres)	
	Private	Public	Private	Public	Private	Public
Packard Flat Road improvements	0.6	8.9	3.2	3.5	3.8	12.4
NV Energy power line (temporary disturbance)	24.8	8.2	183.3	126	208.1	134.3
NV Energy power line (permanent disturbance)	6.5	0.7	18	16.7	24.5	17.4

Source: CRI 2017a

As shown in **Figure 2-1** and **Figure 2-2**, the Proposed Action under the POA 11 includes the following (see Section 2.6 of POA 11 for a full description of the proposed expansion [CRI 2017a]):

- Disturb up to 3,105 acres for expanded mining activities, an upgraded power line, and Packard Flat Road improvements. Approximately 290 acres of the infrastructure improvements will occur outside the POA 11 boundary.
- Expand the Rochester and Packard Pits, with the bottom of the Rochester Pit extending below the historic groundwater elevation
- Remove the Stage I heap leach pad (HLP) and a portion of the Stage II HLP; spent ore would be relocated to the Stage V HLP
- Relocate solution pipelines and utilities from the Stage III HLP to the existing processing plant
- Expand the South and West rock disposal sites (RDSs), to provide 326 million tons of additional storage capacity, and expand the Packard RDS to add 45 million tons of capacity
- Disposal of PAG waste would be determined by the Waste Rock Management Plan (SRK 2018c). This would require additional PAG waste rock from the Rochester Pit to be placed in dedicated PAG material storage areas; the storage areas include unsaturated portions of the Rochester Pit.
- As outlined in the Waste Rock Management Plan (SRK 2018c), PAG waste would be managed as follows:
  - In-pit storage of PAG waste would be in unsaturated portions of the Rochester Pit and would be encapsulated with 50 feet of non-PAG material, consistent with the encapsulation thickness from POA 10.
  - PAG waste at RDSs would be placed on a 50-foot-thick base, composed of non-PAG waste rock material and at a minimum of 20 internal feet from any final (regraded) dump face. Final regraded slopes of the RDSs, which would encapsulate the PAG, would consist of non-PAG material with a minimum thickness of 20 feet (**Figure 2-4**).
  - Growth media cover would be placed over the non-PAG material used to encapsulate the PAG waste in order to enhance revegetation and reduce infiltration.
- Construct and operate the following:
  - Limerick Canyon Stage VI HLP and the Packard HLP, which would accommodate 300 and 60 million tons, respectively, and application rates would be 13,750 and 5,000 gpm, respectively
  - Stage VI and Packard Merrill-Crowe process facilities
  - Stage VI crushing and screening facility; it would be designed to handle 60,000 tons of ore or run-of-mine material, or both, per day; supporting infrastructure would be built, including the Stage VI HLP conveyor system, truck loadout, and ore stockpile
  - Ancillary facilities associated with Limerick Canyon and Packard Flat operations
- Relocate N-pit crusher to Packard Flat; construct and operate the conveyor system, associated loadout, and ore stockpile
- Construct four new growth media stockpiles
- Construct and maintain stormwater diversions and sediment collection basins to meet the 100-year, 24-hour storm criteria
- Construct and maintain new roads, including new haul roads and new light vehicle access roads, and partially relocate and improve a section of the Packard Flat Road to Pershing County road standards
- Install a new water conveyance pipeline from an existing tank fed by production wells near the Rochester Pit to the Limerick Canyon facilities and install a new production water well to support the Packard Flat operations
- Install a pipeline connection from the Stage IV HLP barren solution distribution pipeline to Stage VI for process solution demands, reduce the draindown in existing HLPs, and improve closure efficiency

- Upgrade the electrical utility system to support the proposed infrastructure at Limerick Canyon and Packard Flat, including an upgraded power line
- Engineer the closure and reclamation of the proposed POA 11 facilities. Some of the facilities and associated components would not be reclaimed including the open pits, main access road to the mine, and public access roads. The contingency ponds (process ponds during operation), closure e-cells, and closure stormwater diversion structures would persist long-term until final closure is completed (**Figure 2-3**)
- Fence off the boundary of the Limerick Canyon and Packard Flat process areas, including HLPs and ponds, with an 8-foot-high chain-link (wildlife) fence and fence the Stage VI HLP with a combination of range and wildlife fencing (**Figure 2-1**).

The Proposed Action would reclaim areas as defined in Section 3 of POA 11, continue to use best management practices (BMPs), adhere to operating plans (see Section 2.9 of POA 11), and implement environmental protection measures (see **Appendix B**).

2.1 Alternatives to the Proposed Action

2.1.1 No Action Alternative

Under the No Action Alternative, the life of the CRI Mine would close in approximately 2023. Reclamation, closure, and mining to access precious metal reserves would continue, based on current authorizations, in previously approved plans of operation and reclamation and closure plans (see Section 2.5 of the POA 11 for more details); existing groundwater pumping rates would continue. Mining would continue to allow up to 2,203.1 acres of authorized disturbance within the existing mine plan boundary of 4,838.0 acres (see **Figure 1-3**).

2.1.2 Alternative 1—Management of PAG material in the West RDS

Under Alternative 1, proposed mining expansion operations and long-term reclamation and closure actions would be the same as those under the Proposed Action. The only change under Alternative 1 is that mined PAG material would be placed at the West RDS only (**Figure 2-4**). In-pit storage and encapsulation of PAG material would be the same as under the Proposed Action.

The Alternative 1 layout would include up to two cells in the West RDS. As under the Proposed Action, PAG material would be placed on a 50-foot-thick base, composed of non-PAG waste rock material and at a minimum of 20 internal feet from any final (regraded) dump face. Final regraded slopes of the West RDS, which would encapsulate the PAG, would consist of non-PAG material with a minimum thickness of 20 feet. Growth media cover would be placed over the non-PAG material used to encapsulate the PAG waste in order to enhance revegetation and reduce infiltration.

2.1.3 Alternative 2—Partial Backfill of Pit Lake (Preferred Alternative)

Under Alternative 2, proposed mining expansion and long-term reclamation and closure actions would be the same as those under the Proposed Action. Management of the Rochester Pit lake differs in Alternative 2. Under Alternative 2, CRI would manage the pit lake projected for the Rochester Pit by placing non-PAG backfill in sub-pits 2 and 3 to 25 feet above the saddle elevation where the pits coalesce (**Figure 2-5**). No backfill would be placed in sub-pit 1. Sub-pit 4 would be backfilled with 25 feet of material, which would be similar to the Proposed Action; however, sub-pit 4 would be amended with lime to raise the acid neutralization potential.

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.2.1 Alternate HLP Locations

CRI and the BLM considered alternative locations for the HLPs; however, based on feasibility studies and restrictions, including topography within the mine plan boundary, they determined that no other locations would have enough capacity to leach ore from the expanded Rochester Pit.

2.2.2 Management of PAG Material in the West RDS with Layering

CRI and BLM considered layering the mined PAG material with non-PAG material in the West RDS as the PAG is produced, rather than waiting until mining is complete to place PAG within the RDS PAG cells, which is indicated under Alternative 1.

CRI determined the material balance could support layering PAG and non-PAG material in the West RDS; however, CRI determined that this would not be feasible from an operational standpoint. It would be difficult to sequence the PAG material and non-PAG material; this is because CRI would need to develop complex ramping systems in the Rochester Pit that would carry a high margin of error in PAG placement. In addition, CRI's current fleet does not include enough haul trucks to support the larger haul distances, and the additional trips would increase the potential for air impacts.

2.2.3 Lime Amendment for Pit Lake

CRI and the BLM considered only lime amendments without partial backfill for sub-pits 2 and 3. CRI considered liming the sub-pits to attenuate water quality impacts. The advantage of liming the sub-pits as they fill is that the chemistry can be managed with periodic lime adjustments made in real time, based on water quality testing. After further consideration and research, Alternative 2, Partial Backfill of the Pit Lake, would cover reactive PAG materials faster, thus reducing PAG material exposure to oxidation and water infiltration, compared with lime amendments only. Finally, liming the open pit lakes would require constant monitoring and addition of materials for several decades. For these reasons, lime amendment only was eliminated as a potential alternative.

CRI would maintain lime amendment of the pit lakes as a mitigation measure, in coordination with the Nevada Department of Environmental Protection (NDEP) and CRI's water pollution control permit (WPCP), if water quality issues arise as the pit lake develops.

2.2.4 Water Infiltration/Rapid Infiltration Basins (RIBs)

CRI and the BLM considered installing a water treatment plant and discharging water to either South American Canyon, Limerick Canyon, or Buena Vista Valley. The clay aquitard in Limerick Canyon did not infiltrate water during the field investigation, so RIBs in Limerick Canyon would not be possible. RIBs at Buena Vista Valley would require ROWs on private lands for the pipeline and would result in additional disturbance. The complexity and risk involved with operating a water treatment plant and RIBs would also increase the risk of water quality issues downstream of the mine. In addition, the water balance for POA 11 was configured with the mine plan so that any dewatering flow could be used in the existing closed-circuit system at the Rochester Mine.

2.2.5 Alternative Power Line Routes

Sacramento Canyon

The BLM and CRI assessed an alternative power line alignment that would go through Sacramento Canyon. They eliminated it due to the complexity of construction through steep and rocky terrain, the need for new roads to be constructed, additional cultural impacts, compared with the proposed route, and the need for taller poles with an increased visual impact.

Limerick Canyon

The BLM and CRI eliminated the Limerick Canyon route from the Oreana Substation along Limerick Canyon Road to the Stage VI HLP, due to the need to obtain new ROWs over multiple private land parcels and greater surface disturbance than the proposed route.

This page intentionally left blank.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

The POA 11 EIS incorporates by reference the regulatory framework from the POA 10 EIS (BLM 2016a). For those resources not analyzed in the POA 10 EIS or where the regulatory framework differs from the POA 10 EIS, the updates are included under the specific resource or topic. **Appendix C** includes impact methodology, including analysis method, impact indicators, and nature and type of effects.

The two action alternatives include an alternate method to manage and store PAG material and one to manage pit lake development and water quality. The action alternatives would not change the surface disturbance footprint from the Proposed Action, nor do they include any additional infrastructure. There are no differences in impacts between the Proposed Action and Alternatives 1 and 2 for the following resources: cultural, Native American religious concerns, rangeland management, lands and realty, social values and economics, soils, transportation, access and public safety, and vegetation. These resources do not include a separate analysis of Alternatives 1 or 2 in the direct, indirect, or cumulative discussions.

Because Alternatives 1 or 2 would result in distinct or different impacts from the Proposed Action on air quality, migratory birds, hazardous and solid wastes and materials, surface water and groundwater quality, geology and minerals, special status species, and wildlife, these resources include separate analyses for the two action alternatives.

CRI and the BLM have developed resource baselines for many of the resources discussed below. The reports are summarized in the resource baseline descriptions and are incorporated by reference. These reports are available on the BLM's project website, https://go.usa.gov/xPdjC.

3.1.1 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 and environmental consequences for each of the supplemental authorities that may be affected and the impacts from the Proposed Action, the No Action Alternative, and two action alternatives.

Those resources that do not occur in the plan boundary and/or the general vicinity and would not be impacted by the Proposed Action or alternatives are not analyzed in detail in this EIS, per 40 CFR 1500.4.

Table 3-1
Supplemental Authorities

Supplemental Authority Element	Not Present	Present/ Not Affected	Present/ May Be Affected	Rationale/Reference Section
Air quality	No	No	Yes	See Section 3.3.
Areas of critical environmental concern	Yes	No	No	This element is not in the project area and is not analyzed.
Cultural resources	No	No	Yes	See Section 3.4.

Supplemental Authority Element	Not Present	Present/ Not Affected	Present/ May Be Affected	Rationale/Reference Section
Environmental justice	Yes	No	No	Minority and low-income populations, as defined in Executive Order 12898, Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations, are not in the project area or vicinity.
Floodplains	Yes	No	No	This element is not in the project area and is not analyzed.
Invasive, nonnative species	No	No	Yes	Addressed in Vegetation (Section 3.16).
Migratory birds	No	No	Yes	See Section 3.5.
Native American religious concerns	No	Yes	No	See Section 3.6.
Prime or unique farmlands	Yes	No	No	This element is not in the project area and is not analyzed.
Threatened and endangered species	Yes	No	No	CRI received a species list for the project area from the United States Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System on March 30, 2017. Only the Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*) was identified with potential habitat in the project area. The project area contains no habitat for the Lahontan cutthroat trout; therefore, threatened and endangered species are not analyzed.
Wastes and materials (hazardous and solid)	No	No	Yes	See Section 3.7.
Water quality (surface water and groundwater)	No	No	Yes	See Section 3.8.
Wetlands and riparian zones	No	No	Yes	Addressed in Vegetation (Section 3.16).
Wild and Scenic Rivers	Yes	No	No	This element is not in the project area and is not analyzed.
Wilderness	Yes	No	No	This element is not in the project area and is not analyzed.

3.1.2 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 affected 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**.

Some of the resources that do not occur in the project area or that would not be affected by the Proposed Action 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	No	No	Yes	See Section 3.9.
Noise	No	Yes	No	Noise would not be affected; noise impacts on special status species are addressed in Section 3.14.
Paleontological resources	No	Yes	No	The POA 11 area primarily consists of areas of very low potential (Class 1) and moderate potential (Class 3). A small area of high potential (Class 4) is located within the POA 11 boundary, but no activities are planned in that area. One fossil locality in a small area of very high potential (Class 5) is located within the POA 11 boundary, but there are no proposed activities in that area. Given the geology and the location of proposed activities, there is little to no likelihood for impacts on known or potential significant vertebrate fossils.
Rangeland management	No	No	Yes	See Section 3.10.
Realty	No	No	Yes	See Section 3.11.
Recreation	No	Yes	No	Recreation would not be affected; therefore, it is not analyzed. Access is addressed separately in Section 3.15.
Social values and economics conditions	No	No	Yes	See Section 3.12.
Soils	No	No	Yes	See Section 3.13.
Special status species	No	No	Yes	See Section 3.14.
Transportation, access, and public safety	No	No	Yes	See Section 3.15.
Vegetation (including invasive nonnative species)	No	No	Yes	See Section 3.16.
Visual resources	No	No	Yes	See Section 3.17.
Water quantity (surface water and groundwater)	No	No	Yes	See Section 3.8.
Lands with wilderness characteristics	Yes	No	No	Based on previous studies, the project area does not contain any lands with wilderness characteristics.
Wildlife	No	No	Yes	See Section 3.18.

Additional Affected Resources	Not Present	Present/Not Affected	Present/May Be Affected	Rationale/Reference Section
Wild horses and burros	No	Yes	No	Based on the results of internal scoping, impacts on wild horses and burros were not identified; therefore, this resource is not analyzed.

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 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 8-foot-high chain-link fence to inhibit access by large wildlife species and livestock. Fencing excludes wild horses, burros, and other potential grazers from the project area.

Noise

Noise sources within the project area boundary are blasting, heavy machinery, and truck and other vehicle traffic. In areas within a 10-mile radius, including most of the Humboldt Range south of Unionville, noises are typical of a less developed landscape. Primary sources are vehicles on US Interstate Highway 80 (I-80) and other secondary roads, occasional aircraft, and natural sounds, such as from animals and wind. A noise modeling report determined that noise levels from predicted construction would not exceed noise limits for residential receptors (Saxelby Acoustics 2018); therefore, noise was not analyzed separately, but is included under Special Status Species (**Section 3.14**).

Recreation

The Winnemucca Resource Management Plan (RMP) identifies large special recreation management areas (SRMAs) that contain several recreation management zones (RMZs) within them. RMZ 5 of the Nightingale SRMA is approximately 25 miles west of the POA 11 area, and the Sonoma Range RMZ of the Winnemucca SRMA is approximately 30 miles northeast of POA 11.

There is only light recreational use in the Humboldt Range, which 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.

3.2 CUMULATIVE EFFECTS

For this EIS, cumulative impacts are the sum of all past, present, and reasonably foreseeable future actions (RFFAs) resulting primarily from mining and mineral exploration, ROW construction and maintenance, commercial activities, public uses, and wildfires. Actions associated with these activities have occurred, are occurring, or are reasonably expected to occur within the geographic range of the cumulative effects analysis.

The purpose of this cumulative analysis is to evaluate the contributions of the Proposed Action, two action alternatives, and the No Action Alternative to the cumulative environment. Cumulative impacts analysis is included in each resource section below.

3.2.1 Temporal Boundary of Evaluation

A temporal boundary is the time frame during which the cumulative impacts are reasonably expected to occur. The temporal parameters for this cumulative effects analysis vary from the anticipated lifespan of the proposed project to more than 300 years, depending on the type of impact. The anticipated lifespan of the project is 10 years beyond the current end for POA 10, which is anticipated in 2023. More specifically, the temporal boundary is a 10-year active mining life, including milling and leaching, and 5 years for reclamation and closure. The time frame over which the cumulative analysis was completed is as follows:

- Cultural resources—length of active mining and ground disturbance, approximately 10 years (through 2033)
- Air quality, general wildlife, raptors, vegetation, soils, rangeland, and visual resources—length of active mining, milling, leaching, and reclamation and closure, approximately 15 years (through 2038)
- Water resources—length of water level recovery, projected to be more than 300 years

3.2.2 Description of Cumulative Effects Study Area (CESA) Boundaries

The geographic area of evaluation, or the cumulative effects study area (CESA), is the spatial boundary within which the cumulative impacts analysis was undertaken. The geographical areas considered for the analysis of cumulative effects vary in size and shape to reflect each evaluated environmental resource and the potential area of impact. The CESA boundaries for the Proposed Action and alternatives are described in **Table 3-3**, below; the CESA boundaries are shown in **Figure 3-1**.

Table 3-3
Cumulative Effect Study Areas by Resource

Resource	CESA Description	CESA Name	Size of CESA (Acres)
Air quality	31-mile radius around the project area	Air CESA	2,588,000
Cultural resources	Direct and indirect areas of potential effect (APEs)	Cultural CESA	49,906
Rangeland	Seven grazing allotments that overlap the project area	Rangeland CESA	760,900
Social values and economics	The surrounding counties of Pershing and Humboldt	Socioeconomic CESA	10,059,500
Traffic and access	Project area and the Limerick Canyon and Coal Canyon Roads west to intersections with I-80	Traffic and Access CESA	N/A
Vegetation, wildlife, migratory birds, soils, and special status species	Biologically significant units from the 2019 Resource Management Plan Amendment modified slightly to include the Packard Flat Road improvements	General Wildlife CESA	201,900
Raptors	10-mile buffer of the project area	Raptor CESA	429,900
Visual resources	Three-mile buffer of the project area to include all key observation points (KOPs)	Visual	103,300
Water resources	Model boundary (based on Piteau Associates 2019a)	Hydrologic CESA	63,900

3.2.3 Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable future actions considered in the cumulative analysis were identified by BLM employees with local knowledge of the area. Additional information was obtained using the following:

- The BLM's LR2000 database report, which records lands and mineral actions, run in May 2019
- Agency records
- Current agency GIS records and analysis

The following past and present actions, which have affected resources in the CESAs to varying degrees, have been identified and are outlined in **Table 3-4** and **Table 3-5**, below.

Table 3-4
Past and Present Projects, Plans, or Actions in Each Cumulative Effects Study Area[1]

Projects, Plans, or Actions	CESAs				
	A	C	G	R	H
Grazing and Agriculture					
Irrigation facilities and water pipelines	5,212 acres	N/A[2]	137 acres	93 acres	2 acres
Fenced feeding operations and pipelines	364 miles, averaging 10 feet wide	9 miles, averaging 10 feet wide	35 miles, averaging 10 feet wide	27 miles, averaging 10 feet wide	53 miles, averaging 10 feet wide
Utilities and Infrastructure					
Roads	276 miles, averaging 40 feet wide	7 miles, averaging 40 feet wide	32 miles, averaging 40 feet wide	63 miles, averaging 40 feet wide	66 miles, averaging 40 feet wide
Railroads	14 miles, 200 feet wide	N/A	N/A	4 miles, 200 feet wide	6 miles, 200 feet wide
Communication sites	272 acres	N/A	5 acres	1 acre	2 acres
Telephone or telephone/telegraph line	182 miles, averaging 20 feet wide	N/A	N/A	9 miles, averaging 20 feet wide	33 miles, averaging 20 feet wide
Transmission line	235 miles, averaging 70 feet wide	10 miles, averaging 25 feet wide	34 miles, averaging 60 feet wide	51 miles, averaging 60 feet wide	66 miles, averaging 40 feet wide
Oil and gas pipelines	40 miles	N/A	N/A	N/A	N/A
Mineral Development and Exploration[3]					
Mining and exploration plans of operation	1,662 acres	N/A	2,214 acres	360 acres	410 acres
Exploration notices	85 acres	5 acres	52 acres	48 acres	46 acres
Sand and gravel extraction	5,292 acres	N/A	245 acres	65 acres	389 acres
Wildland Fires					
1997–2011	476,667 acres	16 acres	41,779 acres	13,303 acres	13,224 acres
Land Development					
Land sales	2,491 acres	N/A	N/A	N/A	N/A
Geothermal Leasing					
Geothermal leases	33,654 acres	N/A	N/A	N/A	40 acres
Geothermal unitization site	170,146 acres	N/A	N/A	N/A	8,938 acres
Geothermal unit disturbance	470 acres	N/A	N/A	N/A	175 acres

[1]CESAs are denoted as follows: A is air, C is cultural, G is general wildlife, R is raptor, and H is hydrologic.
[2]N/A (not applicable) indicates that there is no past or present project, plan, or action in the CESA.
[3]Past and present acres associated with the Coeur Rochester or Packard Mines are not included.

Table 3-5
Reasonably Foreseeable Projects, Plans, or Actions in each Cumulative Effects Study Area[1]

Projects, Plans, or Actions	CESAs					
	A	C	G	R	H	V[2]
Grazing and Agriculture						
Irrigation facilities and water pipelines	11 acres	N/A[3]	11 acres	N/A	N/A	N/A
Utilities and Infrastructure						
Roads	491 acres	40 acres	199 acres	212 acres	225 acres	N/A
Railroads	10 acres	N/A	10 acres	N/A	NA	N/A
Communication sites	5 acres	N/A	N/A	N/A	N/A	N/A
Transmission line	589 acres	N/A	6 acres	6 acres	19 acres	
Other BLM special designation: Lovelock Cave facilities	310 acres	N/A	N/A	N/A	N/A	N/A
Other airport lease	993 acres	N/A	N/A	N/A	N/A	N/A
Mineral Development and Exploration						
Mining and exploration plans of operation	435 acres	N/A	403 acres	N/A	N/A	N/A
Exploration notices	91 acres	6 acres	20 acres	26 acres	17 acres	6
Sand and gravel extraction operations	261 acres	N/A	N/A	78 acres	78 acres	N/A
Land Development						
Land sales	2,956 acres	N/A	N/A	N/A	N/A	N/A
Land withdrawals	96,448 acres	N/A	N/A	577 acres	N/A	N/A
Geothermal Leasing						
Geothermal unitization site	60 acres	N/A	N/A	N/A	N/A	N/A

[1]CESAs are denoted as follows: A is air, C is cultural, G is general wildlife, R is raptor, H is hydrologic, and V is visual.
[2]N/A (not applicable) indicates that there is no past or present project, plan, or action in the CESA.
[3]Past and present acres associated with the Coeur Rochester or Packard Mines are not included.

The following tables outline activities or projects by type and the total disturbance authorized or proposed. There are a number of major or specific actions included in the general data, which have been approved or constructed on federal lands in the CESAs. Project descriptions for these actions are outlined in **Table 3-6**.

Table 3-6
Major Projects, Plans, or Actions in Each Cumulative Effects Study Area

Project	CESAs[1]	Description	Status
Leach Hot Springs Geothermal Unit	A	Geothermal exploration operations, totaling 70 acres of disturbance through the construction of up to 12 well pads, for a maximum of 36 exploration wells, and improvements to existing and construction of new on-lease access roads and other improvements	Authorized in 2011
Coyote Canyon Geothermal Unit	A	Construction and operation of a 70-megawatt, utility-grade power plant, totaling 60 acres of disturbance, including the construction of production and injection wells, pipelines, a 230-kilovolt (kV) gen-tie line, and support facilities	Authorized in 2010

Project	CESAs[1]	Description	Status
Dixie Valley Geothermal Unit	A	A 64-megawatt, double-flash, utility-grade power plant constructed in 1988; total acreage of disturbance is unknown	Constructed in 1988
Dixie Meadows Geothermal Unit	A	Geothermal exploration, totaling 82 acres of disturbance from the drilling of temperature gradient wells, observation wells, and production wells at up to 20 locations	Authorized in 2011
Humboldt House Geothermal Unit	A	Expansion and deepening of a reserve and test pit, totaling 0.81 acres of disturbance	Authorized in 2008
New York Canyon	A, H	Construction and operation of a 70-megawatt, utility-grade, power plant, totaling 175 acres of disturbance, including the construction of production and injection wells, an airstrip and airplane hangar, pipelines, a 26-mile 230-kV gen-tie line, and support facilities	Authorized in 2013
Unionville Wildland Urban Interface	A, R, G	Expansion of two fuel breaks around the town of Unionville. The Northside fuel break is 3.4 miles long and 50 feet wide and occupies 20.6 acres. This fuel break will be expanded to 100 feet wide and will occupy 20.5 acres. The Southside fuel break will be 3.5 miles long and 100 feet wide and will occupy 41.2 acres.	Authorized in 2014
Dune Glen fire	A	Emergency stabilization and rehabilitation after 135 acres burned	Authorized in 2013
Restoration and rehabilitation regarding cheatgrass stand failure	A	Research to determine if cheatgrass stand replacement failure (die-off) represents an opportunity for native restoration of severely invaded areas in the Great Basin, disturbing roughly 6 acres	Authorized in 2012
Florida Canyon Mine	A, G	The proposed South Expansion Project involves the expansion of an open pit and a waste rock storage facility, construction and operation of a heap leach pad and various haul roads and access roads, and closure/reclamation of proposed facilities, totaling approximately 1,288 acres (693 acres of BLM-administered public land and 595 acres of private land owned by Alio Gold).	Authorized in 2014
Relief Canyon Mine	A, G, R, H, V	Proposed disturbance of an additional 395 acres for facilities, including crushing and growth media stockpiles	Pending authorization
Fallon Land Withdrawal	A, Gr, S	Proposed withdrawal of public lands to expand the Fallon Range Training Complex	Pending authorization

[1]CESAs are denoted as follows: A is air, G is general wildlife, R is raptor, H is hydrologic, V is visual, Gr is grazing, and S is socioeconomic.

3.3 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.

3.3.1 Regulatory Framework

This section includes information that has been updated since the POA 10 EIS was published. Federal regulatory considerations, including prevention of significant deterioration, new source performance review, Title V permitting, community right-to-know, and the Greenhouse Gas Reporting Rule, were described in the Coeur Rochester POA 10 EIS (BLM 2016a) and are incorporated here by reference. State regulatory considerations, including the Nevada Mercury Control Program, are also incorporated by reference (BLM 2016a). National and state ambient air quality standards, some of which have been revised since the POA 10 EIS was prepared, are described below.

The federal Clean Air Act (42 USC 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 Environmental Protection Agency (EPA) has set time-averaged standards known as National Ambient Air Quality Standards (NAAQS) for six air pollutants considered to be key indicators of air quality: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), two forms of particulate matter (particulate matter with a diameter less than or equal to 10 microns [PM_{10}] and particulate matter with a diameter less than or equal to 2.5 microns [$PM_{2.5}$]), and lead.

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 and has adopted additional standards for ozone, CO, and SO_2. The State also adopted a standard for hydrogen sulfide, for which there is no national standard (NAC 445B.22097). **Table 3-7** shows the Nevada and national ambient air quality standards.

Table 3-7
State and National Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada Standards	National Standards	
			Primary	Secondary
Ozone	1-hour (in Lake Tahoe Basin)	0.10 ppm	—	—
	8-hour	0.070 ppm	0.070 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	53 ppb	Same as primary
	1-hour	100 ppb	100 ppb	—
SO_2	Annual average	0.030 ppm	—	—
	24-hour	0.14 ppm	—	—
	3-hour	0.5 ppm	—	0.5 ppm
	1-hour	—	75 ppb	—
PM_{10}	24-hour	150 μg/m^3	150 μg/m^3	Same as primary
$PM_{2.5}$	Annual arithmetic mean	12 μg/m^3	12 μg/m^3	15 μg/m^3
	24-hour	35 μg/m^3	35 μg/m^3	Same as primary
Lead particles (total suspended particulate sampler)	Rolling 3-month average	0.15 μg/m^3	0.15 μg/m^3	Same as primary
Hydrogen sulfide	1-hour	0.08 ppm	—	—

Sources: NAC 2018; EPA 2018a
ppb = parts per billion; ppm = parts per million; μg/m^3 = microgram per cubic meter

3.3.2 Affected Environment

Air Quality

Current Air Quality Conditions

The project area is in the center of the Humboldt Range in northwestern Nevada's Pershing County. The mine's elevations range from 4,960 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 Bureau of Air Quality Planning operates and maintains a network of ambient air quality monitors throughout rural Nevada; however, there are no active monitoring stations in the project air basin. The bureau operated a PM_{10} monitoring station in Lovelock from 1992 to 1997, but it recorded no violations of the PM_{10} standard 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 in attainment for all of the NAAQS (EPA 2018b); it is also in attainment with the State of Nevada standards (JBR 2014).

Existing Air Emission Sources

National Emission Inventory

The EPA's National Emission Inventory database contains information about sources that emit criteria air pollutants and hazardous air pollutants (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 2014. **Table 3-8** shows emissions for criteria air pollutants and mercury in Nevada's Pershing County.

Table 3-8
2014 National Emissions Inventory, Pershing County, Nevada

Facility	Emissions by Source Category						
	$PM_{2.5}$ (tons)	PM_{10} (tons)	SO_2 (tons)	NO_x (tons)	CO (tons)	VOC* (tons)	Mercury (pounds)
Fuel combustion	16.54	16.59	10.18	103.22	156.54	25.32	0.07
Industrial/metals processing	242.28	1,807.96	7.03	14.92	16.44	4.67	9.03
Mobile sources	57.06	67.33	2.87	1,897.34	3,443.27	479.90	1.10
Solvent utilization	0	0	0	0	0	69.22	0
Storage and transport	7.33	52.72	19.13	40.92	47.66	90.09	0
Waste disposal and recycling	12.36	14.03	0.71	3.30	66.22	4.61	0.01
Miscellaneous	542.12	3,419.60	1.50	3.39	140.68	111.92	0.17
Total	**877.69**	**5,378.23**	**41.42**	**2,063.09**	**3,870.81**	**785.73**	**10.38**

Source: EPA 2015
*volatile organic compound
Note: Greenhouse gas emissions have been removed from the 2014 National Emissions Inventory data query function.

CRI Mine Facility-Wide Emissions

In an air resources baseline report for the POA 10 EIS, Stantec (2015) developed an emissions inventory for mine operations at the CRI Mine (see **Table 3-9**).

Table 3-9
Coeur Rochester Mine Emissions (No Action)

Source	Emissions (Tons per Year)							
	PM_{10}	$PM_{2.5}$	NOx	VOC	CO	SO_2	CO_{2e}	HAPs
Point sources	226	22	584	48	595	0.44	35,418	0.15
Process operations	59	14	28	2.4	5	3.3	5,270	0.72
Total	**285**	**36**	**612**	**50.4**	**600**	**3.74**	**40,688**	**0.87**

Source: Stantec 2015
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, under the EPA's Toxic Release Inventory Program (Community Right-to-Know Reporting), 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 1.5 pound of fugitive or nonpoint mercury emissions and 2.2 pounds of stack or point mercury emissions in 2017 (EPA 2018c). Under the Nevada Mercury Control Program, CRI reported 3.23 pounds of mercury emitted in 2016 (NDEP 2016a).

Climate

Current Climate Conditions

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 (in the vicinity of Pyramid Lake and Carson Sink) to 5,000 feet. Pershing County is arid, historically receiving only 7 inches of rain, 8 inches of snow, and approximately 38 days of measurable precipitation annually. 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 (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[1]. Wind had no strong tendency toward directionality, with only slight preference for the south/southwest. Wind speeds varied somewhat and tended to be strongest from the southwest and west (Trinity Consultants 2018).

The mean annual precipitation (snow and rain) estimated for the mine is approximately 12.61 inches. The precipitation estimate is based on site data collected from the Rochester Mine Meteorological Station data from 1988 to 2016. The estimated average monthly precipitation ranges between 0.30 and 1.69 inches. Most precipitation falls from November through March, with nearly 2 inches of precipitation during the wettest months. The average monthly temperature ranges between 1 degree Fahrenheit (°F) and 93°F. The warmest months are June, July, and August (CRI 2017a).

[1] Pan evaporation is a measurement that combines or integrates the effects of several climate elements: temperature, humidity, rainfall, drought dispersion, solar radiation, and wind.

Climate Change

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

Greenhouse gases (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 human-made processes.

The EPA estimated that national GHG emissions in 2017 (the most recent year for which national data have been tabulated) were 6,456 million metric tons of CO_{2e}. The agency categorized the major economic sectors contributing to US emissions of GHGs in 2017 as follows (EPA 2019):

- Transportation—29 percent
- Electricity—28 percent
- Industry—22 percent
- Commercial and Residential—12 percent
- Agriculture—9 percent

The NDEP estimated Nevada's statewide GHG emissions in 2013 (the most recent year for which state data has been tabulated) at 44 million metric tons of CO_{2e} (NDEP 2016b). The major sectors contributing to Nevada's GHG emissions in 2013 were as follows (NDEP 2016b):

- Electricity generation—34 percent
- Transportation—33 percent
- Residential, commercial, and industrial—16 percent
- Industrial processes—8 percent
- Waste management—4 percent
- Agriculture—3 percent
- Fossil fuel industry—2 percent

3.3.3 Environmental Consequences

The Proposed Action and action alternatives would increase the atmospheric emissions of pollutants regulated by federal and state laws and regulations. The potential impacts on air quality from these actions are described below.

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, the CRI Mine would continue to operate under current conditions, which are regulated by two State of Nevada air quality permits: Class II Air Quality Operating Permit No. AP1044-0063.04 and the Phase II Mercury Operating Permit to Construct No. AP1044-2242. These permits stipulate specific operating conditions, including emissions limits and routine monitoring requirements, to ensure the mine remains in compliance with federal and state air quality regulations. The operating permit also includes surface area disturbance conditions that require CRI to follow its approved dust control plan and NAC 445B.22037 related to fugitive dust (NDEP BAPC 2018).

Air emissions from existing mine operations, estimated in **Table 3-9**, are not expected to increase over current levels, and no new direct and indirect impacts on ambient air quality would occur. The permitted emissions associated with the No Action Alternative were modeled for compliance with the NAAQS as a component of the state air quality permitting process. This process determined that the facility, as presently operated, would not produce ambient pollutant concentrations that exceed the NAAQS (NDEP BAPC 2018).

In addition, the BLM's (2016) air dispersion modeling, performed in support of the POA 10 EIS, indicated that CRI Mine operations under POA 10 (which is representative of No Action Alternative conditions) would not produce ambient pollutant concentrations that exceed the NAAQS. Modeled concentrations of pollutants under POA 10 were shown in Tables 4-2 through 4-6 of the POA 10 Final EIS (BLM 2016a) and are incorporated here by reference. The highest modeled scenario, which is an overestimate of No Action Alternative pollutant concentrations because it included construction that has already been completed (BLM 2016a, Table 4-3, Stage III Operation, Stage V Construction, and Topsoil Removal/Piling), would have the following pollutant concentrations:

- $PM_{2.5}$ (24-hour): 28.54 µg/m^3 (82 percent of NAAQS/NV AAQS)
- $PM_{2.5}$ (Annual): 7.45 µg/m^3 (62 percent of NAAQS/NV AAQS)
- PM_{10} (24-hour): 111.47 µg/m^3 (74 percent of NAAQS/NV AAQS)
- SO_2 (1-hour): 36.97 µg/m^3 (19 percent of NAAQS/NV AAQS)
- SO_2 (3-hour): 21.47 µg/m^3 (9 percent of NAAQS/NV AAQS)
- NO_2 (1-hour): 184.22 µg/m^3 (98 percent of NAAQS/NV AAQS)
- NO_2 (Annual): 17.60 µg/m^3 (18 percent of NAAQS/NV AAQS)
- CO (1-hour): 1,622.69 µg/m^3 (4 percent of NAAQS/NV AAQS)
- CO (8-hour): 841.98 µg/m^3 (8 percent of NAAQS/NV AAQS)

Residual Impacts

No residual impacts are expected to occur because all atmospheric emissions would cease once mine operations end and reclamation occurs.

Proposed Action

Table 3-10 shows the criteria pollutant, HAP, and GHG emissions under the Proposed Action in tons per year. Detailed emissions and calculations associated with all operations are available in Appendix B of the technical support document (Trinity Consultants 2018).

Table 3-10
Proposed Action Aggregated Emissions (Tons per Year)

Emission Source	PM_{10}	$PM_{2.5}$	NOx	VOC	CO	SO_2	CO_{2e}	HAPs
Construction[1]	301	33	32	2.4	19	0.02	2,851	0.07
Point sources[2]	63	14	28	2	5	3	5,270	0.15
Process operations[3]	116	11	672	55	647	0.46	39,706	0.83
Total	**481**	**58**	**732**	**60**	**671**	**3.8**	**47,827**	**1.05**

Source: Trinity Consultants 2018
[1]Construction related to the Proposed Action only
[2]Total emissions from existing and proposed point source operations
[3]Total emissions from existing and proposed process operations

As shown in **Table 3-10**, the facility-wide HAP emissions are estimated to be 1.05 tons per year. There are no ambient air quality standards for HAPs, except lead; rather, HAPs are regulated at the source. EPA thresholds for any single HAP or all HAPs combined are 10 and 25 tons per year. POA 11 emissions of 1.05 tons for all HAPs combined would not rise to the level of significance and are not analyzed further. Mercury emissions would continue to be subject to Phase II Mercury Operating Permit to Construct No. AP1044-2242.

The modeled air pollutant concentrations under five operational scenarios are presented below. For all scenarios, the highest impacts occurred at the project area boundary and attenuated with distance. Based on the air dispersion modeling, pollutant concentrations would be below the NAAQS and NV AAQS for all criteria pollutants and all time-averaging periods;[2] thus, construction and implementation of POA 11 would be in compliance with the NAAQS and NV AAQS.

The results of the AERMOD dispersion modeling for the Proposed Action of POA 11 are presented in **Table 3-11** through **Table 3-15**. These tables, reflecting various phases of the Proposed Action, show the highest modeled results at any point of public access for all pollutant averaging time combinations (based on the design value), the background concentration for the pollutant, and the lowest applicable NAAQS and NV AAQS for each of the pollutant averaging time combinations. The emissions from two large emergency generators (**Table 3-15**) were modeled separately from the rest of the mine operations because these sources are only operated when power to the rest of the mine has been interrupted and the generators are needed to power essential equipment, such as keeping water moving to prevent spills from ponds. Because other emission-generating sources cease in emergency situations, emissions from emergency generators are not included in the estimates of total impacts. Emergency generators are permitted by the Nevada Bureau of Air Pollution Control (NBAPC) and subject to maximum limits on operating hours and annual emissions.

<u>PM_{10} and $PM_{2.5}$ Emissions and Modeled Concentrations</u>

PM_{10} and $PM_{2.5}$ emissions are generated by almost all on-site emissions sources. The major sources are construction emissions from the access road and interior road network, Stage IV HLP expansion and Packard HLP construction, and from excavated borrow areas, stockpile areas, and yards. Such emission controls as water sprays, bag houses, and cartridge filters help minimize emissions from the material process equipment (crushers, screens, and conveyors); surface watering and chemical treatments help minimize emissions from unpaved roads, windblown dust, and material transportation.

Emissions of PM_{10} and $PM_{2.5}$ associated with POA 11 from the sources described above are inherent to the mining process and would be ongoing throughout the life of the Proposed Action. The direct impact on air quality from these emissions is predicted by the maximum modeled ambient pollutant concentration. For PM_{10}, the maximum concentration would occur from the construction of new Stage VI and Packard HLPs, new crushing and conveying facilities, associated yards, borrows, road expansions, and other disturbance areas (**Table 3-11**).

At any point of public access under these activities, the maximum predicted PM_{10} impact from POA 11 is 55.16 $\mu g/m^3$ for the 24-hour averaging period, which would occur during construction (**Table 3-11**). For $PM_{2.5}$, the maximum predicted impact from POA 11 for the 24-hour averaging period is 12.27 $\mu g/m^3$, which would occur during mine operation, using the new Packard Pit and the new Packard HLPs and trucking waste rock to the Packard RDS (**Table 3-14**).

The maximum annual arithmetic average $PM_{2.5}$ concentrations at any point of public access, 5.22 $\mu g/m^3$, would occur under three scenarios: construction of the facilities (**Table 3-11**), trucking waste rock to the West RDS (**Table 3-12**), and trucking waste rock to the South RDS (**Table 3-13**). The maximum modeled ambient air concentrations for both PM_{10} and $PM_{2.5}$ show levels below the NAAQS and NV AAQS.

The indirect impact of particulate emissions is dust deposited on vegetation, which would lower its productivity.

[2] Because modeling was performed only for criteria pollutants (and averaging times) with NAAQS, no comparison can be made with the 24-hour and annual SO_2 NV AAQS.

Table 3-11
Construction of Stage VI and Packard Heap Leach Pads, New Crushing and Conveying Facilities, Associated Yards, Borrows, Road Expansions, and Other Disturbance Areas

Pollutant	Ave. Period	NAAQS (µg/m³)	NV AAQS (µg/m³)	Model Results (µg/m³)	NDEP Back-ground (µg/m³)	Rep. Back-ground (µg/m³)	Total Modeled + NDEP Back-ground	Total Modeled + Rep. Back-ground	% NAAQS Using NDEP Back-ground	% NAAQS Using Rep. Back-ground	% NV AAQS Using NDEP Back-ground	% NV AAQS Using Rep. Back-ground
$PM_{2.5}$[a,f]	24-hr	35	35	3.92	7	8	10.92	11.92	31.19	34.06	34.06	34.06
$PM_{2.5}$[d,f]	Annual	12	12	2.82	2.4	2.3	5.22	5.12	43.50	42.67	42.67	42.67
PM_{10}[b,f]	24-hr	150	150	44.96	10.2	10.2	33.87	33.87	36.77	36.77	36.77	36.77
SO_2[c]	1-hr	196	196	0.07	0	6	117.33	123.33	0.04	3.10	3.10	3.10
SO_2[d]	3-hr	238	1,300	0.07	0	6.3	122.43	128.73	0.03	0.49	38.94	0.49
NO_2[a,e]	1-hr	188	188	64.10	0	9.1	151.28	160.38	34.10	38.94	7.27	38.94
NO_2[d, e]	Annual	100	100	5.17	0	2.1	8.38	10.48	5.17	7.27	4.97	7.27
CO[d]	1-hr	40,000	40,500	66.88	0	1,947	183.69	2,130.69	0.17	5.03	7.47	4.97
CO[d]	8-hr	10,000	10,500	40.19	0	744	67.43	811.43	0.40	7.84	38.94	7.47

Source: Trinity Consultants 2018 for NDEP-recommended background concentrations and comparisons with NAAQS; EMPSi staff analysis for representative background concentrations and comparison with NV AAQS; selected representative background concentrations obtained from BLM 2018a, Table 3.7-3

[a] 8th high value averaged over modeled period (with plume depletion for particulates)
[b] Highest 3rd high over 2 years modeled (with plume depletion)
[c] 4th high value averaged over 2 years modeled
[d] Highest 1st high averaged over 2 years modeled for $PM_{2.5}$
[e] Using ozone limiting method
[f] Deposition from CRI sources only

Table 3-12
Operation of the Mine Using the New Stage VI Heap Leach with Trucking of Waste Rock to the West RDS

Pollutant	Ave. Period	NAAQS (µg/m³)	NV AAQS (µg/m³)	Model Results (µg/m³)	NDEP Back-ground (µg/m³)	Rep. Back-ground (µg/m³)	Total Modeled + NDEP Back-ground	Total Modeled + Rep. Back-ground	% NAAQS Using NDEP Back-ground	% NAAQS Using Rep. Back-ground	% NV AAQS Using NDEP Back-ground	% NV AAQS Using Rep. Back-ground
$PM_{2.5}$[a,f]	24-hr	35	35	3.19	7	8	10.19	11.19	29.11	31.97	29.11	31.97
$PM_{2.5}$[d,f]	Annual	12	12	2.82	2.4	2.3	5.22	5.12	43.50	42.67	43.50	42.67
PM_{10}[b,f]	24-hr	150	150	24.06	10.2	10.2	34.26	34.26	22.84	22.84	22.84	22.84
SO_2[c]	1-hr	196	196	117.33	0	6	117.33	123.33	59.86	62.92	59.86	62.92
SO_2[d]	3-hr	238	1,300	122.43	0	6.3	122.43	128.73	9.42	9.90	9.42	9.90
NO_2[a,e]	1-hr	188	188	151.3	0	9.1	151.3	160.4	80.48	85.32	80.48	85.32
NO_2[d, e]	Annual	100	100	8.68	0	2.1	8.68	10.78	8.68	10.78	8.68	10.78
CO[d]	1-hr	40,000	40,500	176.56	0	1,947	176.56	2,123.56	0.44	5.31	0.44	5.24
CO[d]	8-hr	10,000	10,500	74.15	0	744	74.15	818.15	0.74	8.18	0.71	7.79

Source: Trinity Consultants 2018 for NDEP-recommended background concentrations and comparisons with NAAQS; EMPSi staff analysis for representative background concentrations and comparison with NV AAQS; selected representative background concentrations obtained from BLM 2018a, Table 3.7-3

[a] 8th high value averaged over modeled period (with plume depletion for particulates)
[b] Highest 3rd high over 2 years modeled (with plume depletion)
[c] 4th high value averaged over 2 years modeled
[d] Highest 1st high averaged over 2 years modeled for $PM_{2.5}$
[e] Using ozone limiting method
[f] Deposition from CRI sources only

Table 3-13
Operation of the Mine Using the New Stage VI Heap Leach with Trucking of Waste Rock to the South RDS

Pollutant	Ave. Period	NAAQS (μg/m³)	NV AAQS (μg/m³)	Model Results (μg/m³)	NDEP Back-ground (μg/m³)	Rep. Back-ground (μg/m³)	Total Modeled + NDEP Back-ground	Total Modeled + Rep. Back-ground	% NAAQS Using NDEP Back-ground	% NAAQS Using Rep. Back-ground	% NV AAQS Using NDEP Back-ground	% NV AAQS Using Rep. Back-ground
$PM_{2.5}$[a,f]	24-hr	35	35	3.12	7	8	10.12	11.12	28.91	31.77	28.91	31.77
$PM_{2.5}$[d,f]	Annual	12	12	2.82	2.4	2.3	5.22	5.12	43.50	42.67	43.50	42.67
PM_{10}[b,f]	24-hr	150	150	23.67	10.2	10.2	33.87	33.87	22.58	22.58	22.58	22.58
SO_2[c]	1-hr	196	196	117.33	0	6	117.33	123.33	59.86	62.92	59.86	62.92
SO_2[d]	3-hr	238	1,300	122.43	0	6.3	122.43	128.73	9.42	9.90	9.42	9.90
NO_2[a,e]	1-hr	188	188	151.28	0	9.1	151.28	160.38	80.47	85.31	80.47	85.31
NO_2[d, e]	Annual	100	100	8.38	0	2.1	8.38	10.48	8.38	10.48	8.38	10.48
CO[d]	1-hr	40,000	40,500	183.69	0	1,947	183.69	2,130.69	0.46	5.33	0.45	5.26
CO[d]	8-hr	10,000	10,500	67.43	0	744	67.43	811.43	0.67	8.11	0.64	7.73

Source: Trinity Consultants 2018 for NDEP-recommended background concentrations and comparisons to NAAQS; EMPSi staff analysis for representative background concentrations and comparison to NV AAQS; selected representative background concentrations obtained from BLM 2018a, Table 3.7-3

[a] 8th high value averaged over modeled period (with plume depletion for particulates)

[b] Highest 3rd high over 2 years modeled (with plume depletion)

[c] 4th high value averaged over 2 years modeled

[d] Highest 1st high averaged over 2 years modeled for $PM_{2.5}$

[e] Using ozone limiting method

[f] Deposition from CRI sources only

Table 3-14
Operation of the Mine Using the New Packard Pit and the New Packard Heap Leach with Trucking of Waste Rock to the Packard RDS

Pollutant	Ave. Period	NAAQS (µg/m³)	NV AAQS (µg/m³)	Model Results (µg/m³)	NDEP Back-ground (µg/m³)	Rep. Back-ground (µg/m³)	Total Modeled + NDEP Back-ground	Total Modeled + Rep. Back-ground	% NAAQS Using NDEP Back-ground	% NAAQS Using Rep. Back-ground	% NV AAQS Using NDEP Back-ground	% NV AAQS Using Rep. Back-ground
$PM_{2.5}$[a,f]	24-hr	35	35	5.27	7	8	12.27	13.27	35.06	37.91	35.06	37.91
$PM_{2.5}$[d,f]	Annual	12	12	2.52	2.4	2.3	4.92	4.82	41.00	40.17	41.00	40.17
PM_{10}[b,f]	24-hr	150	150	30.41	10.2	10.2	40.61	40.61	27.07	27.07	27.07	27.07
SO_2[c]	1-hr	196	196	117.3	0	6	117.3	123.3	59.85	62.91	59.85	62.91
SO_2[d]	3-hr	238	1,300	122.39	0	6.3	122.39	128.69	9.41	9.90	9.41	9.90
NO_2[a,e]	1-hr	188	188	130.87	0	9.1	130.87	139.97	69.61	74.45	69.61	74.45
NO_2[d, e]	Annual	100	100	9.34	0	2.1	9.34	11.44	9.34	11.44	9.34	11.44
CO[d]	1-hr	40,000	40,500	458.97	0	1,947	458.97	2,405.97	1.15	6.01	1.13	5.94
CO[d]	8-hr	10,000	10,500	201.07	0	744	201.07	945.07	2.01	9.45	1.91	9.00

Source: Trinity Consultants 2018 for NDEP-recommended background concentrations and comparisons with NAAQS; EMPSi staff analysis for representative background concentrations and comparison with NV AAQS; selected representative background concentrations obtained from BLM 2018a, Table 3.7-3

[a] 8th high value averaged over modeled period
[b] Highest 3rd high over 2 years modeled
[c] Annual $PM_{2.5}$ includes plume depletion
[d] Highest 1st high averaged over 2 years modeled for $PM_{2.5}$

Table 3-15
Emergency Generators

Pollutant	Ave. Period	NAAQS (µg/m³)	NV AAQS (µg/m³)	Model Results (µg/m³)	NDEP Back-ground (µg/m³)	Rep. Back-ground (µg/m³)	Total Modeled + NDEP Back-ground	Total Modeled + Rep. Back-ground	% NAAQS Using NDEP Back-ground	% NAAQS Using Rep. Back-ground	% NV AAQS Using NDEP Back-ground	% NV AAQS Using Rep. Back-ground
$PM_{2.5}$[a,f]	24-hr	35	35	0.91	7	8	7.91	8.91	22.60	25.46	22.60	25.46
$PM_{2.5}$[d,f]	Annual	12	12	2.53	2.4	2.3	4.93	4.83	41.08	40.25	41.08	40.25
PM_{10}[b,f]	24-hr	150	150	1.52	10.2	10.2	11.72	11.72	7.81	7.81	7.81	7.81
SO_2[c]	1-hr	196	196	117.3	0	6	117.3	123.3	59.85	62.91	59.85	62.91
SO_2[d]	3-hr	238	1,300	122.39	0	6.3	122.39	128.69	9.41	9.90	9.41	9.90
NO_2[a,e]	1-hr	188	188	130.87	0	9.1	130.87	139.97	69.61	74.45	69.61	74.45
NO_2[d, e]	Annual	100	100	4.89	0	2.1	4.89	6.99	4.89	6.99	4.89	6.99
CO[d]	1-hr	40,000	40,500	69.85	0	1,947	69.85	2,016.85	0.17	5.04	0.17	4.98
CO[d]	8-hr	10,000	10,500	23.19	0	744	23.19	767.19	0.23	7.67	0.22	7.31

Source: Trinity Consultants 2018 for NDEP-recommended background concentrations and comparisons with NAAQS; EMPSi staff analysis for representative background concentrations and comparison with NV AAQS; selected representative background concentrations obtained from BLM 2018a, Table 3.7-3

[a] 8th high value averaged over modeled period (with plume depletion for particulates)
[b] Highest 3rd high over 2 years modeled (with plume depletion)
[c] 4th high value averaged over 2 years modeled
[d] Highest 1st high averaged over 2 years modeled for $PM_{2.5}$
[e] Using ozone limiting method

Gaseous Pollutant Emissions and Modeled Concentrations

Combustion of fuel in machinery can produce elevated ambient levels of CO, NO_2, and SO_2. Examples are diesel fuel combustion from ore and waste rock haul trucks and from mobile equipment, such as loaders and dozers; blasting combustion; propane combustion in processing units, such as furnaces; and fuel oil or diesel combustion in units, such as the generators. PM_{10} and $PM_{2.5}$ are also a byproduct of combustion, but the associated emission levels are much less than those associated with directly emitted sources from mining and material handling.

The direct impact on air quality from fuel combustion is represented by the maximum modeled concentrations of the gaseous pollutants CO, NO_2, and SO_2.

For CO, the maximum concentration would occur from mine operation using the new Packard Pit and the new Packard HLP and trucking waste rock to the Packard RDS (**Table 3-14**). At any point of public access under this scenario, the maximum predicted CO impact from POA 11 is 458.97 $\mu g/m^3$ for the 1-hour averaging period and 201.07 $\mu g/m^3$ for the 8-hour averaging period using the NDEP-recommended background concentration of zero and 2,405.97 $\mu g/m^3$ for the 1-hour averaging period and 945.07 $\mu g/m^3$ for the 8-hour averaging period using the representative background concentrations of 1,947 $\mu g/m^3$ and 744 $\mu g/m^3$, respectively.

For NO_2, the maximum concentration for the 1-hour averaging period would occur from mine operation using the new Stage VI Heap Leach and trucking waste rock to the West RDS (**Table 3-12**) or the South RDS (**Table 3-13**), while the maximum concentration for the annual averaging period would occur using the new Packard Pit and the new Packard HLP and trucking waste rock to the Packard RDS (**Table 3-14**). At any point of public access under this scenario, the maximum predicted NO_2 impact from POA 11 is 151.30 $\mu g/m^3$ for the 1-hour averaging period and 9.34 $\mu g/m^3$ for the annual averaging period using the NDEP-recommended background concentration of zero and 160.4 $\mu g/m^3$ for the 1-hour averaging period and 11.44 $\mu g/m^3$ for the annual averaging period using the representative background concentrations of 9.1 $\mu g/m^3$ and 2.1 $\mu g/m^3$, respectively.

For SO_2, the maximum concentration would be similar under all scenarios, except construction. At any point of public access under these scenarios, the maximum predicted SO_2 impact from POA 11 is 117.33 $\mu g/m^3$ for the 1-hour averaging period and 122.43 $\mu g/m^3$ for the 3-hour averaging period using the NDEP-recommended background concentration of zero. The maximum predicted SO_2 impact from POA 11 is 123.33 $\mu g/m^3$ for the 1-hour averaging period and 128.73 $\mu g/m^3$ for the 3-hour averaging period using the representative background concentrations of 6 $\mu g/m^3$ and 6.3 $\mu g/m^3$, respectively.

The modeled combustion emissions for the Proposed Action predict CO, NO_2, and SO_2 concentrations below the NAAQS and NV AAQS; as a result, the direct impacts from the Proposed Action would not exceed the NAAQS or NV AAQS for any gaseous pollutant. Indirect impacts associated with fuel combustion are from the production of GHG emissions. These impacts are detailed below under *Climate Change Effects.*

Summary

The CRI Mine under POA 11 operating conditions would result in air pollutant concentrations below the NAAQS and NV AAQS for all criteria pollutants and all-time averaging periods; thus, the Proposed Action would not result in impacts on air quality that exceed the NAAQS or NV AAQS.

Emissions from the CRI Mine under POA 11 operating conditions would be minimized. This would be the result of compliance with the terms and conditions of the air quality permits described under the No Action Alternative (as amended to incorporate changes in mine operations based on POA 11) and environmental protection measures outlined in POA 11 (CRI 2017a). These measures are using dust abatement on unpaved and non-vegetated surfaces, regularly maintaining equipment to ensure engines meet the manufacturer guidelines, adhering to posted speed limits, seeding disturbed areas, and using water sprays and other controls at the crusher and conveyor drop points to control fugitive dust.

Residual Impacts

No residual impacts are expected to occur because all atmospheric emissions would cease once mine operations end and reclamation occurs.

Alternative 1—Management of PAG material in West RDS

Emissions from POA 11 operations under Alternative 1 would be similar to those described for the Proposed Action (see **Table 3-10**). This is because proposed mining expansion and long-term reclamation and closure actions would be similar. Alternative 1 differs from the Proposed Action in that CRI would place mined PAG material at the West RDS only, instead of in the West and South RDSs. The level of activity from emission-generating sources would be within the bounds of the modeled operational scenario in **Table 3-8**, which showed modeled pollutant concentrations well below the NAAQS and NV AAQS for all pollutants; thus, Alternative 1 would not result in impacts on air quality that exceed the NAAQS or NV AAQS.

Alternative 2—Partial Backfill of Pit Lake

Emissions from POA 11 operations under Alternative 2 would be similar to those described for the Proposed Action (see **Table 3-10**). This is because proposed mining expansion and long-term reclamation and closure actions would be similar. Alternative 2 differs from the Proposed Action in that CRI would manage the pit lake projected for the Rochester Pit by placing some non-PAG backfill in sub-pits 2 and 3 instead of in the West and South RDSs. Placing more non-PAG material at the Rochester Pit may reduce pollutant concentrations slightly at the project boundary. This is because the Rochester Pit is farther from the boundary than both the West and South RDSs. Because modeled pollutant concentrations are well below the NAAQS and NV AAQS for all pollutants in the modeled West and South RDS scenarios (**Table 3-12** and **Table 3-13**), Alternative 2 would not result in impacts on air quality that exceed the NAAQS or NV AAQS.

Climate Change Effects

Publications in the scientific literature indicate there is a direct correlation between climate change and emissions of GHGs. This was most recently documented by the Intergovernmental Panel on Climate Change in its Fifth Assessment Report (2014).

GHGs include CO_2, methane, nitrogen oxides, and ozone. They also include water vapor, which is generally not considered in GHG calculations, although it is a dominant GHG. Many of these gases occur naturally in the atmosphere; however, human-made sources have substantially increased the emissions of GHGs. Of these, the greatest contribution is from CO_2 emissions. CO_{2e} is the equivalent of CO_2, which has the same global warming impact as the combined emissions of various GHGs.

The combined GHG emissions from the No Action Alternative would be 40,688 tons per year of GHGs, as measured in CO_{2e}. CO_{2e} emissions from the proposed project would increase the US CO_{2e} emissions by 0.00062 percent and Nevada CO_{2e} emissions by 0.09 percent.[3] At both the state and national scale, this would be a negligible impact.

[3] The EPA estimated that national GHG emissions in 2017 (the most recent year for which national data has been tabulated) were 6,547 million metric tons of CO_{2e} (EPA 2019). The NDEP estimated Nevada's statewide GHG emissions in 2013 (the most recent year for which state data has been tabulated) at 44 million metric tons of CO_{2e} (NDEP 2016b).

The combined GHG emissions from the Proposed Action, Alternative 1, and Alternative 2 would be 47,827 tons per year of GHGs, as measured in CO_{2e}. CO_{2e} emissions from the proposed project would increase the US CO_{2e} emissions by 0.0007 percent and Nevada CO_{2e} emissions by 0.11 percent. At both the state and national scale, this would be a negligible impact.

Cumulative Impacts

The CESA for air and atmospheric resources is the air quality CESA, which includes a 31-mile radius around the project area and consists of approximately 2,588,000 acres.

Past and Present Actions

Before the federal Clean Air Act, few if any measures to control or minimize impacts on air quality were required. Most mining operations were of smaller scale and consisted of underground operations with small disturbance footprints. Most air quality impacts from these operations were from fugitive dust generated during exploration, road building, trenching, mining, and travel on dirt roads. Historical wildland fires (1997 to 2011) have burned approximately 476,667 acres in the air quality CESA, or approximately 18.4 percent (**Table 3-4**).

Present actions in the air quality CESA likely to be contributing to air quality impacts are grazing and agriculture, utilities and infrastructure, land development, geothermal leasing, and mineral development and exploration (see **Table 3-4**). While these actions principally contribute point source particulate matter emissions and fugitive dust, there are also combustion emissions.

Approved mineral exploration and mining notices and plans of operations and mineral material disposal sites total approximately 7,039 acres of surface disturbance; this is approximately 0.3 percent of the air quality CESA. Land development permits and geothermal leases cover approximately 36,615 acres, which is approximately 1.4 percent of the CESA (see **Table 3-4**).

The two closest permitted mines are in the air quality CESA and are regulated under NBAPC operating permits. As outlined in Permit No. AP1041-2441, the stationary emission sources of the Pershing Gold Corporation Relief Canyon mine are as follows: waste rock and wet and dry ore material transfers, ore crushing and stockpiling, gold precipitation circuits, a propane boiler, milling, and baghouses. As outlined in Permit No. AP1499-0279.02, the stationary emission sources of the EP Minerals Colado Plant diatomaceous earth and perlite mine are as follows: crushing, material transfers, material classification and drying, bulk loading and packaging, baghouses, material sizing and blending, wood chipping, pallet cleaning, and fuel storage.

<u>*Reasonably Foreseeable Future Actions*</u>

RFFAs in the air quality CESA that may contribute to impacts on air quality are grazing and agriculture, utilities and infrastructure, land development, geothermal leasing, and mineral development and exploration (see **Table 3-5**).

Air quality impacts from these actions are from generation of fugitive dust and point source particulate matter emissions; products of combustion are also emitted from these activities. During hard rock mining and exploration, for example, emissions may be generated from processing facilities and fossil fuel burning by heavy equipment and other vehicles. Some of these emissions would be localized and subject to NBAPC air quality permits and compliance, development of mitigation measures, and implementation of operational performance standards. Others would be more long term and basin wide and would not be subject to NBAPC permitting.

Cumulative Impacts from the No Action Alternative

Under the No Action Alternative, the existing and authorized CRI Mine would continue to operate under current operational conditions. Current mine operations are regulated by two State of Nevada air quality permits, Class II Air Quality Operating Permit No. AP1044-0063 and the Phase II Mercury Operating Permit to Construct No. AP1044-2242. Direct and indirect impacts on the ambient air quality would not increase over current levels.

The BLM modeled cumulative air dispersion in support of the POA 10 EIS (BLM 2016a). Cumulatively modeled concentrations of pollutants under POA 10 in combination with the Relief Canyon Mine and EP Minerals Colado Plant were shown in Tables 5-6 through 5-10 of the Final EIS (BLM 2016a); they are incorporated here by reference. The highest modeled scenario (BLM 2016a, Table 5-7, Stage III Operation, Stage V Construction, and Topsoil Removal/Piling) showed modeled pollutant concentrations from the combined POA 10, Relief Canyon Mine, and EP Minerals Colado Plant emissions were the same as the modeled pollutant concentrations from the POA 10 project only.

Modeling of cumulative emissions sources indicated that CRI Mine operations under POA 10 (which is representative of current operations), in combination with operations at the Relief Canyon Mine and EP Minerals Colado Plant, would not produce ambient pollutant concentrations that exceed the NAAQS (BLM 2016a) or NV AAQS. As such, the No Action Alternative's contribution to the cumulative air quality environment would not result in cumulative impacts that would exceed the NAAQS (BLM 2016a) or the NV AAQS for modeled pollutants.

Cumulative Impacts from the Proposed Action

Each of the identified individual projects in the air quality CESA, including existing and proposed mining operations, emit air pollutants. The existing and proposed mining operations are the major sources of quantifiable criteria pollutants in the CESA. Criteria pollutant emissions from the Relief Canyon Mine and EP Minerals Colado Plant were included in the cumulative modeling scenario to demonstrate their cumulative impact on air quality from proposed CRI Mine operations.

Cumulatively modeled pollutant concentrations from the combined POA 11, Relief Canyon Mine, and EP Minerals Colado Plant emissions were the same as the modeled pollutant concentrations from the POA 11 project only. This is because the Relief Canyon Mine and EP Minerals Colado Plant emissions were of a magnitude and too far away to be significant to two decimal places. Therefore, the cumulative impacts on air quality from proposed CRI Mine operations would be the same as the direct impacts shown in **Table 3-11** through **Table 3-15**.

The Proposed Action's contribution to the cumulative air quality environment would not result in cumulative impacts that would exceed the NAAQS or NV AAQS for modeled pollutants. The RFFAs detailed in **Table 3-5** and **Table 3-6** would result in additional emissions, similar to those emitted by existing operations in the air quality CESA. In addition, the major sources of pollutants in the CESA would operate under permit conditions established by the NBAPC. Cumulative modeling indicated concentration values that were not greater than those modeled for direct impacts. Detailed emissions and calculations associated with the cumulative quantitative analysis are available in the technical support document detailing the results of dispersion modeling (Trinity Consultants 2018).

Cumulative Impacts from Alternatives 1 and 2

Under Alternatives 1 and 2, emissions from POA 11 operations would be similar to those described for the Proposed Action. This is because proposed mining expansion and long-term reclamation and closure actions would be similar. Because the level of activity from emission-generating sources under Alternatives 1 and 2 would be similar under the Proposed Action, the cumulative effects of these alternatives would be as described for the Proposed Action.

3.4 CULTURAL RESOURCES

3.4.1 Affected Environment

The area of potential effect (APE) encompasses areas of proposed disturbance within the POA 11 boundary and the proposed disturbance corridors outside the plan boundary (**Figure 3-2**). The BLM develops the APE in consultation with the Nevada State Historic Preservation Office (SHPO). The direct effects APE is approximately 3,607 acres where ground-disturbing operations would occur; the indirect effects APE is approximately 49,906 acres.

Cultural resources, such as archaeological or built-environment sites or districts, are normally identified and recorded during intensive field surveys. On BLM-administered public land, an intensive pedestrian survey using transects spaced no more than approximately 100 feet apart is considered a Class III inventory. Inventories of this nature are the standard for identifying and recording cultural resources, if conditions within the APE allow for adequate visual inspection (BLM 2014, 2018b). Once fieldwork is complete, the BLM archaeologist reviews a technical report presenting inventory findings and National Register of Historic Places (NRHP) eligibility recommendations for resources identified in the APE. After the BLM accepts the report and eligibility recommendations, it forwards the report to the SHPO for review and concurrence on NRHP eligibility and project effects (BLM 2014).

The direct effects APE and portions of the indirect effects APE have been subjected to Class III surveys (**Figure 3-2**). Fifty-four Class III surveys have covered the entire direct effects APE and portions of the indirect effects APE over the past 42 years. Together, the inventories identified just over 300 resources (see **Table D-1** in **Appendix D**) and a cultural district related to the historic workings at the Rochester and Packard Mines (Giambastiani 2019; Ross-Hauer 2019). 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; Busby et al. 1993; Shamberger 1973). The prehistoric sites in the inventory areas reflect seasonal hunting and gathering encampments and task sites of Archaic to Late Prehistoric age.

Of the identified resources, 183 are in the direct effects APE, 116 are in the indirect effects APE, and 11 are in both the direct and indirect effects APE. In the direct APE, there are 19 NRHP-eligible sites (see **Table D-2** in **Appendix D**). Three of these sites are not independently eligible but are eligible as contributing elements to the Rochester Cultural District (RCD; CrNV-02-12593/D-177). There are also eight unevaluated resources in the direct APE: one is a complex lithic scatter with subsurface potential; three are resources that were not located and either no longer exist or are outside the direct APE; and four are unevaluated linear resources with ineligible and non-contributing segments to D-177 in the direct APE. There are 156 additional resources in the direct APE that are not NRHP-eligible.

In the indirect effects APE, there are 20 NRHP-eligible sites (see **Table D-2** in **Appendix D**). Three of these sites are not independently eligible but are eligible as contributing elements to the RCD. There are also 10 unevaluated resources in the indirect effects APE: two are historic habitations; one is a prehistoric habitation, the Champion Mine; two are sites that were not located and either no longer exist or are outside the indirect APE; and three are additional linear resources that are unevaluated overall; nevertheless, all segments in the indirect APE have been determined to be ineligible and non-contributing to D-177. There are 87 additional sites in the indirect APE that are not NRHP-eligible.

Eleven resources span both the direct and indirect APE, one of which is the NRHP-eligible RCD. Four additional resources are NRHP-eligible independently and as contributing elements to the RCD (see **Table D-2 in Appendix D**). One linear resource contains no eligible or RCD contributing segments in either APE; however, it is eligible because it has segments determined to be RCD contributing elsewhere. One additional linear resource is unevaluated overall, but all segments in the direct APE have been determined to be ineligible and non-contributing to the RCD; one segment in the indirect APE has been determined to be eligible and contributing to the RCD. There are four additional sites spanning the direct and indirect APE that are not NRHP-eligible.

Six of the resources in the direct effects APE are architectural resources: two transmission lines, two roads, one pipeline, and an unevaluated cabin. Three of these, are eligible as contributing elements to the RCD. There are four architectural resources in the indirect effects APE, three of which are ineligible; one pipeline is eligible as a contributing element to the RCD. One road spans the direct and indirect APEs and was determined to be ineligible and non-contributing to the RCD. One railroad spans the direct and indirect APEs and was determined to be ineligible and non-contributing to the RCD, with one exception: one segment in the indirect APE was considered eligible and contributing to the RCD. These architectural components are listed among the archaeological resources accounted for in **Table D-2**.

The RCD itself is a 3,538-acre historic district that straddles the direct and indirect APE. Separated into the northern RCD and the southern RCD, it contains 166 identified resources (Giambastiani 2019, Appendix E District Inventory). Two sites are nonexistent, and 24 resources contribute to the NRHP eligibility of the district under Criterion D.[4] The RCD as a district conveys notable contributions to Nevada's mining history in the early twentieth century and retains data potential for understanding mineral extraction in the American West during the early twentieth Century (Giambastiani 2019, Appendix E).

3.4.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, operations would continue in the existing project area, based on current authorizations under the previously approved mining plans of operation and reclamation and closure plans. These activities would affect only those historic properties that have been previously mitigated or identified as needing treatment to mitigate impacts, such as mitigation measures outlined for resources addressed in POA 10.

Mitigation Measures

Under the No Action Alternative, there would be no mitigation measures or monitoring beyond those measures already associated with the previously approved mining plans of operations.

Proposed Action

The Proposed Action could affect cultural resources directly, indirectly, and cumulatively within the POA 11 boundary. In accordance with the National Historic Preservation Act (NHPA), there could be adverse impacts on these sites affecting the aspects of NRHP site integrity. Of the known resources in the direct effects APE, there are 21 NRHP-eligible resources (including six resources that overlap both the direct and indirect APEs), five unevaluated sites, and four individually ineligible sites that contribute to the NRHP eligibility of the RCD (including CrNV-02-8571; see **Table D-2** in **Appendix D**). Of the known resources in the indirect effects APE (not including the eligible sites above), there are 20 NRHP-eligible sites, 10 unevaluated sites, and 3 individually ineligible sites that contribute to the NRHP eligibility of the RCD (see **Table D-2** in **Appendix D**).

For the 25 historic resources in disturbance areas either completely or partially within the direct APE, there are 10 NRHP-eligible, single-component, historic-era sites; six multicomponent sites with NRHP-eligible, prehistoric components; four RCD-contributing but individually ineligible historic-era components; three NRHP-eligible, single-component, prehistoric sites; one unevaluated prehistoric site; and the RCD. Each of these resources would be directly affected by surface disturbance associated with the Proposed Action

[4] Criterion D, "Information potential," is satisfied if the property has yielded or may be likely to yield information important to prehistory or history.

(**Table D-3** in **Appendix D**). Avoidance may be an option to mitigate impacts on these components; however, sites that may be physically damaged would require mitigation via archaeological data recovery or another form of acceptable treatment. CRI is developing a POA 11 historic properties treatment plan that will identify mitigation for affected resources.

In the indirect APE, there are 13 NRHP-eligible historic sites, nine unevaluated historic sites, three multicomponent sites with eligible prehistoric components, one multicomponent site with an eligible historic component, one unevaluated prehistoric site, and three individually ineligible sites that contribute to the NRHP eligibility of the RCD. At each of these resources, indirect effects would not have the potential to physically damage or destroy the historic or prehistoric components; impacts on the NRHP aspects of integrity at the historic components would include visual effects only (see **Table D-2** in **Appendix D)**.

The visual resource management (VRM) study focused on select NRHP-eligible, unevaluated, and ineligible but contributing to the RCD historic-era sites in the direct and indirect APEs. The study addressed several historic components for potential visual impacts from the POA 11 Proposed Action (see **Table D-3** in **Appendix D**). Following SHPO review, it was determined that 11 resources would be subject to visual effects. Five of these are in the indirect APE and six are in both the direct and indirect APE: CrNV-02-471, CrNV-02-4235, CrNV-02-8571, CrNV-02-12711, CrNV-12977, and the RCD (CrNV-02-12593). Two sites included in the VRM study would be affected directly (CrNV-22-401 and CrNV-22-4229/4230/B14129). In the indirect APE, the Proposed Action would also have some residual sound and atmospheric impacts on the setting of the RCD. This would be due to potential changes in industrial sound and airborne particulates from nearby project activities. No other known NRHP aspects of integrity would be affected.

The intensity of adverse impacts in the direct and indirect APEs would be reduced or resolved through approved mitigation aligning with the programmatic agreement (PA) between the BLM, Nevada Division of Historic Preservation and Archaeology, the Advisory Council on Historic Preservation, and CRI (BLM et al. 1992).

Mitigation Measures

A historic properties treatment plan for POA 11 aligning with the PA (BLM et al. 1992) is in development and will align with cultural resources eligibility determinations presented in the SHPO's letter to the BLM of May 13, 2019, and subsequent addenda (SHPO 2019). The plan will include specific descriptions of how impacts on historic properties will be mitigated. Treatment measures could include avoidance, data recovery at selected sites, public outreach and interpretation, or other methods meeting the approval of the PA parties. Any cultural resources mitigation or treatment for POA 11 would be considered separately from ongoing mitigation for POA 10 disturbances.

Concurrent with project planning or approved mitigation, CRI would notify all personnel and contractors that collecting, excavating, and vandalizing historic and archaeological artifacts or sites is illegal on public land, as defined in CRI's forthcoming historic properties treatment plan. Further, if CRI discovers archaeological artifacts (objects greater than 50 years old) or human remains during surface-disturbing activities, they will notify the BLM immediately. This would minimize direct and indirect impacts on unknown cultural sites.

Alternative 1—Management of PAG material in West RDS

Impacts would be the same as those described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

Impacts would be the same as those described under the Proposed Action.

Cumulative Impacts

The CESA for cultural resources is the same as the direct and indirect effect APEs (**Figure 3-2**). Past, present, and reasonably foreseeable future actions have affected and may continue to affect cultural resources, including those listed in **Table D-3** of **Appendix D**.

Wildfires, specifically the Oreana, Mine, and Limerick fires between 2012 and 2017, have had major impacts on the POA 11 area in the recent past and were shown to erase certain NRHP aspects of integrity in the RCD. Most contributing resources within the fire perimeters now retain only integrity of location (Appendix H in Giambastiani 2019). Other past and present actions such as historic and modern mineral resource exploration and extraction, recreation, and BLM-authorized activities, may affect historic properties and other cultural resources. This would be the result of loss or disturbance of integrity at sites that are not protected, changes in setting and access, and vandalism. These actions would negatively affect the NRHP aspects of integrity and potentially the significance of the historic property components.

Impacts from reasonably foreseeable future actions could occur in the cultural resources CESA; examples are ongoing mineral resource exploration and extraction, surface erosion resulting from fires and vegetation/fuels reduction, recreation, unauthorized artifact collecting, vandalism, and natural processes. BLM-authorized actions and those of other federal agencies that could affect cultural resources in the assessment area would be subject to projection and compliance review. The cumulative impacts on the resources in the RCD would affect the NRHP aspects of the district as a whole.

If impacts on NRHP-eligible, unevaluated, or RCD-contributing resources cannot be avoided, they would be mitigated via a historic properties treatment plan.

3.5 MIGRATORY BIRDS

3.5.1 Affected Environment

The potential habitat evaluated for migratory birds focuses on the project area (see **Figure 1-1**); it does not include the study area for the golden eagle, which is a 10-mile radius around the project area. Golden eagles (*Aquila chrysaetos*) are discussed in **Section 3.14**.

All bird species and the location of all bird nests observed in the project area were recorded during wildlife surveys conducted in 2016, 2017, and 2018. The method used for the migratory bird surveys is included in Section 3.4 of the baseline wildlife survey reports (WRC 2017a, 2017b). Biologists also surveyed for raptor species through a combination of aerial surveys and ground observations. Western burrowing owls (*Athene cunicularia*) are discussed in **Section 3.14**.

Sixty-nine bird species were observed during the wildlife surveys, including 11 raptor species. Nine raptor nests were observed in the project area and another 17 were observed within a 1-mile buffer of the project area. Most migratory birds were observed along stream beds and in pinyon-juniper woodlands. These habitats have the greatest structural diversity, and some of the streambeds also had water in a few locations (WRC 2017a, 2017b, 2018a).

3.5.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, the CRI mine operations would continue under existing plans, with no expansion. Reclamation and mining would continue, based on current authorizations in previously approved plans of operation. Mining would continue to allow up to 2,203 acres of authorized disturbance in the existing authorized mine plan boundary, and reclamation and closure would continue, based on existing approved authorizations.

Operation under the No Action Alternative would continue to directly affect migratory birds by removing vegetation in areas proposed for surface disturbance. Most of the surface disturbance associated with the No Action Alternative would be reclaimed, with the exception of the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures.

Proposed Action

The Proposed Action would directly affect migratory bird habitat by removing up to 3,105 acres of vegetation for POA 11 mining, constructing a power line, widening and relocating Packard Flat Road, and by increasing human and equipment presence in habitat areas or close to active nest sites. These activities would remove available nesting and foraging habitat, including 531 acres of pinyon-juniper woodlands where most birds were observed (WRC 2017a, 2017b). No streambeds would be affected within the POA 11 boundary. During construction of the power line, construction equipment operators will traverse several streambeds. Despite this, no surface disturbance is expected in the streambeds.

Injury or mortality of migratory birds from being crushed by construction or mining equipment or vehicles or loss of burrow or roost habitat from ground disturbance under the Proposed Action, is expected to be low. This is because most migratory birds may avoid areas of disturbance. Before the surface is disturbed during the nesting season (March 1 through August 31), CRI would survey the area to ensure no nests with eggs or young are present. If such nests are found, they would be avoided by an appropriate distance to prevent destroying the nest and disturbing the nesting birds.

There is a potential for injury or mortality of migratory birds by poisoning, mainly by ingesting solution in industrial ponds, which can attract wildlife in the arid Great Basin (Clark and Hothem 1991) for drinking and foraging (O'Shea et al 2000); however, potential sources of open water are fenced, covered, or otherwise restricted from wildlife access, as described in **Appendix B**.

Migratory birds would have access to the Rochester Pit lake, which may develop a biological system over time, and could use this water source during migration or nesting. **Section 3.18.2** includes an analysis from the ecological risk assessment (ERA). It is unlikely that ingesting pit lake water would be toxic to birds because constituent levels are predicted to be below the lowest observed adverse effect level (LOAEL) thresholds (SRK 2018a).

Springs and seeps in the project area provide potential water sources for migratory birds. There is the possibility for mining to affect spring and seep water levels in such water bodies as Limerick Canyon Spring 4, McCarty Spring, Weaver Springs 2 and 3, and Packard Flat artesian spring, and especially water levels near the HLPs (see **Section 3.8.2** for more details; **Figure 3-3**). If water levels in the seeps and springs decrease, it could affect migratory birds in the area or require them to travel to other seeps and springs in the area; however, migratory birds may easily move longer distances in search of water or prey. It is unlikely that water quality would be affected by groundwater seepage from the HLPs or the Rochester Pit lake, as described in **Section 3.8.2**.

The loss of habitat is temporary in most locations because surface disturbed by the Proposed Action would be reclaimed or revegetated after mining is complete. Surface disturbance subject to revegetation would be seeded with a BLM-approved seed mix. The mix would contain native seeds or plants that are compatible with native soils in the project area and also forb and shrub species to provide forage for wildlife, including migratory birds.

Approximately 8.6 miles of new power lines would be constructed as part of the Proposed Action. Potential impacts from power lines, including electrocution, would be minimized by implementing the environmental protection measures listed in **Appendix B**. There is a potential for increased risk of predation due to the new power line, which increases the risk of raptors using the power poles as perch sites. CRI would incorporate standard raptor protection designs, as outlined in Suggested Practice for Avian Protection on Power Lines (APLIC 2006). Approximately 2.1 miles of existing power lines would be removed. The migratory birds in this area may experience decreased risk of predation from the removal of perch sites.

Mining, drilling, and construction noise may disturb birds nesting in the vicinity of the proposed project, resulting in nest abandonment. During construction, noise would be greatest near construction sites and would diminish with distance from the noise source.

Potential impacts from the Proposed Action would be minimized by implementing the environmental protection measures listed in **Appendix B**. Before the surface is disturbed during the nesting season (March 1 through August 31), CRI would survey the area to ensure no nests with eggs or young are present. If such nests are found, they would be avoided by an appropriate distance to prevent destroying the nest and disturbing the nesting birds.

Residual impacts on migratory birds and raptors include direct impacts on approximately 2,836 acres of sagebrush shrubland and pinyon-juniper woodland nesting and foraging habitat. This represents approximately 28 percent of sagebrush shrubland and pinyon-juniper woodland habitat in the project area. Removing vegetation on these lands would result in a loss of breeding and foraging habitat for migratory birds.

This acreage would not be disturbed all at one time due to incremental mining and interim reclamation. Reclaimed land would have more grass and forb forage and less mature shrub forage in the short term, which may shift avian species use in these areas. As the plant communities in reclaimed areas mature, larger shrubs may provide additional cover and nesting opportunities. Pit walls that would not be reclaimed may increase cliff nesting habitat for raptors; in turn, this could result in increased predation on and mortality of migratory birds that serve as prey for raptor species.

Approximately 415 acres of sagebrush shrubland and pinyon-juniper woodland habitat would not be reclaimed following mine closure. This represents a permanent impact of approximately 3 percent of migratory bird breeding and foraging habitat in the project area.

Though the Proposed Action would result in a net loss of 415 acres (approximately 3 percent) of breeding and foraging habitat for migratory birds, it would not contribute to a loss of viability for any migratory bird species. This is because most mining would be concentrated near previously disturbed areas, extensive similar habitat is available in and next to the project area, and environmental protection measures, including breeding bird surveys, would further reduce impacts on migratory birds.

Alternative 1—Management of PAG material in the West RDS

Impacts on migratory birds under Alternative 1 would be the same as under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

Partial backfill of sub-pits 2 and 3 and lime amendments would improve the water quality of the Rochester Pit lake (see **Section 3.8.2**). The ERA modeled Alternative 2 and determined that no constituents would exceed the no observed adverse effect level (NOAEL) toxicity reference values (TRVs), whereas the Proposed Action would exceed the NOAEL TRVs for aluminum (SRK 2018d). This would reduce the risk of toxicity for migratory bird species ingesting water from the pit lake.

Cumulative Impacts

Past and Present Actions

Past and present actions that have potentially affected migratory birds are grazing and agricultural conversion, utilities and other ROW construction, mineral development and exploration, and wildland fires.

Generally, impacts on migratory birds from the actions described above could be due to loss or modification of vegetation that serves as nesting and foraging habitat, transportation and establishment of noxious weeds from ground-disturbing activities, harassment or disturbance of individual birds during critical breeding and nesting periods, and direct impacts on or injury to or mortality of individuals from collision with vehicles or infrastructure, electrocution, drowning, poisoning from contact with industrial ponds, or removal or trampling of active nests, eggs, or fledglings.

RFFAs

Reasonably foreseeable projects, plans, or actions in the general wildlife CESA are summarized in **Table 3-5**. The largest potential increase in disturbance is due to minerals exploration and development (403 acres), followed by sand and gravel extraction (78 acres) and utilities and infrastructure expansion, particularly ROW projects. This includes roads (199 acres) and to a lesser extent railroads (10 acres) and transmission lines (6 acres). Additional small-scale potential impacts are expansion of irrigation facilities and water pipelines (11 acres).

Proposed Action

Impacts on migratory birds from the Proposed Action are from loss or modification of vegetation that serves as nesting and foraging habitat, harassment or disturbance of individuals during breeding or nesting periods, and direct impacts on or injury or mortality of individuals from collisions with vehicles or infrastructure, electrocution, drowning or poisoning from contact with industrial ponds, or removal or trampling of active nests, eggs, or fledglings. Potential impacts on migratory birds are fully described under *Direct and Indirect Impacts*, above.

Potential impacts would be minimized by adhering to CRI's environmental protection measures listed in **Appendix B**. Breeding bird surveys would be conducted before surface disturbance during the nesting season (March 1 through August 31) to avoid impacts. Standard raptor protection designs, as outlined in Suggested Practice for Avian Protection on Power Lines (APLIC 2006), would be incorporated into the design and construction of power lines. Open ponds would be covered to prevent migratory birds from drowning. Vegetation disturbed by mining would be reclaimed, with the exception of the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures. Weeds would be treated in reclaimed areas. Because the Proposed Action is localized and discrete, those individuals that can avoid the project area should be able to successfully forage and breed in expansive adjacent, undisturbed areas of the CESA.

Based on the above analysis and findings, incremental impacts on migratory birds from the Proposed Action would represent approximately 2 percent of potential cumulative disturbance, when added to past, present, and reasonably foreseeable future actions in the CESA.

Alternative 1—Management of PAG material in the West RDS

Alternative 1 would have the same cumulative impacts as described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

Alternative 2 would improve the water quality of the Rochester Pit lake and reduce the risk of harm to migratory birds from ingesting pit lake water. This would reduce the cumulative impacts on migratory birds compared to the Proposed Action.

3.6 NATIVE AMERICAN RELIGIOUS CONCERNS

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 the Proposed Action or alternatives. The purpose of consultation is to limit, restrict, or eliminate negative impacts on those sites, activities, or resources.

3.6.1 Affected Environment

The project area is in the traditional territory of the Northern Paiutes and is outside the area of the Ruby Valley Treaty (Stewart 1939). To date, the tribes have raised no concerns about specific traditional sites, areas, or activities in the project area. The American Canyon and South American Canyon Springs are in the project area, and traditional Northern Paiutes consider springs to be sacred (Tiley and McBride 2013, pp. 46 and 51). Springs 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, pp. 76 and 77).

The American Canyon and South American Canyon Springs were affected 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

On May 22, 2019, the BLM sent consultation letters to the Fallon Paiute Shoshone Tribe, Lovelock Paiute Tribe, Winnemucca Indian Colony, and Pyramid Lake Paiute Tribe. To date, none of the tribes have raised concerns about 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.

3.7 Wastes and Materials (Hazardous and Solid)

3.7.1 Affected Environment

Production at the mine is limited by crushing capacity, which is a function of the mine's air permit. 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 description of process solution handling is in Section 2.5.9 of POA 11 (CRI 2017a); a schedule of process pond and contingency pond volumes is set forth in Section 2.5.10 of POA 11 (CRI 2017a). The contingency pond capacities will be several times larger than the active ponds to ensure containment if large storms charge the HLP facilities with excess water. Such water would be recycled back to the process, resulting in zero discharge.

The primary chemicals and fuels used for mine and ore processing operations are sodium cyanide, diesel fuel, gasoline, propane, petroleum oils, lab acids (sulfuric and nitric), fluxing reagents, diatomaceous earth, zinc dust, emulsion, ammonium nitrate, and lime. As needed, bulk fuels and reagents are transported to the CRI Mine via Limerick Canyon Road from I-80, using trucks operated by licensed vendors. 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 used on-site are stored in a security-controlled facility specifically designed for these materials, in accordance with Mine Safety and Health Administration and United States Bureau of Alcohol, Tobacco, Firearms, and Explosives regulations. Additional details are provided in Sections 2.6.11 and 2.5.15 of POA 11 for chemicals and storage, respectively (CRI 2017a).

The CRI Mine's designated EPA identification number is NVD-986767572. The mine is classified as a large quantity generator (LQG) of hazardous waste, as defined by the Resource Conservation and Recovery Act (RCRA). A LQG generates over 2,200 pounds of hazardous waste in a month. The LQG status requires that it adhere to specific on-site management and transportation, as outlined by RCRA. The CRI Mine has the appropriate waste management and emergency hazard response plans on file at the Winnemucca BLM office.

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 contained and stored at the wash bay, pending transportation off-site for proper disposal by a licensed vendor. In the future the soils may be disposed of on-site, if approved by the State of Nevada.

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 3-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 and is not hazardous waste.

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 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 destroyed cyanide by oxidation but 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.

3.7.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, operations would continue, based on current authorizations under the previously approved mining plans of operation and reclamation and closure. Materials will be handled according to the approved POA 10.

Proposed Action

The Proposed Action fuel and reagent use rates are set forth in POA 11 Table 2-6. Those materials handling practices are not significantly changed from POA 10 under the Proposed Action and exhibit a relatively low risk of release under modern handling and containment procedures. Cyanide solution volumes are increased at the site under the Proposed Action, in conjunction with increased HLP operations. Cyanide use would occur in accordance with the BLM Nevada Cyanide Management Plan (1991), which greatly reduces the risk of release. The major risk of release to the environment associated with fuel and reagent quantities is their transport; the risk increases in conjunction with expansion of the mine in accordance with the quantities used.

Management of geological waste materials is considered separately from hazardous and solid waste. Because waste rock is intimately connected with the hydrology and geochemistry of the site, it is discussed in **Section 3.8** with those subjects.

Alternative 1—Management of PAG material in the West RDS

There is little nexus between PAG management at the site and management of most hazardous and solid wastes. Alternative 1 does not significantly alter solid and hazardous waste handling from the Proposed Action. As an indirect impact, PAG management consumes fuel, to the extent that it is being loaded and hauled or non-PAG is being shaped to encapsulate it. Because transport is the primary fuel release risk, fuel consumption is positively correlated with the release risk.

Alternative 2—Partial Backfill of Pit Lake

Alternative 2 does not significantly affect hazardous and solid waste management. Additional fuel and lime would be consumed during fill placement.

Cumulative Impacts

Materials and fluids management would minimize the potential for cumulative impacts on wastes and materials. Monitoring requirements would identify potential impacts.

There is the potential for cumulative impacts associated with management of a new plant and Stage VI HLP. The Proposed Action would mine the Stage I HLP and a portion of the Stage II HLP, which was the focus of remediation, described in POA 10. All HLPs require monitoring during operations and draindown monitoring upon closure, which would include post-mining monitoring of the solutions and surrounding groundwater. This would result in increased need for HLP draindown management and monitoring as required to accommodate expanded HLP capacity under POA 11. Much of the draindown management and monitoring under POA 10 would overlap with implementation of POA 11 activities and monitoring.

3.8 WATER QUALITY AND QUANTITY (SURFACE AND GROUND)

3.8.1 Affected Environment

The study area for water resources (quantity and quality) is the Hydrologic Model Area, shown on **Figure 3-3**. The Hydrologic Model Area straddles portions of the following three hydrographic basins (WSP 2017):

- Lovelock Valley Hydrographic Sub-Basin (73) of the Humboldt River Basin
- Buena Vista Valley Hydrographic Sub-Basin (129) of the Central Region
- Packard Valley Sub-Area (101A) of the Carson Desert Sub-Basin (101) of the Carson River hydrographic basin

Groundwater

The CRI Mine is located 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 (WSP 2017; **Figure 3-4**).

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), extends along the west flank of the Humboldt Range. It is traced as a 200- to 500-foot-wide, steeply dipping shear zone just east of the current Rochester mine pit. It is expected to be intercepted by the enlarged POA 11 pit (**Figure 3-4;** WSP 2017).

Due to the topography in the project area, groundwater can flow in all directions. Groundwater generally flows from areas of higher elevations toward the center of basins, such as Buena Vista Valley, Lovelock Valley, and Carson Desert. The project area groundwater system contains three distinct hydrogeologic units. Each of these systems is described below.

Quaternary alluvium

The 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. They appear to be perched above the bedrock groundwater systems but in some cases may be supported by discharge of bedrock groundwater into the alluvial deposits. Piteau (2019a) displays a poor correlation between precipitation and spring discharge. This suggests that both groundwater levels and spring discharge are influenced by discharge from the underlying bedrock aquifers into the alluvial aquifers in some of these canyons.

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, with discontinuous sand and gravel lenses (WSP 2017).

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. The geometric mean hydraulic conductivity measured in Packard Valley alluvial wells is 0.22 feet per day and is 0.03 feet per day in alluvial wells in the Limerick Canyon area (WSP 2017).

Groundwater in the Sage Hen Flat and South American Canyon flows to the 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 it flows east to Buena Vista Valley (**Figure 3-5**).

Water level elevations in alluvial wells in Spring Valley at the northern end of the project area indicate alluvial flow to the northeast, toward Buena Vista Valley (**Figure 3-5**; WSP 2017).

Water level elevations in Limerick Canyon indicate alluvial groundwater flows to the west, toward the springs in Limerick Canyon (**Figure 3-5**), and ultimately to the Humboldt River.

In the Packard area, at the southern end of the project area, groundwater flow is to the southwest, toward the center of Packard Flat and the Carson Sink.

Bedrock 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 geometric mean hydraulic conductivity measured in bedrock wells in the Rochester Pit area outside of the BRF of 0.14 feet per day and a storage coefficient of 7.0x10-4 (WSP 2017). Fractures, faults, and formation changes result in some local zones of relatively higher conductivity, although cross-cutting faults associated with the BRF (discussed below) are thought to be lower permeability that restrict groundwater flow. 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, due primarily to pumping from on-site wells in the BRF (**Figure 3-6**).

Bedrock in the BRF

The BRF acts as a flow conduit in the area, with bedrock groundwater flow migrating toward and then along its north-south-trending trace. The BRF has a higher conductivity than the unfractured bedrock and alluvial deposits.

Measured values for hydraulic conductivity along the strike of the BRF have a geometric mean of 1.3 feet per day (WSP 2018). The specific storage of the BRF is also considered high for a bedrock unit, with measured values ranging from $3.3\text{x}10_{-3}$ to $3.2\text{x}10_{-2}$ and a geometric mean of $1.5\text{x}10_{-2}$. Several cross-cutting features intersect the BRF, including three mapped faults in the vicinity of the Rochester Pit (**Figure 3-6**). 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 this effect (WSP 2017).

The BRF is the main drainage artery for the bedrock groundwater system in the portion of the project area, with a pumping-induced area of drawdown extending approximately from south of the Stage II HLP on the south to the Stage IV HLP on the north (a distance of approximately 10,000 feet). Within the area of drawdown associated with the BRF there is a groundwater divide, with water north of the Stage I HLP flowing north to Buena Vista Valley, and water south of the Stage II HLP flowing to the south, toward Packard Wash and the Carson Desert.

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 (WSP 1 2018).

Hydrogeology

Recharge to groundwater in the project area is derived from precipitation and snowmelt infiltration. Shallow groundwater outflows to springs, while deeper groundwater flows to portions of the bedrock aquifer system outside the project area, ephemeral streams, pumping mine production wells, recovery (pump-back) wells, and under-drains.

Shallow groundwater evapotranspiration occurs from these units. Due to the high elevation of much of the mine and relatively limited extent of shallow alluvial groundwater, evapotranspiration is limited. Potential annual evapotranspiration estimated at 44.7 inches greatly exceeds the average annual precipitation of 12.6 inches (WSP 2017).

Groundwater Quality

Detailed groundwater chemistry data are presented in WSP 2017. Each hydrogeologic unit has a distinct groundwater quality as described below:

Quaternary alluvium

Groundwater in Quaternary unconsolidated sediments is characterized as sodium to calcium bicarbonate/sulfate type. The groundwater has generally high levels of total dissolved solids (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 (WSP 2017).

Historical releases from the Stage I HLP resulted in groundwater contamination with concentrations of arsenic, mercury, manganese, nitrate/nitrite, TDS, and weak acid dissociable cyanide above the Nevada Reference Values (NRVs) in WI-16, WI-17R, WI-19, WI29/R, MW-30/R, MW-35, MW-37, and MW54 (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 HLP and process pond areas.

Groundwater remediation north of the Stage I 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).

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 in 2013 for these drains was approximately 13 gpm (SWS 2015).

Bedrock outside the BRF

Bedrock groundwater outside the BRF zone is a calcium-sulfate type in the South American Canyon and American Canyon. The water has naturally elevated TDS, near neutral pH, and elevated levels of trace constituents, particularly arsenic, iron, manganese, and nitrate. Past releases from the Stage I HLP in Sage Hen Flats (as described above) have locally affected the bedrock groundwater quality with elevated levels of nitrate, chloride, and other mine-related constituents.

Bedrock in the BRF

The BRF zone water chemistry is a sodium/calcium-chloride and sodium-sulfate/bicarbonate type, with moderate levels of TDS, slightly basic pH, and low levels of trace constituents. Arsenic, iron, manganese, and mercury concentrations are above their respective NRVs but aside from these compounds, the groundwater in the bedrock in the BRF is of good quality.

Surface Water

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. Surface water flow in the project area is ephemeral, typically occurring after brief and intense periods of precipitation or from snowmelt. Surface drainages are dry the remainder of the year, with the exception of the areas immediately downstream of mapped springs, shown on **Figure 3-3.**

Surface Water Quantity

A detailed survey of seeps and springs was conducted in 2016 and is reported in WRC 2018b. A summary of this survey is presented in WSP 2017. There are over 100 springs that were monitored. The flow rates measured during the fourth quarter of 2017 range from 0 up to approximately 48 gpm, and 14 of the monitored springs have discharge greater than 3 gpm. Approximately 80 of these springs were defined as being perennial or likely perennial (having consistent flow).

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, SWS 2012a, WRC 2018b, and WSP 2018.

In general, springs in the area range from a calcium chloride to sodium bicarbonate type, generally with water quality below 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 (0.05 mg/l), arsenic naturally exceeds the EPA Safe Drinking Water Act drinking water standard (0.01 mg/l) in most springs. Of all the springs, only Cole Canyon Spring has naturally high TDS and chloride. WSP (2017) summarizes the laboratory water quality data from samples collected at springs from 2013 through the second quarter of 2017; SWS (2014) summarizes the data from springs collected through the fourth quarter of 2013.

Jurisdictional Wetlands and Waters of the United States

The project area does not contain jurisdictional wetlands or Waters of the United States (SRK 2017a). In a 2016 survey, SRK mapped 199,979 linear feet of ephemeral drainages and 2.725 acres of wetlands not previously verified (SRK 2017a). These features were determined to have no direct or indirect connectivity to a relatively permanent water or traditional navigable water (SRK 2017a). In the 2016 survey, SRK reaffirmed the US Army Corps of Engineers' 2001, 2006, and 2012 determinations that the project area does not contain jurisdictional features (SRK 2017a). In October 2018, the US Army Corps of Engineers confirmed the 2016 survey findings and conclusions and reaffirmed the previous determinations (USACE 2018).

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 2017a). As required by NAC 445A.433 (1)(c), these diversions have been designed to divert flows from the 100-year 24-hour storm.

Sediment collection basins are proposed to be constructed in the project area to collect solids transported with stormwater runoff. The basins will be located at the discharge points of the Stage VI HLP north and south diversion channels and at the discharge points of the RDS collection channels, as shown on Figure 21 in the POA 11 (CRI 2017a).

Well Pumping

Water supply pumping for the mine has been ongoing in the BRF since 1987, with 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. All production wells are completed in the BRF hydrogeologic unit and range in depth from 620 to 1,530 feet (WSP 2017).

Water-supply pumping rates vary seasonally. Higher rates usually occur during the warmer parts of the year (May through October) for dust control and 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 (Piteau Associates 2019a).

Water Rights

Water wells and water rights in the vicinity of the Coeur Rochester Mine are listed in the Nevada Department of Water Resources (NDWR) database and are presented in WSP 2018. There are 104 water rights, including 43 groundwater rights, in the NDWR database. The groundwater rights include those for mine water supply wells PW-1A through PW-4A (Buena Vista basin), two supply wells at the Packard Mine, production wells at the Relief Canyon Mine, plus municipal supply, commercial, domestic, irrigation, and monitoring wells. CRI has total water rights of 2,088-acre feet per annum (afa). As stipulated by water rights permits, the combined annual freshwater use from these four supply wells cannot exceed 1,927.3 afa; however, the amount 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 967.3 afa.

The Nevada Division of Water Resources Water Rights Mapping Application did not include any public water reserves in the project area. There were two public water reserves south of the project area, but the Proposed Action would not affect them (NDWR 2019).

Geochemistry

Characteristics and management of mined materials are aspects of the affected environment that ultimately govern water quality if they result in seeps to surface water or leach to groundwater.

This subsection outlines the findings from CRI's Coeur Rochester POA 11 Geochemical Characterization Report (SRK 2018b) and POA Waste Rock Management Plan (SRK 2018c). All rock types at the mine exceed 12 times crustal average concentrations for antimony, arsenic, selenium, and silver. All material types were elevated in lead and thallium at greater than three times average crustal abundance. Most of the material types were elevated in barium, cadmium, mercury, molybdenum, sulfur, uranium, tungsten, and zinc. Cadmium was elevated in the Rochester Formation only, but especially in the deeper unoxidized fraction, which would form the base of the proposed pit lake. Specific values for constituents relative to their rock type are set forth in Section 7.3 of the Geochemical Characterization Report, with full results in Appendix B of that report (SRK 2018a).The determination of whether elevated constituents could affect water quality involves complex interactions between the rock and water under various pH and redox regimes. For this reason, rock types at the mine were subjected to numerous tests, described in detail in SRK 2018c.

In 2014, a comprehensive summary of the geochemical characterization was submitted to the BLM with a summary of the data review and findings to support POA 10. The numerous rock geochemical characterization studies for the Coeur Rochester Mine were summarized in that work; these studies are still relevant to POA 11, largely with respect to oxide materials and to provide context for geochemistry work done for POA 11. Those documents are listed in the POA 10 EIS (BLM 2016). These studies are instructive when evaluating environmental impacts of oxide waste and the proposed pit lake when the water level has recovered from pumping.

The geochemical testing methods in the characterization studies included the following:

- 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 (ABA), 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

CRI performed over 27,000 geochemical tests on mine materials before or during the approval of POA 10; these tests are summarized in Table 3-9 of the POA 10 EIS (BLM 2016). For POA 11, CRI performed over 4,000 additional geochemical tests for the Rochester Pit and several hundred tests for the Packard Pit, summarized in Table 6.2 in the Geochemistry Characterization Report (SRK 2018b). More sampling was warranted in the Rochester Pit due to its larger size and greater potential for PAG material.

Waste rock at the mine follows three general patterns:

- Non-acid-generating oxide, some of which can release slightly elevated constituents listed above plus iron and manganese, but almost all produce fairly good quality water with neutral pH.
- Mixed material containing some sulfur, metals, and PAG material; this may include rocks with oxidized hydroxysulfate precipitates, which can release mild acid, metals, and sulfate when first flushed with water.
- PAG material, which contains mixed sulfides that oxidize when exposed to air, releasing significant acid, metals, and sulfate over time. PAG material generally does not pose a significant threat to water quality when it is stored in a manner that inhibits oxidation.

There are oxidized and partially oxidized acidic sulfur salts on some rock surfaces in mineralized zones. When exposed to oxygen and moisture over time, sulfur-bearing rocks can react as follows:

- Iron sulfides (FeS and FeS_2) oxidize to ferric iron, sulfate, acid, and acid sulfosalts in reactions that are catalyzed by the resulting ferric iron, which can exacerbate acid rock drainage (ARD).
- Base metal sulfides, such as those of copper, nickel, lead, and zinc, do not promote oxidation, but their breakdown is accelerated in acidic environments. They can release toxic metals and metaloids, but typically with less acidity than pyritic sources.
- Oxidized sulfur-bearing salts from previous oxidation reactions often harbor residual acid and metals, which can dissolve in contact with water. They tend to occur naturally at the transitional boundary between oxide and non-oxide materials at mines or can develop in non-oxide materials after exposure to air and moisture. These sulfur-bearing salts can dissolve in water, releasing residual acid, metals, and sulfur. They tend to produce ARD upon initial flushing, but their leachate chemistry typically attenuates faster than sulfidic sources.

Due to the variability in ARD sources at the mine, SRK related the potential for ARD generation to sulfur content, rather than sulfide content as is traditionally done in mining. This provides a conservative and useful screening tool at this mine to separate PAG from non-PAG material (0.4 percent sulfur by weight).

The potential for PAG materials to cause ARD either from the RDSs or from the pit wall surfaces is discussed in **Section 3.8.2**. Details of the mineralization of materials at the site are set forth in the Geochemical Characterization Report (SRK 2018b), with a generalized depiction of increasing sulfur content on Figure 5-1 of that document.

By comparing the results of humidity cell tests, meteoric water mobility procedure tests, and static ABA of various rock types, SRK confirmed that sulfur content (0.4 percent by weight) is the key variable that can be used to distinguish PAG material from non-acid-generating oxide. PAG content increases with depth and proximity to the mineralized fault zone.

To prevent oxidation of PAG material and release of constituents, PAG waste rock needs to be segregated and placed in the interior of RDSs to limit its exposure to air and meteoric water.

3.8.2 Environmental Consequences

The environmental consequences of various alternatives on surface water and groundwater quality and quantity were evaluated with respect to the same impact indicators that were applied for POA 10. These include degradation of water quality below applicable state or federal regulations, effects on riparian habitat from a reduction in spring flows or groundwater levels, impacts on water rights, and increased sedimentation of streams.

Direct and Indirect Impacts

Direct impacts on groundwater quantity are those that change groundwater levels due to changes in infiltration or changes in well pumping. Direct impacts on surface water quantity are those that increase or decrease stream flows. Groundwater quality is directly affected by activities that change the concentration of regulated compounds. Surface water quality is directly affected by activities that affect the ambient quality of surface waters.

Indirect effects on groundwater quantity and quality result from activities that modify the areas or sources that recharge the groundwater system and the quality of that recharge water. Indirect impacts on surface water are from activities that disturb soil and modify drainages. The distribution and condition of wetlands and riparian areas indirectly change surface water quantity because wetlands and riparian areas affect infiltration and stream flows. Changes in surface water quantity may also affect the water available for vegetation and subsequently the ability for wildlife and livestock to forage.

No Action Alternative

Under the No Action Alternative, operations would continue based on current authorizations; existing pumping rates and groundwater levels predicted for POA 10 would continue.

Groundwater Quantity

Groundwater quantity impacts and trends under the No Action Alternative would remain consistent with present day and projected future conditions. Water levels would be expected to remain suppressed at or below the top of the backfill surface in the eastern portion of the Rochester Pit final configuration. A seasonal surface expression of water may develop on the pit backfill material from December through February, the months with the highest precipitation. The pit backfill would be expected to remain a permanent hydraulic sink, with little or no groundwater flowing through the pit backfill material.

In the alluvial aquifer system in Limerick Valley, incremental drawdown is projected to be up to 15 feet approximately 15 years after mining ends for the 500-gpm pumping scenario and up to 38 feet approximately 20 years after mining for the 900-gpm pumping scenario (SWS 2015). Incremental drawdown of greater than 10 feet in the alluvial aquifer system is projected to extend to the west into the upper portions of Limerick Valley. Incremental drawdown of greater than 10 feet in the bedrock system is projected to extend up to

1,800 feet east of the project area at the end of mining. Incremental drawdown of greater than 10 feet in the bedrock groundwater system due to groundwater pumping is projected to extend up to 1.4 miles north of the project area to the southern portion of Spring Valley. The maximum drawdown would be from 1 to 3 years after mining. Spring Valley Springs 1 and 2 (**Figure 3-3**) are in the limit of the 10-foot incremental drawdown contour; however, their flows are likely derived from surface water recharge into the alluvial groundwater system and should not be affected by drawdown in the bedrock aquifer.

Groundwater pumping would be reduced following mine closure in 2023. Remediation pumping for contaminated groundwater in the vicinity of the Stage I HLP is assumed to continue at rates equal to 2013; however, the efficiency of the pump-back system remains to be evaluated. Groundwater monitoring and reporting would continue according to current permit requirements.

Groundwater Quality

Groundwater quality impacts and trends under the No Action Alternative would remain consistent with present day conditions. Geochemical modeling predicts that backfilled pore water chemistry in the Rochester Pit will exceed NDEP reference values for cadmium, manganese, selenium, and thallium, from years 25 to 100 after groundwater pumping ceases. Groundwater monitoring and reporting would continue according to current permit requirements. Water quality of springs, seeps, and wetlands outside the project area are not expected to be affected.

Surface Water Quantity

The No Action Alternative would affect surface water quantity only to the extent water is withdrawn from the alluvial aquifer of Limerick Valley and reduces the quantity of water discharging to downgradient springs fed by the alluvium. The Stage V HLP in POA 10 is expected to cover American Canyon Spring and other nearby seeps. Nearby surface water drainages may already experience a reduction in flow due to decreased recharge beneath the expanded Stage IV and new Stage V HLPs; however, seeps and springs would continue to be monitored quarterly according to the CRI mine hydrologic monitoring program and the NDEP WPCP requirements.

Surface Water Quality

Geochemical modeling predicts that winter water expression in the POA 10 Rochester Pit could exceed the NDEP Profile III standards for fluoride, boron, and selenium. Seep and spring water quality impacts under the No Action Alternative would be expected to remain consistent with approved POA 10 conditions. Monitoring and reporting would continue according to current permit requirements. The No Action Alternative would maintain the current BMPs used to control stormwater runoff from disturbed or undisturbed areas in the project area.

Geochemistry

Under the No Action Alternative, the PAG material mined under POA 10 would be encapsulated in a relatively large amount of non-acid-generating oxide. Additionally, the Rochester Pit surface under POA 10 did not produce a pit lake. As such, there are minimal risks to the environment from the pit or RDS facilities in POA 10.

Proposed Action

The proposed POA 11 activities are as follows:

- Expanding the Rochester and Packard Pits, with the bottom of the Rochester Pit extending up to 750 feet below the pre-mining groundwater elevation and forming a pit lake after mining ends
- Constructing and operating the Limerick Canyon Stage VI and the Packard HLPs and associated processing facilities
- Installing a new production well to support the Packard Flat operations

- Expanding mining by 10 years, through 2033, with associated dewatering from pumping wells
- Continuing pumping for heap leach makeup water through 2040
- Constructing and maintaining stormwater diversion and sediment collection basins to meet the 100-year storm criteria

Groundwater Quantity

The BLM evaluated the potential impacts on groundwater quantity from the Proposed Action using a numerical groundwater flow model (Piteau Associates 2019a). To simulate the POA 11 mine plan, the groundwater model developed for POA 10 was used and expanded in all directions to an area of approximately 100 square miles, and model boundary conditions were updated accordingly. The current groundwater model was developed consistent with BLM guidance (BLM 2008) and was calibrated to observed water level data collected through 2017.

Under the Proposed Action, groundwater would be used for heap leach activities and would come from existing on-site water supply wells in the BRF. Pumping would range from approximately 350 to 675 gpm through 2023, similar to recent rates; approximately 280 to 450 gpm through the end of mining in 2033; and 150 to 250 gpm through 2040. Water supply for heap leach activities at the Packard Mine would be provided by a new mine supply well east of the Packard Pit in the BRF, with pumping rates of approximately 350 gpm in 2023, and ranging from approximately 130 to 220 gpm in 2024 through 2028, and approximately 70 to 110 gpm in 2029 through 2035.

Groundwater modeling predicts that a pit lake would form in the Rochester Pit. This lake is predicted to be a permanent hydraulic sink causing groundwater to flow toward it, since the pit lake water level would be approximately 250 feet lower than pre-mining water levels (Piteau Associates 2019a). Impacts of the Rochester Pit being a terminal sink include lowering groundwater levels over a large area around the pit and a loss of groundwater resources due to evaporation from the open pit lake. Figure 4.21 from SWS 2014 includes predicted end of mining water levels for the No Action Alternative. Figure 4.32 from Piteau Associates 2019a shows the water levels for the Proposed Action at the end of mining; Figure 4.49 from Piteau Associates 2019a shows incremental drawdown relative to POA 10 at the time of maximum extent of drawdown; and Figure 4.50 shows the cumulative drawdown at the time of maximum extent of drawdown, respectively.

The hydraulic sink was characterized at the end of mining and at the maximum extent (i.e., largest), which the model determined would occur 30 years after mining ceases. Drawdown is aligned parallel to the BRF and decreases rapidly away from it to the east and west. The model predicts drawdown exceeding at least 10 feet (i.e., the 10-foot drawdown contour) extending beyond the model boundaries along portions of the southern, eastern, and northern boundaries. It is preferable to have the model extend outside the area of the predicted 10-foot drawdown contours, so the extent of those contours can be depicted accurately; however, monitoring to that extent may not be necessary. This is because the modeling accounts for variations and because the predicted drawdown is higher in those areas than if flow were allowed to cross the boundaries. Where drawdown exceeds 10 feet along the southern model boundary, it corresponds to where water levels were defined based on the proposed mining schedule of the Relief Canyon Mine. Monitoring and future iterations of the model may resolve these discrepancies.

At the end of mining, drawdown exceeding at least 10 feet (i.e., the 10-foot drawdown contour) extends to the north and south edges of the model boundaries near the BRF. The width at which there is greater than 10 feet of drawdown at the model boundaries is approximately 2.1 miles on the model southern boundary. The width at which there is greater than 10 feet of drawdown on the northern model boundary is approximately 2 miles. At the end of mining, drawdown beneath the Packard Pit will range from approximately 10 to 50 feet (see Figure 4.32 in Piteau Associates 2019a).

The maximum extent of drawdown due to POA 11 operations is predicted to occur approximately 30 years after the end of mining. At that time, drawdown greater than 10 feet would extend to the northern, western, and southern boundaries of the model. A zone along the southern boundary is predicted to have more than 160 feet of POA 11-related drawdown. Thirty years after mining ends, the maximum drawdown beneath the Packard Pit would be approximately 40 to 60 feet.

The hydraulic sink will have the following characteristics at the end of mining and maximum extent (**Table 3-16**). Northern and southern extents are measured from the maximum drawdown at the end of mining, which would occur beneath the eastern side of the Rochester Pit where the pit expands into the BRF (see Figure 4.32 in Piteau Associates 2019a). Eastern and western extents are measured at right angles from the BRF.

Table 3-16
Maximum Extent of the Hydraulic Sink

Drawdown	End of Mining (Year: 2033)	Maximum Extent (Year: 2063)
Northern Extent (feet)	+37,000	+37,000
Southern Extent (feet)	+24,000	+24,000
Eastern Extent (feet)	11,350	13,125
Western Extent (feet)	10,925	+13,125
Drawdown (feet)	760	210
Groundwater elevation (feet amsl)	5458	-

+ Indicates that the 10-foot drawdown contour extends beyond the boundaries of the groundwater model.

Groundwater levels recover to approximately 5,979 feet in backfilled material approximately 30 years after mining ends in Rochester sub-pit 4; but, in sub-pits 1 through 3, groundwater levels would be approximately 400 feet below pre-pumping levels. This is more than 260 feet below POA 10 water levels, and more than 200 feet below second quarter 2017 water levels (these were the most up-to-date numbers available at that time). Water levels would rise to approximately 5,943 feet 300 years after mining ends in sub-pits 1 through 3, which is approximately 65 percent recovery to the pre-pumping groundwater elevation of approximately 6,200 feet. After 1,000 years after mining ends, the pit lake and nearby groundwater elevation are predicted to be approximately 18 feet higher, or approximately 68 percent recovery to pre-pumping groundwater levels (Piteau Associates 2019b).

Uncertainties in predicted groundwater flow rates and directions leave open the possibility that in some portions of the Rochester Pit lake there may be groundwater flow-through. This would be due to a combination of the following:

- Complex site hydrogeology
- Sensitivity of flow associated with the selection of hydraulic conductivity values assigned to the BRF and bedrock aquifers near the pit
- Simulation of a low-permeability fault along the southeast side of the pit
- Uncertainties with inflow from the BRF

These uncertainties would be addressed through appropriate monitoring of groundwater levels during and after mining, as discussed in **Chapter 4**.

There are poor correlations between precipitation and spring flow in most monitored locations, suggesting that springs are supplied, at least in part, by discharge of bedrock groundwater. The additional bedrock drawdown could therefore result in less groundwater discharge to shallow alluvium and to springs, thus decreasing spring discharge and surface water flows. Impacts on surface water quantity for affected seeps and springs are discussed below.

POA 11 includes development of several facilities onto previously undeveloped land; these include the Stage VI HLP and expansions of the West, South, and Packard RDSs. These facilities will reduce recharge to groundwater, which would lower groundwater levels. Springs and surface riparian systems that depend on groundwater discharges could be reduced as a result (see Figure 2.1 in Piteau Associates 2019a). The decreased groundwater levels could lead to a reduction in discharge from hydrologically connected springs.

The POA 11 mine plan and projected water use are within current water rights permits, so no additional water rights are necessary for POA 11 operations. CRI obtained senior water rights that are needed to replace out-of-priority consumptive use associated with evaporation from the post-mining Rochester Pit.

Groundwater Quality

Groundwater quality is not likely to be affected if the Rochester Pit lake is a terminal sink, as is predicted under the Proposed Action (Piteau Associates 2019a).

At 300 years, when the lake is predicted to have recovered from mine pumping to an elevation of 5,943 feet, predicted chemistry does not contain enough ARD constituents to prevent the lake from becoming a natural biological system. Natural biota, including algae, can be expected to ultimately flourish in the long-term pit lake. As such, biological detritus is reasonably expected to accumulate at the lake bottom.

Lake bottom organic sediments retard outflow of constituents by three primary mechanisms. First, organic lakebed materials exhibit low conductivity, reducing outflow volumes. Second, they provide a substrate for sulfur-reducing bacteria to generate sulfides and carbonates, which convert sulfate into insoluble sulfides and chemically trap cadmium as cadmium sulfide, copper as copper sulfide, and lead as lead sulfide. Cadmium, copper, fluoride, and lead are all incorporated into carbonates by ion substitution. Fluoride is further sequestered as fluorapatite in lakebed sediments with sufficient calcium and phosphorus. Third, organic lakebed sediments exhibit effective adsorption for cadmium, copper, and lead. Because the existing geochemical model does not and cannot reasonably incorporate biological processes over the course of centuries without undue speculation, the model is deemed conservative with respect to the ultimate chemistry of the lake upon recovery.

Groundwater quality could be affected if the Rochester Pit lake is not a terminal sink for groundwater flow. If the pit lake is not a terminal sink, some of the pit water could migrate out of the pit into the bedrock aquifer or along the BRF. If a flow-through pit lake scenario does occur, it would develop centuries after the cessation of mining when depressed groundwater levels from mine pumping have recovered. A flow-through pit lake is governed by NDEP under Profile I standards. Because the prospect of a flow-through pit lake would occur centuries into the future, it is difficult to refine expected chemistry outflow to groundwater with confidence beyond the existing model without producing speculative results.

Groundwater quality is not expected to degrade as a result of a decrease in recharge area associated with the Limerick Canyon Stage VI and the Packard HLPs. In addition, the leak detection and control and fluid management measures that are part of HLP operations should result in no degradation of groundwater quality in alluvial aquifers downgradient of these facilities. The pump-back system installed prior to POA 10 would need to be evaluated to verify that it is effective in containing the existing groundwater contamination plume.

The Proposed Action is not expected to affect water quality of springs, seeps, and wetlands outside the project area.

Surface Water Quantity

To the extent that bedrock groundwater is in hydraulic communication with the overlying alluvial aquifers, drawdown in the bedrock aquifer would reduce the quantity of water discharging to springs and surface streams fed by the alluvium. For example, there appears to be a strong correlation between spring flows and bedrock pumping that suggests bedrock groundwater levels affect the discharge of springs; spring flows were much higher in 2011 following a period of low bedrock pumping from 2008 to 2011, and spring flows stayed low after 2011, when bedrock pumping increased.

Bedrock pumping also appears to affect shallow alluvial water levels, as seen in the Sage Hen Flat area, in which PW-2A bedrock pumping in mid-2015 correlates to decreased groundwater levels in alluvial wells WI-29R and MW-52B (Piteau Associates 2019a). Due to the complex geology in the area, there are localized variations in the degree to which bedrock pumping affects shallow groundwater and overlying springs. For example, there does not appear to be an effect on South American Canyon and Lower American Canyon springs from pumping in the BRF.

Construction of the Stage VI HLP and expansion of the West, South, and Packard RDS facilities may reduce recharge and the quantity of water discharging to springs and surface streams fed by the hydraulically connected alluvial aquifers. This would be due to the presence of low permeability materials at the base of the HLP and RDSs. The ephemeral streams in Limerick Canyon, Rochester Canyon, Weaver Canyon, and Packard Flat basins and any springs that might be buried by the RDS facilities would experience a further and permanent decrease in flow from alluvial aquifers. There would also be associated adverse impacts on riparian vegetation and communities that rely on these flows. The springs closest to the proposed HLPs would experience the largest impacts and could include Limerick Canyon Spring 4, McCarty Spring, Weaver Springs 2 and 3, and the Packard Flat artesian spring (**Figure 3-3**). Surface water rights associated with these springs could be affected.

Stormwater flows from the HLPs would be routed into ditches and might by conveyed to other drainages, and draindown would be diverted to e-cells; therefore, there may be less discharge of stormwater flows from the HLPs, and less water would infiltrate the alluvium from which spring flows are derived.

Surface Water Quality

Geochemical modeling of the Rochester Pit lake indicates that during the first decades the open pit would contain lower pH water with exceedances of some Profile III constituents, including aluminum, cadmium, copper, fluoride, and lead (Piteau Associates 2019a). If partially backfilled, the pit lake water would exceed Profile III concentrations for cadmium, copper, and lead (Piteau Associates 2019a). It is not clear from the available modeling whether contaminated pit lake water would resurface in springs or seeps outside the pit in the case of a flow-through pit lake. If pit lake water did flow out and discharge to downgradient springs or seeps, it is likely that attenuating reactions would occur within the aquifer rock and dilution of any remaining compounds with surrounding groundwater.

No water quality impacts are anticipated from the HLP draindown, because HLP management is engineered to maintain zero discharge facilities. Leak detection, control, and fluid management measures would be included in the Stage VI HLP design to trigger corrective action if needed.

Seeps and springs would continue to be monitored quarterly, according to the CRI mine hydrologic monitoring program and WPCP requirements.

Geochemistry

The Proposed Action would expand the Rochester Pit into more sulfidic material by deepening its lowest elevation to 5,500 feet from the currently permitted 5,975 feet, creating a pit lake. Mining into more sulfidic material would result in potential impacts on water quality in the pit lake and potential release of constituents from the RDSs. In the pit lake, the PAG material would determine the chemical evolution of the pit lake and potential impacts on water quality as described above. In the RDSs, the manner in which PAG material is stored would affect whether it would oxidize and release aqueous metals, salts, and acid under the RDSs. Seepage from RDSs can infiltrate groundwater or appear as seeps or both.

The potential for PAG material to affect the environment includes how the material is managed to limit oxidation and contact with precipitation once it is mined. The faster PAG material is covered by non-reactive rock or is submerged in water, the faster the oxidation reactions can be quenched, leaving undesirable constituents locked in the rock. Limiting potential releases from the RDSs relies on limiting infiltration of precipitation to keep PAG material as dry as possible. Conversely, pit lake water quality relies on submerging PAG materials on the pit shell as quickly as possible to deprive them of oxygen.

The pit is divided into four sub-pits. Sub-pits 1, 2, and 3 under the Proposed Action are open water, which eventually coalesce during infilling. The first sub-pit is the largest and is at the lowest elevation. It would contain a lower percentage of PAG material on its pit wall relative to other pits (Figure 5.6 in Piteau Associates 2019a) and would have rapid influx due to its low elevation and proximity to the BRF. Accordingly, PAG material would get covered quickly and would exhibit the best water quality of all the sub-pits before the sub-pit waters coalesce.

Sub-pit 2 contains up to 45 percent PAG material on its surface, depending on lake elevation (Figure 5.7 in Piteau Associates 2019a). It would exhibit low pH and elevated arsenic, cadmium, and lead for two decades before combining with sub-pit 1 (Figures 5.15 to 5.17 in Piteau Associates 2019a).

Sub-pit 3 contains up to 100 percent PAG material on its surface, declining to 25 percent PAG material at deeper elevations with varying percentages based on lake elevation (Figure 5.8 in Piteau Associates 2019a). It would remain open for more than a century before combining with the main pit lake. It would exhibit low pH and elevated arsenic, cadmium, and lead before combining with the other sub-pits.

Sub-pit 4 would contain up to 62 percent PAG material at low fill levels, grading to 38 percent PAG material at high fill elevations. Sub-pit 4 would be backfilled under all action alternatives and would not factor into the groundwater modeling.

Under the Proposed Action, PAG material is stored and encapsulated in RDSs at the end of mining operations. During this time, it is exposed to atmospheric conditions and is subject to oxidation. Because sulfides are more prevalent at depth, they are encountered in higher percentages toward the end of the mine life, shortening the storage time for most of the PAG waste rock mass. A disadvantage of storing PAG material and rehandling it is that reactive surfaces can be freshened, increasing the likelihood of further oxidation after placement. When PAG material oxidizes, acidic salts can develop on the rock surfaces. These salts and other constituents, such as acid, metals, and sulfate, can be released when exposed to water and enter the water column, so the longer PAG material is stored in atmospheric conditions, the greater its potential to release ARD constituents to the environment. The waste rock would be observed for seeps, and the surrounding groundwater would be monitored as discussed in **Chapter 4**. In addition, a WPCP from NDEP would prescribe specific monitoring locations and testing parameters.

Alternative 1—Management of PAG material in the West RDS

Alternative 1 differs from the Proposed Action only with respect to mined PAG management and permanent storage of PAG materials in the West RDS.

Groundwater Quantity

Groundwater levels, drawdown, and their projected impacts and groundwater supply are anticipated to be the same as for the Proposed Action; however, there is the potential the West RDS could leak water that would recharge the underlying aquifers and increase groundwater levels in that area. Existing monitoring requirements from the BMRR should provide adequate data to determine if any leaks occur. The proposed design of a 50-foot base layer at the bottom of the RDS composed of non-PAG material and surface cover to reduce infiltration would reduce the likelihood of groundwater recharge from this RDS.

<u>Groundwater Quality</u>
Groundwater quality impacts from Alternative 1 are anticipated to be the same as for the Proposed Action; however, there is the potential that the West RDS could leak contaminated water that might reach the underlying aquifers and degrade groundwater quality. The proposed design of a 50-foot base layer composed of non-PAG material and surface cover to reduce infiltration would reduce the likelihood of contaminated water infiltrating below the non-PAG base material.

<u>Surface Water Quantity</u>
Surface water flows are likely to be the same as under the Proposed Action. Establishing a growth media cover on the West RDS may reduce runoff, compared with the Proposed Action, so there may be a reduction in streamflow. Proposed mining operations, including runoff controls and closure operations, would be the same as for the Proposed Action.

<u>Surface Water Quality</u>
Alternative 1 is similar to the Proposed Action, except that the PAG waste rock would be encapsulated in two cells on the West RDS. Surface water quality is likely to be the same as or better, compared with the Proposed Action. This is because establishment of a growth media cover on the West RDS may reduce runoff, compared with the Proposed Action, and result in less sedimentation.

<u>Geochemistry</u>
Alternative 1 is similar to the Proposed Action, except that the PAG waste rock from the Rochester Pit would be encapsulated in two cells on the West RDS. The advantage of this is that if the PAG material were to oxidize and increase the potential for the release of constituents, it would occur in a single location. CRI would need to remediate a single RDS, leaving the other RDSs clean, if needed, for additional cover or other remedial strategies. The alternative still retains the disadvantage of PAG material being stored in the elements pending final placement. It would also have to be moved and thereby rehandled.

Having large masses of PAG material in only two cells would increase the potential for the cells to become reactive, in which case they may heat up and cause convection in the RDS. This speeds up any chemical reactions in the RDS, increasing the potential for the release of constituents. The advantage is that the PAG material would be limited to one RDS; so, in the unlikely scenario that remediation does become necessary, it would be done in only one location.

Alternative 2—Partial Backfill of Pit Lake
Alternative 2 is the same as the Proposed Action, except for management of the Rochester Pit lake. No backfill would be placed in sub-pit 1. In sub-pits 2 and 3, non-PAG backfill material would be placed 25 feet above the saddle elevation where the pits coalesce (**Figure 2-4**). In sub-pit 4, 25 feet of backfill material would be placed, as in the Proposed Action, but it would be amended with lime to raise the acid neutralization potential.

<u>Groundwater Quantity</u>
Groundwater levels, drawdown, and their projected impacts are anticipated to be similar to those of the Proposed Action, except in the immediate vicinity of the Rochester Pit. There would be less open water in the Rochester Pit under Alternative 2, so evaporation would be smaller, resulting in less water loss due to evaporation; therefore, groundwater levels would recover faster after the end of mining. The potential that the pit lake would become a flow-through system would be higher than under the Proposed Action. This is because pit water levels would rise more quickly through and above the partial backfill and would experience

less evaporation; therefore, the pit water balance would be less favorable for the pit to become a terminal lake for groundwater flow. Away from the Rochester Pit lake, groundwater flow rates and directions are expected to be the same as for the Proposed Action.

Groundwater Quality

Under Alternative 2, the pit lake has a higher potential of being flow-through than under the Proposed Action; however, any water released from the pit lake would be of better quality with respect to Profile III constituents. This would be due to reactions with the lime amendments placed in-pit backfill materials. Groundwater in-pit backfill materials would be of better quality due to reactions with the lime amendments placed in the backfill.

Surface Water Quantity

Surface water flows are expected to be the same as under the Proposed Action.

Surface Water Quality

Surface water quality would be similar to that of the Proposed Action, except in the Rochester Pit lake, where backfilling sub-pits 2 and 3 would increase the pH and reduce elevated metal levels prior to coalescing with the main pit lake. As a result, if the pit lake does flow through to groundwater, it would be less likely to affect water quality.

Although geochemical modeling predicts that concentrations of metals in the pit water would be lower than under the Proposed Action, due to the precipitation of minerals and buffering of pH from the lime (Table 5.24 from Piteau Associates 2019a), several major ions (calcium, sulfate, bicarbonate, and chloride) are predicted to have higher concentrations in the pit water due to leaching from the backfill and reaction of the lime amendment. Calcium, modest sulfate levels predicted for the lake, and bicarbonate are reasonably expected to produce biological activity and development of lakebed deposits that aid in reducing heavy metals concentrations in the lake. Additionally, increased alkalinity reduces aquatic toxicity of cadmium and lead.

Geochemistry

Alternative 2 would reduce PAG-related impacts compared with the Proposed Action because sub-pits 2 and 3 would be backfilled with lime-amended oxide. The backfill would cover the PAG material on the pit shell; incoming water would rise quickly in the sub-pits, saturating PAG material on the pit shell quicker than under the Proposed Action. The lime amendment would inhibit oxidation of acid-generating materials in those sub-pits and reduce the potential for release of pollutants. In addition, the non-PAG backfill could help adsorb some ARD constituents before they enter the water column; therefore, compared with the Proposed Action, the backfill alternative would produce slightly better long-term water chemistry in the main pit lake and would increase pH and reduce elevated metal constituents in sub-pits 2 and 3 prior to coalescing with sub-pit 1.

Cumulative Impacts

Proposed Action

Past and Present

Past and present mining at the site has affected water resources. The primary impact on groundwater quantity has been from dewatering the bedrock aquifer system to provide water for mine operations.

Groundwater quality impacts are primarily related to historical process leaks, which are subject to ongoing remedial activities.

Surface water quantity impacts are related to covering American Canyon Spring as part of POA 10 operations and reduction in flow. There are no known impacts on surface water quality.

RFFAs

POA 11 activities that would result in cumulative impacts on surface water and groundwater are an expansion and deepening of the Rochester and Packard Pits; expansion of the West, South, and Packard RDSs; construction of the Stage VI HLP; and operation of a new water supply well to provide makeup water for Packard Mine HLP operations. Dewatering will increase by the additional POA 11 water needs for the Limerick Canyon Stage VI HLP, the Packard HLP, and associated processing facilities.

At the maximum extent of groundwater drawdown, cumulative drawdown from POA 10 and POA 11 mining will have a larger area of more than 10 feet of drawdown than the incremental POA 11 drawdown. The cumulative drawdown greater than 10 feet extends to the northern, western, and southern boundaries of the groundwater model and extends approximately 2.7, 3.4, and 1.3 miles along those model boundaries. The cumulative drawdown is predicted to exceed 210 feet in one section along the southern model boundary. Thirty years after mining ends, the cumulative drawdown beneath the Packard Pit is approximately 45 to 65 feet. Modeling shows that groundwater levels will not return to pre-pumping elevations for more than 1,000 years after mining ends at the Rochester Pit.

The Proposed Action extends groundwater quantity impacts much farther in time than is projected for POA 10. Groundwater flow is permanently altered through creation of a groundwater sink in the Rochester Pit. The sink would be subject to permanent evaporation losses.

The Proposed Action would exhibit minimal additional risk to groundwater quality if the Rochester Pit remains a terminal sink; however, if portions of the pit enter into a hydrologic flow-through situation, then groundwater quality would be adversely affected in the downgradient, southwest direction.

Cumulative Impacts

The site is geographically isolated, such that groundwater and surface water impacts from past, present, and proposed mining at the site do not combine with impacts from other projects, other than POA 10 activities.

No Action Alternative

Past and Present Actions and RFFAs

The No Action Alternative would result in additional dewatering of the bedrock aquifer system. This would be due to well pumping that supplies water to the POA 10 HLP processing facilities. Groundwater quantity would be affected until sometime between 2110 and 2130, depending on the amount of groundwater actually used. Groundwater flow would be permanently altered through creating a groundwater sink in the eastern portion of the Rochester Pit. American Canyon Spring would be covered by an HLP, which would reduce infiltration and therefore reduce flow to American Canyon Spring.

The No Action Alternative exhibits minimal additional risk to groundwater quality, except in the vicinity of the Rochester Pit backfill area, where salts would concentrate as a result of evaporation. The chemistry of that seasonal expression would be mitigated by the lime in the backfill.

Surface water quantity and quality would be affected by the reduction in hydrologically connected groundwater that discharges into creeks or supplies spring and thus reduces surface flows.

Cumulative Impacts

The site is geographically isolated, such that groundwater and surface water impacts from past, present, and proposed mining at the site did not, do not, and would not combine with impacts from other projects.

Alternative 1—Management of PAG material in the West RDS

Cumulative impacts under Alternative 1 would be similar to those described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake
Cumulative impacts under Alternative 2 would be similar to those described for the Proposed Action.

3.9 GEOLOGY AND MINERALS

3.9.1 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 2015). 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 can be found on Figure 2-2 of the Geochemistry Characterization Report (SRK 2018b).

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 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 2012b). Textural variations result in strong vertical layering, due to contrasting hydraulic properties (SWS 2010). 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.

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; however, both formations become increasingly sulfidic with depth, with a mixture of iron and base metal sulfides. The key sulfide minerals identified in previous 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 (BLM 2016a).

Additionally, there are oxidized and partially oxidized acidic sulfur salts on some rock surfaces in mineralized zones. When exposed to oxygen and moisture over time, sulfur-bearing rocks can react as follows:

- Iron sulfides (FeS and FeS_2) oxidize to ferric iron, sulfate, acid, and acid sulfosalts in reactions that are catalyzed by the resulting ferric iron, which can cause autocatalytic, runaway ARD.
- Base metal sulfides, such as those of copper, nickel, lead, and zinc are not autocatalytic upon oxidation, but their breakdown is accelerated in acidic environments. They can release toxic metals and metaloids, but typically with less acidity than pyritic sources.
- Oxidized sulfur-bearing salts from previous oxidation reactions often harbor residual acid and metals, which can dissolve in contact with water. They tend to occur naturally at the transitional boundary between oxide and non-oxide materials at mines or can develop in non-oxide materials after exposure to air and moisture. These sulfur-bearing salts can dissolve in water, releasing residual acid, metals, and sulfur. They tend to produce ARD upon initial flushing, but their leachate chemistry typically attenuates faster than sulfidic sources.

Due to the variability in ARD sources at the mine, SRK related the potential for ARD generation to sulfur content, rather than sulfide content as is traditionally done in mining. This provides a conservative and useful screening tool at this mine to separate PAG from non-PAG (0.4 percent sulfur by weight).

The potential for PAG materials to cause ARD either from the RDSs or from the pit wall surfaces is discussed in **Chapter 4**. Details of the mineralization of materials at the site are set forth in the Geochemical Characterization Report (SRK 2018b), with a generalized depiction of increasing sulfur content on Figure 5-1 of that document.

Seismicity

Construction of mine facilities is regulated by standards of the Uniform Building Code, and Pershing County currently uses the 2006 code (International Code Council 2006). The seismic zone designation throughout Pershing County is D1, on a scale ranging from 1 (indicating less damage expected) to 4 (indicating the most damage expected). Pershing County does not have specific seismic 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 United States Army Corps of Engineers (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 on the Richter scale, yielding a horizontal ground acceleration of 0.12 g (CRI 2015a). 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 6.0) 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 3-4**). 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

See **Section 3.8.1**, Geochemistry, for a description of the rock characterization within the project area.

3.9.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, operations would continue, based on current authorizations under the previously approved mining plans of operation and reclamation and closure. Materials would be handled according to the approved POA 10. No pit lake occurs under POA 10.

Proposed Action, Alternative 1, and Alternative 2

All of the action alternatives would effectively make underlying minerals unfeasible to access by further open pit mining.

Cumulative Impacts

The project area is considered for cumulative impacts on geology and minerals. Mining and exploration in the project area contribute to mineral resource depletion, removal of mineral resources from availability for development, and topographic changes; these activities can affect geochemical characterization, which is discussed in **Section 3.8**.

3.10 Rangeland Management

3.10.1 Regulatory Framework

For BLM-administered public lands, the foremost authority that provides for grazing on public land is the Taylor Grazing Act. It was passed on June 28, 1934, to protect public rangelands and their resources from degradation, to provide an orderly use to improve and develop public rangelands, and to stabilize the livestock industry. Following various homestead acts, the Taylor Grazing Act established a system for allotting grazing privileges. The FLPMA and the Public Rangeland Improvement Act of 1978 also provide authority for managing grazing on public rangelands. Grazing administration is governed by 43 CFR 4100.

All applicants for grazing permits must also meet the qualifications for public land grazing privileges that are specified in the BLM's grazing regulations, including control over accepted base property, which is private property recognized by the BLM as having preference (or priority) for the use of grazing privileges.

An allotment is a designated area or management unit that allows grazing and can be made up of multiple pastures. The allowed use of grazing on each allotment is determined based on allocated animal unit months

(AUMs). An AUM is equal to the approximate amount of forage needed to sustain 1 cow and her calf for a month.

3.10.2 Affected Environment

Currently, the project area is available for livestock grazing with four allotments and 8 permittees overlapping the project area (**Table 3-17** and **Figure 3-7**). The four allotments total 760,937 acres, with 2 percent (12,193 acres) overlapping the project area. Grazing allocations in each allotment range from 11 to 2,139 AUMs. 65 percent of the permits are for cattle, with the remaining permits for sheep grazing. Cattle graze the allotments year-round while sheep graze the allotments in the spring and fall, as they move from winter to summer grazing areas. **Table 3-18** shows grazing allotments, permitted AUMs, and grazing periods in the project area.

Table 3-17
Grazing Allotments in the Project Area

Grazing Allotment	Total Acres	BLM Acres	Acres within the Project Area
Coal Canyon-Poker	176,131	97,800	6,057
South Rochester	255,331	172,000	1,637
Star Peak	171,519	81,300	48
Rawhide	157,956	126,600	4,608
Total	760,937	477,700	12,350

Table 3-18
Grazing Allotments and Permittees

Authorization Allotment	PERMITTEE					
	Number of Heads	Type	Annual Start Date	Annual End Date	Percent Public Land	Permitted AUMs
2702028	**BINGO WESNER**					
Coal Canyon-Poker	64	Cattle	11/01	11/30	100	63
2702031	**DUNCAN FAMILY TRUST**					
Coal Canyon-Poker	493	Cattle	03/01	07/15	60	1,332
	36	Cattle	07/16	10/31	60	77
	3	Cattle	07/16	10/31	100	11
	493	Cattle	11/01	02/28	60	1,167
2702040	**JOHN OLAGARAY**					
Coal Canyon-Poker	2000	Sheep	03/20	03/31	93	147
	700	Sheep	04/25	05/01	93	20
	2000	Sheep	10/01	10/26	93	318
Rochester	700	Sheep	04/01	04/24	100	111
	537	Sheep	03/01	02/28	100	1,289
2700108	**JOHN OLAGARAY**					
Rawhide	835	Sheep	04/01	04/24	100	132
2700183	**THE SHINING K**					
Rochester	138	Cattle	01/01	10/31	100	1,379
Rawhide	214	Cattle	01/01	10/31	100	2,139
2702045	**VESCO RANCH**					
Rawhide	30	Cattle	04/01	11/30	100	241

Authorization Allotment	PERMITTEE					
	Number of Heads	Type	Annual Start Date	Annual End Date	Percent Public Land	Permitted AUMs
2703812	**CRAWFORD CATTLE**					
Rochester	44	Cattle	04/01	12/31	100	398
Rawhide	40	Cattle	04/01	12/31	100	362
2700176	**JIM C. ESTIL**					
Rochester Common	166	Cattle	03/01	02/28	39	777

3.10.3 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, CRI would not expand the mine, and associated effects on rangelands would not occur. Under the No Action Alternative, CRI has constructed a four-strand perimeter fence around the POA 10 boundary that excludes livestock from 4,838 acres. In the POA 10 EIS, the BLM determined that there would be no adjustments to AUMs associated with excluding livestock from the POA 10 area (BLM 2016a).

Proposed Action

The Proposed Action would fence off the proposed HLPs and the pits, but the remainder of the project area would be open to grazing (**Figure 2-1**). The Proposed Action includes 2,748 acres of disturbance for mining activities. Reclamation would occur concurrently with mining activities, and reclaimed areas would be open to grazing once reclamation standards are met.

The proposed Packard Flat Road improvements would permanently remove 16 acres of vegetation, while the power line would temporarily disturb 341 acres outside of the POA 11 boundary during construction. Areas disturbed during construction of the power line would be reclaimed after construction, and grazing would resume on these lands.

Most of the area disturbed by mining would be reclaimed after mining is completed and the perimeter fencing would be removed; the exception is approximately 1,043 acres that would not be reclaimed: the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures (CRI 2017a). Reclamation would be completed on approximately 2,062 acres of the total proposed disturbance area (66 percent of total proposed disturbance). The loss of rangeland and forage available for grazing would be considered during the BLM allotment evaluation process.

No springs or seeps would be fenced off, and all would still be accessible to livestock. Impacts on spring flows are expected to be minimal and not extend outside of the POA 11 boundary (see **Section 3.8.2**).

Two to 3 percent of the four grazing allotment acreages are contained within the POA 11 boundary; permanent disturbance for the power line and Packard Flat Road improvements would be excluded to grazing for the duration of mining. The impact on acres within the allotments is unlikely to result in the loss of AUMs. The proposed project would include 1,043 acres of permanent rangeland loss, which would last beyond reclamation.

Alternative 1—Management of PAG material in West RDS

Impacts would be the same as those described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

Impacts would be the same as those described under the Proposed Action.

Cumulative Impacts

The Proposed Action would likely not result in the loss of AUMs; the project area covers only 2 to 3 percent of the acreage in the four grazing allotments (**Table 3-17**). Direct and indirect impacts on grazing would be minimal from the Proposed Action; therefore, no cumulative impacts are anticipated.

3.11 LANDS AND REALTY

3.11.1 Affected Environment

The project area is in the BLM Winnemucca District, HRFO, which revised its RMP in 2015 (BLM 2015a). The Winnemucca RMP includes several management goals, objectives, and actions for lands, realty, transportation, and access, on pages 2-51 through 2-52 and 2-75 through 2-83 (BLM 2015a). Additionally, the FLPMA and the 2012 Pershing County Master Plan also provide regulatory framework guidance for lands, realty, transportation, and access.

The entire project area is in Pershing County and designated land uses are agriculture, mining, and recreation (Pershing County 2012).

Rights-of-Way

The ROWs on BLM-administered public lands in the project area are associated with Packard Flat Road (also known as Relief Canyon Road) and two electrical power lines (see **Table 3-19** and **Figure 3-8**). The Packard Flat Road ROW is 60 feet wide, with an approximately 12-foot-wide gravel surface. The ROW extends north-south, from the southwestern edge of the project boundary to the Packard pit.

Table 3-19
Existing ROWs

Facility Description	Serial Number	Description
Packard Flat Road	N-91649	60-foot-wide roadway corridor, with a 12-foot-wide travel lane entering the project from the south
60kV distribution line	NV Energy ROW N-043389	60kV power line, which traverses west to east across the project area and is south of the stage IV HLP
60kV distribution line	NV Energy ROW N-093923	60kV power line, which extends from the POA 10 boundary west to the Oreana Substation

In addition to Packard Flat Road, American Canyon Road is an 8- to 12-foot-wide gravel 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 public land is approximately 5.7 miles, 1.3 miles of which are within the project boundary.

Pershing County maintains ROW N92476, which is associated with American Canyon Road. It is an important access road to the CRI Mine and surrounding locations. Limerick Road and American Canyon Road are the main access roads to the CRI Mine.

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

There are also three 4kV power lines: two lines extend south from the American Canyon substation and a third line enters the American Canyon substation from the east..

3.11.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be developed and associated impacts on land use and realty would not occur. The existing ROWs outlined in **Table 3-19** would remain unchanged.

Proposed Action

The Proposed Action and expansion of POA 11 boundary (12,047.3 acres, including 8,654.5 acres of BLM-administered public lands and 3,392.8 acres of CRI-owned lands) is consistent with the Winnemucca RMP; it designates land use in the project area as open for mineral exploration and development (BLM 2015a). The Proposed Action would be consistent with the agricultural, mining, and recreation land use designation for this section of Pershing County (Pershing County 2012).

Currently, there is relatively little public use of the project area; livestock grazing impacts are discussed in **Section 3.10**. The project area represents a very small proportion of the BLM-administered public lands available in the region; therefore, impacts would be negligible.

Rights-of-Way

The Proposed Action would obtain a new power line ROW and would relinquish two power line ROWs (**Table 3-20**). In addition, CRI would relocate a portion of Packard Flat Road requiring an amended ROW, as described in **Table 3-20** and would widen a portion of Packard Flat Road (**Figure 3-8**). (For impacts on traffic and transportation, see **Section 3.15**.) The proposed ROW actions would not affect the impact indicators listed above. The proposed new power line ROW, two relinquished power line corridors, and amended Packard Flat Road ROW would not adversely affect land use or utility availability in the project area.

Table 3-20
Proposed ROW Actions

Facility Description	Serial Number	Proposed ROW Action	ROW Dimensions/Acreage
Packard Flat Road	N/A	Relocate 2.07 miles of Packard Flat Road and construct 1.95 miles of new road within the proposed POA 11 boundary	Relocation: 60 feet wide by 10,930 feet long/15.1 acres Construction: 60 feet wide by 10,296 feet long/14.2 acres
Packard Flat Road	N/A	Widen 2.85 miles of Packard Flat Road to have a running width of 24 feet	60 feet wide by 15,048 feet long/20.7 acres
60kV distribution Line	NV Energy ROW N-043389	Relinquish and remove NV Energy's 60kV distribution line, NVN 043389, in its entirety[1]	75 feet wide by 19,471 feet long/33.5 acres
60kV distribution line	NV Energy ROW N-093923	Relinquish and remove a 5,168-foot (0.98-mile) portion of NV Energy's 60kV distribution line, NVN 093923	40 feet wide by 5,168 feet long/4.7 acres
Proposed 120kV distribution line	N/A	Construct a 45,548-foot-long, 120kV, high voltage distribution line from the Oreana Substation to the Panama Substation	40 feet wide by 45,548 feet long/41.8 acres

[1] The ROW for NVN 043389 is 19,471 feet long, 11,124 feet of which currently exists.

Alternative 1—Management of PAG material in West RDS
Impacts would be the same as those described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake
Impacts would be the same as those described under the Proposed Action.

Cumulative Impacts
No direct or indirect impacts are anticipated from the proposed ROW actions; therefore, there would be no cumulative impacts.

3.12 Social Values and Economic Conditions

3.12.1 Affected Environment

The study area for the socioeconomics analysis is Pershing and Humboldt Counties, with additional data provided for the cities of Lovelock, Winnemucca, and Imlay. The BLM based the specific study area on the primary location of workers employed at the mine and the location of most goods and services purchased to support mine operations and employees. Sammons/Dutton LLC (2017) developed a baseline socioeconomic and environmental justice report that provides the basis for the summary below.

Employment
In 2015, the employment in the two counties was 12,611. This represented a net gain of more than 274 jobs, compared with 2010. Although employment gains were registered in both counties, most of the growth occurred in Pershing County (Table 3 in Sammons/Dutton 2017). In 2016, the Coeur Rochester and Packard Mines supported an estimated 651 jobs in Pershing County and elsewhere in northern Nevada. Of the total, 316 were direct employees of CRI or long-term contractors employed at the Coeur Rochester and Packard Mines. An estimated 335 other jobs in the region were supported by purchases by the Coeur Rochester and Packard Mines and its contractors and employees (Sammons/Dutton 2017).

Mining plays a critical role in the economies of both counties, generating substantial payrolls for their workers. Personal income data for Pershing County showed total earnings of nearly $149 million for workers employed in the county in 2015. This included nearly $58 million in the mining sector, approximately 40 percent of which was in conjunction with the CRI Mine. In 2015, the mining industry generated total labor earnings of $233.3 million in Humboldt County, one-third of the total labor earnings of county residents. Of CRI's total payroll, nearly 50 percent accrues to Pershing County residents and 24 percent accrues to Humboldt County residents (Sammons/Dutton 2017).

Housing
Table 11 in the baseline socioeconomic report shows housing inventories in Pershing and Humboldt Counties (Sammons/Dutton 2017). The trend includes an increase in the total occupied housing in Pershing County since 2010, with increases in renter-occupied housing more than offsetting a decline in owner-occupied housing. Trends in occupancy show an increase in owner-occupied housing and also a greater reduction in the number of renter-occupied units.

Public Education
The Pershing County School District is based in the town of Lovelock and the Humboldt County School District is based in Winnemucca and the two provide public education in the study area. Fall enrollment in the Pershing County School District (grades K-12) declined steadily over the past decade, from a high of 790 in 2005/2006 to 627 in 2016/2017 while fall enrollment in the Humboldt County School District remained constant with 3,399 students enrolled in the 2005-2006 and 2017-2017 school years (Sammons/Dutton 2017).

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.

Local Government Fiscal Conditions

Pershing County's budgeted general fund revenues for the current and past two fiscal years have ranged between $9.9 million in fiscal year 2014/2015 and $11.1 million in fiscal year 2011/2012. A 2016 analysis of CRI's economic contribution estimated that the portion of the sales and use, property, and net proceed taxes paid in 2016 that accrued to Pershing County represented about 11 percent of its total current revenue receipts in that year (Sammons/Dutton 2017).

3.12.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Implementing the No Action Alternative would not extend the mine life by 10 years. Without the authorization of the Proposed Action, the expansion and construction described under the Proposed Action would not occur, nor would the economic effects associated with the extended period of operations. Rather, CRI would cease mining in 2023 and, after 3 years of residual leaching, would enter final reclamation, which is anticipated to require an additional 2 years. Effects on social values and economic conditions would be as described in the POA 10 EIS (BLM 2016a).

<u>Income and Employment</u>

The economic stimulus associated with the existing CRI operation would continue at current levels through 2023 under the No Action Alternative. Mining would cease in 2023, and the operation would transition to residual leaching and reclamation. Approximately 90 percent of the current direct employment at the mine would be reduced after mining stops, a net reduction of approximately 284 employees. A comparable number of indirect and induced jobs would be affected in Pershing and Humboldt Counties and elsewhere in northern Nevada. The adverse effects of these job losses would be most heavily felt in Pershing County.

Labor income of the mine's employees and many of the jobs supported by purchases by mine workers would be reduced correspondingly. This would include contracted services, as well as the consumer expenditures of employees. Total CRI-related labor income under the No Action Alternative during the remaining life of the mine is estimated at $285 million, a $182 million reduction over total labor income, compared with that under the Proposed Action. Most of that income, as well as the future reductions, would accrue to resident households in Pershing County.

Local businesses would collectively experience declines in sales revenues. The relative magnitude of the declines would drive the reductions in indirect and induced employment. Some business owners may find it necessary to decrease or cease operations. Commercial real estate vacancies would likely increase, and some real estate values would likely decline. The decreases would likely be long term, absent other mining or industrial development. Some displaced workers may choose to retire, while others may transfer to other CRI operations.

Many or most displaced CRI workers and contractors would seek other employment, temporarily pushing local unemployment upward. Over the long term, some emigration would occur, and some workers may exit the labor force. The net result under the No Action Alternative would be an economic contraction of the Pershing County economy.

<u>Population and Housing</u>

Unless another major mining or other industrial project were to begin operations in roughly the same time frame, Lovelock and Pershing County would likely experience a substantial loss of population in 2024 due to reduction in CRI employment. Many direct CRI and contractor employees would likely relocate to seek employment or, given an option, would accept transfers to other CRI operations.

In 2016, 145 CRI workers lived in Pershing County (Sammons/Dutton 2018). Given the average household size of 2.31 persons in 2016, an estimated 335 people, or about 5 percent of the 2016 Pershing County population of 6,690, is associated with CRI direct employment (US Census Bureau 2016). These estimates do not include the 14 CRI contract workers because the residency of contract employees is unknown. If CRI contract workers living in Lovelock and Pershing County were to emigrate after employment, population losses in Lovelock and Pershing County would increase.

It is not known how many of the employees who would lose employment in 2023 under the No Action Alternative would relocate, but emigration of CRI employees and their families would likely represent a substantial population loss for Lovelock. Between 2007 and 2011, when CRI ceased mining and reduced the CRI workforce by about 80 percent, Lovelock's population declined by about 12 percent. The national recession also occurred during that period, so it is difficult to estimate the population loss associated with CRI employment reductions and any loss associated with the recession.

In 2016, 145 CRI direct workers lived in Humboldt County, which includes the larger community of Winnemucca (Sammons/Dutton 2018). Assuming all 145 direct workers reside in Winnemucca, the CRI direct employment and households represent just under 2 percent of Winnemucca's 2016 population of 7,881 (US Census Bureau 2016). Population loss in Winnemucca and Humboldt County would be less certain, given the larger population base, fewer resident CRI employees, and increased likelihood for workers to find alternative employment.

Absent another project starting in roughly the same period, some of the CRI employees and their spending may relocate to seek employment. This would contribute to further population loss, particularly in Lovelock and Pershing County.

Population loss in Pershing County, particularly in Lovelock, would likely result in an adverse impact on the housing market. As CRI employees and perhaps some indirect and induced employees relocate, the number of houses available for sale would increase, potentially depressing residential real estate values. There also would likely be a reduction in demand for rental properties, depressing the rental market. Again, this phenomenon would be most severe in the Lovelock area, given the relatively large percentage of CRI workers living in that community, relative to its size.

Public Facilities and Services, Including Schools

Cessation of mining at CRI in 2023 and the likely population emigration would decrease the demand and use of public water and wastewater systems, law enforcement, fire suppression, emergency medical facilities, and hospitals, primarily in Lovelock and Pershing County. Cessation of mining and the likely resulting population loss would reduce user fee revenues. Coupled with the reduction in CRI tax payments that accrue to local governments, reductions in revenues for local service providers would correspondingly result in diminished budgets, reduced staffs, and potentially decreased service levels for some public facilities and services. These effects would occur primarily in Lovelock and Pershing County and 10 years sooner under the No Action Alternative than under the Proposed Action.

CRI employees and their families use Pershing General Hospital in Lovelock for a variety of health care needs. They also rely on the hospital for physicals and occupational health care. Consequently, the hospital would experience reduced patient care revenues under the No Action Alternative.

Pershing and Humboldt County schools would likely see enrollment declines in conjunction with the cessation of mining and eventual closure and completion of final reclamation. The total number and grade distribution of departing students is unknown; this would depend on household demographics in place at the time, the extent to which laid off householders find other employment in the area and remain, and the extent to which they relocate. Based on current residency patterns, the Pershing County School District would likely lose more students than would the Humboldt County School District. School district administrations would likely find it necessary to reduce staff and expenditures in response to the declines in student enrollment.

Fiscal Effects

The cessation of mining and production at CRI would have fiscal repercussions for Pershing and Humboldt Counties, Lovelock, local school districts, and the State. Production cessation would lessen State and local sales and use tax, ad valorem and net proceeds taxes, and other license and fee revenues paid by CRI, its employees, and workers whose jobs are indirectly supported by CRI.

The fiscal effects under the No Action Alternative would occur as mining ceases in 2023. The level of company spending for operating and maintenance would continue to decline due to reduced production levels and staff, resulting in declining ad valorem taxes and other revenues in 2024 and beyond.

Projections of future CRI tax revenues under the No Action Alternative are not available; however, the scale of the differences is reflected in the cumulative gross value of production, which is estimated at $1.3 billion under the No Action Alternative and $3.7 billion under the Proposed Action. Pershing County would be directly affected as a result of lower tax collections, and the Pershing County School District would be affected by declining enrollments on the state-authorized level of spending. Declining demand and use may allow expenditures to decline, but the levels of service may also decline.

Social Effects

Implementing the No Action Alternative would likely result in substantial social and economic disruption from the reductions in employment at CRI and the relocation of workers and families from Lovelock and Humboldt County.

To help achieve economic and community sustainability post-closure of the Rochester mine, CRI has provided support to the Pershing County Economic Diversification Authority. This agency focuses on business retention and expansion, community collaboration, and business recruitment and economic development training. It also supports the Lovelock Depot Visitor Center/Pershing County Chamber of Commerce, which promotes tourism and business development throughout the county. CRI has provided monetary contributions and funded technical assistance for these organizations, and CRI employees serve in leadership capacities on these organizations' boards of directors.

Proposed Action

The Proposed Action would result in additional temporary construction and continued operation of the mine for 10 years beyond currently authorized operations. Impacts described under the No Action Alternative from mine closure would also occur under the Proposed Action, but they would be at a delayed time frame due to the extended mine operation time frame of 10 years.

Income and Employment

In 2016, CRI employed 302 CRI employees and 14 contract employees. In addition, contract construction work at the operations supported approximately 100 on-site construction jobs. Contractors engaged by CRI make associated purchases for lodging, food, and sundry items while they are living in the area. Many employees from outside the area may purchase gasoline, food, and a limited range of sundry items locally. Taxes and fees paid under existing operations and purchases of goods and services by the mine, its contractors, and employees support the equivalent of 335 additional jobs in the region. Combined payroll for 2016 operations for direct employees of CRI was estimated at $24.6 million. Including indirect and induced jobs, CRI supported $45.3 million in associated labor income in Pershing County and elsewhere in Nevada.

Construction. The Proposed Action would support an estimated 160 job-years of temporary employment during a multiyear construction period for the proposed facilities.[5] Most of that effort is anticipated to occur in 2020 and 2021, with an average of 58 on-site jobs over a 19-month period and a peak of 117 workers during mid-2020. Some of the construction workers and contractors may come from, for example, Pershing and Humboldt Counties; however, most are likely to come from more distant locations and either commute to the area daily or relocate to the area temporarily on a weekly basis.

Indirect and induced effects associated with CRI's operations are business revenues from and jobs at mine service firms and at retail and other consumer-oriented businesses that serve the mine-related population. Materials, equipment, and services would be purchased both locally and elsewhere in Nevada. This is particularly the case in the Reno/Sparks area, where many major mining service and construction firms are located. A temporary increase in spending is anticipated in association with construction: An estimated 44 additional indirect and induced jobs would be supported in the region by contractor and workforce spending.

Operations. No additional operations employees are anticipated beyond current levels under the Proposed Action. Implementing POA 11 would sustain the current operating workforce and associated indirect and induced jobs at current levels for up to 10 years, followed by several years of lower production and employment. During this time residual leaching, closure, and reclamation would provide employment for approximately 10 percent of the operations workforce following the completion of active mining.

Summed over time and expressed in terms of equivalent job-years (1 job for 1 year), the incremental employment associated with POA 11 would be an estimated 6,576 job years of long-term employment. In total, the Proposed Action would generate an estimated $467 million in additional labor income over the extended life of the mine. Proposed project-related purchases under POA 11 would also initiate additional indirect economic effects, such as those described above. Continued purchases of goods and services would support other economic activity, business income, and profit for vendors and would produce sales and use tax revenues.

<u>Population and Housing</u>

More than 70 percent of current CRI and on-site contractor employees reside in Pershing and Humboldt Counties, while approximately 26 percent of CRI's current workforce resides in Fallon, Fernley, the Reno/Sparks area, or other more-distant Nevada or out-of-state communities (Sammons/Dutton 2018).

Construction. Implementing the Proposed Action would trigger an influx of temporary workers in Pershing and Humboldt Counties, particularly in years 2020 and 2021. The construction workforce, estimated to average 58 workers, would generate temporary in-migration to the project area, although some of the jobs would likely be filled from the local workforce. Of those workers who relocate temporarily, most would be unaccompanied by households, and many would relocate to the area during the workweek only, returning to their residences on weekends.

As proposed, POA 11 includes a multi-phased construction program tied to a $210 million-plus capital investment. Approximately 85 percent of that outlay would occur in 2020 and 2021, employing a peak on-site workforce of as many as 117 construction workers. A substantially smaller temporary workforce would be employed for several months in 2025.

[5] A job-year represents the equivalent of one job for 1 year; for instance, one full-time worker or several part-time or temporary workers working for a corresponding amount of time.

Annual average unemployment in Pershing and Humboldt Counties in 2018 was reported at 4.1 percent and 3.4 percent, representing 410 unemployed individuals for both counties (BLS 2019). As a result, although some new construction jobs would be filled from the local labor force, most workers would likely come from elsewhere in northern Nevada and would reside in the area during the workweek. Elko and Reno/Sparks are two important centers for mining support and construction companies.

Temporary construction workers typically seek short-term rental accommodations in motels, recreational vehicle (RV) parks, and apartments. Lovelock and Winnemucca, the two largest communities within easy daily commuting distance to the project, have 29 motels with a total of 1,282 rooms, and nine RV parks, with a total of 468 spaces (Sammons/Dutton 2017). Few apartments are available in the communities nearest the project.

The existing accommodations would be adequate to accommodate the temporary construction workforce associated with the Proposed Action. Temporary accommodations could occasionally be fully booked during periods of concurrent peak construction-related demand and demand from I-80-related tourism/travel and local special events. During such times, nightly rates might increase, some people would park overnight on streets and in parking lots, and some individuals may be displaced to other locations, for example forced to continue to Battle Mountain to the east or Fernley to the west. Potential temporary housing shortages would most likely occur in 2021, the anticipated peak year of POA 11-related development.

The temporary construction-related demand would be a favorable impact for the local lodging industry, particularly to the extent that it would boost demand during the traditional off-season. RV parking and camping would not be allowed at the construction site, and contractors would be directed to advise construction workers against parking or camping illegally on BLM-administered public or private lands.

Operations. Because the extended period of mining and crushing authorized by POA 11 would be accomplished with existing CRI and contractor employees, no change in local or regional CRI operations-related population or housing demand would occur; consequently, little or no additional demand for conventional housing (houses, apartments, and mobile homes) is anticipated. Continued employment of the CRI and contractor workforce for 10 years would postpone the population emigration.

Public Facilities and Services, Including Public Schools

CRI's direct workforce currently accounts for an estimated 105 to 135 students enrolled in Pershing or Humboldt County schools. The county school districts would experience enrollment declines in conjunction with the cessation of mining and later with completion of final reclamation and closure.

Construction. The limited scale and duration associated with the relatively small construction workforce would not require expansion of community infrastructure or additional staffing by local governmental agencies or school districts. Most construction workers are likely to commute daily or weekly and would not be accompanied by households.

Operations. Mining and crushing during the extended period under the Proposed Action would be done by existing CRI and contractor employees; consequently, the BLM anticipates no new CRI operations-related demand on public services and facilities nor operations-related increases in public school enrollment. Cessation of mining at CRI in the 2032 to 2033 time frame and the population emigration that would likely follow would decrease demand and use of public water and wastewater systems, law enforcement, fire suppression, emergency medical facilities, and hospitals, primarily in Lovelock and Pershing County. As a result, some staffing cutbacks and changes in public services could occur.

Similarly, declines in students are anticipated when mine operations stop. The total number and grade distribution of departing students is unknown; it would depend on household demographics in place at the time, the extent to which heads of households affected by layoffs find other employment in the area and remain, and the extent to which they relocate from the community. Based on current residency patterns, Pershing County School District would likely lose more students than would Humboldt County School District. School district administrations would find it necessary to reduce staff and expenditures in response to the declines in student enrollment.

Fiscal Effects

The State of Nevada collects sales, use, and net proceeds taxes and distributes them to counties, school districts, and, in the case of sales and use taxes, to municipalities. Counties collect property taxes and distribute them to the counties, school districts, and special districts. The existing operations are taxed at the same rate per $100 of taxable value as other real property in the counties. Purchases of equipment, supplies, and construction materials, along with consumer purchases by CRI's existing workforce and other workers, are subject to sales and use taxes. In 2016, CRI paid a combined total of more than $4.3 million in ad valorem and sales and use taxes and nearly $1.7 million in net proceeds taxes. The estimated portions of those sales and use, property, and net proceeds taxes that accrued to Pershing County were equivalent to more than 10 percent of the County's total general fund revenue receipts in 2016.

The Pershing County School District receives a substantial share of CRI-generated sales and use tax payments through distributions of the local school support tax. Pershing County and the City of Lovelock received a combined $292,900. An estimated $964,500 accrued to the state's general fund. The State estimates that nearly $1.73 million was disbursed to the State's distributive education fund and statutory allocations to cities and counties across the state.

Projections of future revenues associated with the Proposed Action are unavailable due to multiple uncertainties about the cost and value of production. CRI anticipates that project operations under the Proposed Action would sustain the revenue contributions for approximately 10 years beyond those that would accrue under the presently approved mine plan.

Sales and use taxes. Although projections of future sales and use tax revenues are not available, the Proposed Action would generate substantial sales and use taxes. They would be from the construction of the leach pad, ongoing operations and maintenance of more than $50 million annually during mining and crushing and residual leaching, closure, and reclamation. These revenues would provide critical financial support for the affected entities, particularly Pershing County and the City of Lovelock.

Net proceeds taxes. Projected net proceeds taxes under the Proposed Action are not available, but they could be substantial, assuming that future commodity prices of silver and gold remain high. For example, the total potential value of future production under the Proposed Action could total $2.4 billion for the remaining life of the mine. This calculation is based on CRI's reserve estimates and assumed long-term average commodity prices of $20 per ounce for silver and $1,300 per ounce for gold. Commodity prices at those levels have produced substantial net proceeds in the past and could do so in the future, given CRI's plans to maintain labor at current levels, the scale of capital investment required, and planned other operating and maintenance spending.

Property taxes. The Proposed Action would maintain the capital value of plant and equipment at the mine. It would support continued annual property tax payments for 10 additional years, followed by lower payments for subsequent years as leaching, reclamation, and closure occur.

Employee-generated tax revenue. CRI-related direct, indirect, and induced employment also generates sales tax. Sources are consumer expenditures and property taxes, service charges, and local government and school district fees. CRI's workers, their families, and those households indirectly supported by the mine also contribute to the demand for public services and facilities and the need for public expenditures.

Approval of the Proposed Action is not expected to increase the long-term residential population; demand for services is anticipated to remain at or near current levels. As a result, the fiscal support provided to local government and public services from CRI-related households likely exceeds that from most other residents and households.

Social Effects

Social effects are impacts on the social setting for local communities from direct and indirect project impacts. Impacts can be changes to social values, changes to air and water quality for local and regional communities, or changes to other nonmarket values, such as preservation of species or open space for future generations. Social effects can be analyzed in terms of qualitative changes to community values by modeling estimates of impacts of nonmarket values in monetary terms.

The Proposed Action construction-related social issues are likely to be minimal. This is because of the relatively small Proposed Action-related construction workforce: an average of 58 workers over 12 months. It is also based on the potential for some workers to be locally hired and others to be daily and weekly commuters from other northern Nevada communities.

Impacts on area residents and local air and water quality would be minimized by project environmental protection measures (see **Appendix B**).

Alternative 1—Management of PAG material in West RDS

Impacts would be the same as those described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

Impacts would be the same as those described under the Proposed Action.

Cumulative Impacts

Past and Present Actions

Past and present actions in the two-county CESA pertaining to social values and economics include ongoing land development, utilities and infrastructure development, mineral development and exploration, and geothermal leasing. These activities would continue to affect population, demand for public services, employment opportunities, increased revenues, and expenditure for the communities in the CESA.

In addition to projects listed in **Table 3-6**, several ongoing mining operations are occurring in Humboldt and Pershing Counties. Operations in Humboldt County are six mining operations as of 2017 (Hycroft, Lone Tree Complex, Marigold, MIN-AD, Turquoise Ridge, and Twin Creeks). These operations employ an estimated 1,426 workers and 372 contract employees. In addition to the Coeur Rochester Mine, Pershing County included five operations in 2017 (Colado, Empire Gypsum, Florida Canyon, Relief Canyon, and Sunrise Placer), employing a combined estimated 272 company employees and 29 contract employees (Perry and Visher 2017).

The level of impacts from ongoing land uses, including mines, is not quantified here; this is because it would be affected by such factors as the timing of construction and operations, the size of workforce, and the location or residence of the workforce. Ongoing actions are considered to be part of the existing social and economic conditions.

RFFAs

RFFAs that may influence social and economic conditions are geothermal exploration and facility construction and other mining activities in the vicinity, such as the south expansion of the Florida Canyon Mine (authorized in 2014) and additional facilities proposed at the Relief Canyon Mine (pending authorization). Specific planned projects are discussed in **Table 3-6**. These actions would increase temporary (construction-related) and permanent (operations-related) demand for labor in the two-county CESA, with effects on workforce employment. The level of employment at mines and geothermal facilities in the two-county CESA may change depending on such factors as market conditions for minerals and energy.

Proposed Action

The identified projects in the CESA, including the Proposed Action, could have an impact on social values and economic conditions. As previously described, the Proposed Action would add 10 years of sustained direct mine and contractor employment in the two-county CESA and a temporary influx of 58 construction employees. Cumulative impacts, as a result of the Proposed Action, when added to past and present actions and RFFAs, are expected to be minimal and beneficial for local employment levels and related social and economic conditions.

No Action Alternative

Under the No Action Alternative, the CRI Mine would cease operation in 2023. The economic stimulus associated with the CRI operation would continue at current levels through 2022, after which a reduction of approximately 90 percent of the current direct employment at the mine would follow the cessation of mining, a net reduction of approximately 284 employees. The contribution to cumulative impacts on the two-county CESA from mine employment and related economic stimulus would be reduced from the current levels described under existing conditions.

3.13 SOILS

3.13.1 Affected Environment

The project area includes 15 soil map units, as mapped by a Natural Resource Conservation Service soil survey (**Figure 3-9**). For soil map unit descriptions, see Table 1 in the SRK botanical survey reports (SRK 2017b, 2017c). The most extensive soil in the project area is the Roca-Reluctan association, which occurs in most of the central and northern portions of the project area. Slopes vary from gently sloping piedmonts and fan skirts, with moderate runoff, to steep foothills and side slopes, with moderate to rapid runoff.

Sensitive Soils

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 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 common in arid and semiarid plant communities worldwide. 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 (**Figure 3-10**). **Table 3-21** 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 3-10**.

Table 3-21
Potential for Sensitive Soil Layers and Proposed Surface Disturbance

Potential	Project Area (Acres)	Mining Activities (Acres)		Power Line (Temporary Disturbance; Acres)		Power Line (Permanent Disturbance; Acres)		Packard Flat Road Improvements (Acres)	
		BLM	Private	BLM	Private	BLM	Private	BLM	Private
Potential for Biological Soil Crusts									
High	2,461.2	844.5	234.1	2.0	4.2	10.8	31.1	1.4	8.8
Moderate	799.2	282.4	0	0	0	0	0	1.4	2.5
Low	6,883.8	1,233.3	153.6	22.5	13.2	196.6	99.5	0.9	1.1

Potential	Project Area (Acres)	Mining Activities (Acres)		Power Line (Temporary Disturbance; Acres)		Power Line (Permanent Disturbance; Acres)		Packard Flat Road Improvements (Acres)	
		BLM	Private	BLM	Private	BLM	Private	BLM	Private
Soils with Wind Erosion Potential									
High	25.3	9.5	0.3	0	0	9.4	0	0	0
Moderate	4,326.8	1,127.0	234.1	2.0	4.2	10.8	31.1	3.7	12.4
Low	7,997.6	1,223.9	153.4	22.5	13.2	187.2	99.5	0	0
Soils with Water Erosion Potential									
High	2,671.9	287.4	1.6	0	0	0	0	0	0
Moderate	6,892.3	1,218.9	151.7	22.5	13.2	187.2	99.5	0	0
Low	2,785.5	854.0	234.4	2.0	4.2	20.1	31.1	3.7	12.4

Source: BLM GIS 2019

Water erosion potential is a function of many factors: 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 public land in the project area, approximately 2,671.9 acres are highly susceptible to water erosion (see **Table 3-21** and **Figure 3-11**).

Wind erosion occurs after protective vegetation is removed. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, and organic matter. On BLM-administered public land in the project area, approximately 25.3 acres of soils are highly susceptible to wind erosion (**Figure 3-12** and **Table 3-21**).

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. Currently, there is approximately 1,000,000 cubic yards of growth medium stockpiled in the project area from stripping areas in the mine boundary (CRI 2017a). Growth medium is used in reclamation and closure activities. For a more detailed description of how CRI uses growth medium during reclamation, see the 2015 Final Permanent Closure Plan (CRI 2015b).

3.13.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, mining to access precious metals reserves and reclamation would continue, based on current authorizations as described in the POA 10 EIS (BLM 2016a). Mining would continue to use standard operating procedures, operating plans, and previously committed environmental protection measures. Mining would continue to directly and indirectly affect soils in the project area. The authorized disturbance of up to 2,203 acres in the existing authorized mine plan boundary (see **Figure 1-2**) could still occur. The additional 3,105 acres would not be disturbed, as under the Proposed Action, but indirect and direct impacts on soil resources from previously authorized mining activities would continue. Reclamation and closure would continue, based on existing and approved authorizations. At least 2 years before site closure, CRI would submit a final permanent closure plan, in accordance with the requirements of NDEP and the BLM.

Proposed Action

Direct impacts on soil resources in the project area would result from the additional surface disturbance of 2,748 acres for the proposed POA 11 mine expansion, 341 acres of temporary disturbance for power line construction, and 16 acres of disturbance for realigning and widening Packard Flat Road. Removing native soils would degrade or cause the loss of soil function from mixing soil horizons. Soil compaction during construction and long-term storage in stockpiles would contribute to soil erosion and reduced soil productivity. This would come about by decreasing soil permeability, reducing water storage capacity, damaging biological soil crusts, and increasing precipitation runoff and erosion potential. Approximately 1,445 acres of soils with high potential for biological soil crusts and wind or water erosion would be affected during construction (**Table 3-21**). These areas have an increased risk of erosion and lower reclamation potential.

Approximately 1,043 acres of permanent disturbance would result from maintaining the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures. If these facilities were on soils classified as high risk for accelerated erosion from wind or water or as areas with biological soil crusts, then additional mitigation measures would need to be implemented to prevent undue degradation or loss of soil resources.

CRI would reclaim up to 2,062 acres by replacing growth medium over the stabilized surfaces of these features before revegetation. Growth medium would be salvaged and stockpiled during stripping, grading, and surface clearing associated with the construction of project facilities; the medium would be located away from mining activities in order to reduce erosion potential (**Figure 2-1**). Additionally, the growth medium stockpiles would be graded to avoid development of rills and to reduce slope erosion and would be seeded to minimize erosion rates. BMPs, such as diversions or berms, would be constructed as needed to prevent erosion. Stockpiling growth medium would reduce its overall loss, lessening the long-term impacts on soil resources.

The goals for eventual reclamation and closure under the Proposed Action are detailed in Section 3 of the POA 11 (CRI 2017a). In general, reclamation would remove mine facilities, rip compacted soil, grade to natural landscape percentages, and establish native vegetation to conditions that match or are better than the conditions of the original landscape. Reclamation would be ongoing during the life of the project, and areas would be reclaimed in accordance with BLM and NDEP regulations. CRI would report annually to the BLM the location and extent of reclamation that occurs in the reporting year. If reclamation is successful, then impacts on soil resources would be largely temporary and would be considered negligible at final closure of the mine.

Alternative 1—Management of PAG material in West RDS

Impacts would be the same as those described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

Impacts would be the same as those described under the Proposed Action.

Cumulative Impacts

Past and Present Actions

Past and present actions that have potentially affected soils are mining and mineral exploration, geothermal development, livestock grazing, ROWs for road construction and maintenance, transmission lines, telephone/telegraph lines, and wildland fires, as outlined in **Table 3-4**. Impacts from these activities are damage to biological soil crusts, loss of soil productivity due to changes in soil compaction, chemical alteration, and soil loss due to erosion.

Historical fires have burned approximately 42,000 acres within the CESA (**Table 3-4**). Past and present mineral exploration and mining notices or plans of operation affect approximately 1,200 acres. ROW disturbance totals about 66 miles, and livestock grazing occurs on portions of the CESA. Management after a fire includes emergency stabilization and rehabilitation, which includes seeding burned areas to reduce erosion.

State and federal regulations require project operators to provide financial assurance to guarantee that surface disturbance from mineral activities are reclaimed once the activities are complete. ROW disturbance for roads, power lines, and telephone lines are long-term disturbances, with maintenance often resulting in short-term disturbance. Livestock grazing in allotments follows the rangeland health standards and, if managed appropriately, does not result in excessive erosion.

RFFAs

Reasonably foreseeable projects, plans, or actions in the general wildlife CESA are summarized in **Table 3-5**. The largest potential increase in disturbance is due to minerals exploration and development (403 acres), followed by utilities and infrastructure expansion, particularly ROW projects. This includes roads (199 acres) and to a lesser extent railroads (10 acres) and transmission lines (6 acres). Additional small-scale potential impacts are from expanding irrigation facilities and water pipelines (11 acres). Continued reclamation of past mining and exploration activities would mitigate soils movement and productivity loss. Soil salvaged and used in reclamation would become viable and would be expected to return to pre-disturbance productivity once vegetation is established. Seeding and revegetating areas that have been burned would reduce soil movement and loss.

Cumulative Impacts

The Proposed Action would disturb up to 3,105 acres (see **Tables 2-2** and **2-3**) of undisturbed soils in the project area. When added to the past, present, and reasonably foreseeable future action disturbance areas (see **Table 3-4** and **Table 3-5**), the cumulative total disturbance represents 24 percent of the total CESA.

In addition, these impacts would be localized and minimized by environmental protection measures and BMPs (see **Appendix B**). Over time, growth media salvage and reuse, recontouring, erosion and drainage controls, and revegetation are anticipated to restore similar or improved post-mining land use conditions on the disturbed areas, in comparison with existing conditions. Pending completion of successful reclamation, the incremental additional effects on soils as a result of the Proposed Action would not be permanent for most of the project area. Based on the analysis and findings, incremental cumulative impacts on soils as a result of the Proposed Action would represent an incremental disturbance of 2 percent of the CESA.

3.14 SPECIAL STATUS SPECIES

3.14.1 Affected Environment

The study area for special status species is the project area. The survey area for golden eagles is a 10-mile radius around the project area, and these data are also considered.

Special status species with the potential to occur in the project area are listed in Tables 2, 5, 6, 7, 8, and 9 in the wildlife baseline survey reports (WRC 2017a, 2017b) and Table 2 in the botanical baseline survey reports (SRK 2017b, 2017c, 2018d). In the project area, there is the potential for the following special status species: 8 plants, 6 raptors, 20 migratory birds, 3 reptiles, and 18 mammals, including 12 bat species.

Special Status Plant Species Results

SRK surveyed for special status plant species during the baseline botanical surveys. Descriptions of the special status plant species with potential to occur in the project area are in Section 3.2 of the baseline botanical surveys, and the special status plant survey method is in Section 3.3 (SRK 2017b, 2017c, 2018d).

SRK observed one BLM-sensitive plant species in the project area: Lahontan beardtongue (*Penstemon palmeri* var. *macranthus*) (see Figure 9 in the botanical baseline reports for locations of the sensitive plant species). SRK observed no species status plant species in the 2018 survey of the additional utility corridors (SRK 2017b, 2017c, 2018d). Potential habitat was observed for other sensitive plant species, but no individuals were observed (see Section 4.3 of the botanical baseline survey reports for more information on the known populations and potential habitat [SRK 2017b, 2017c, 2018d]).

Special Status Raptors

WRC conducted aerial and ground surveys for raptor nests in 2016 and 2017. They surveyed by helicopter in potential nesting habitat, such as cliffs, rock outcrops, the upper third of deciduous and conifer trees, and along artificial structures, such as windmills, power transmission towers, and nesting platforms.

WRC observed no sensitive raptor species nests in the project area. Three occupied golden eagle (*Aquila chrysaetos*) nests were observed within the 1-mile buffer around the project area (WRC 2017a, 2017b).

While no ferruginous hawks (*Buteo regalis*) were observed in the project area, this species has been recorded in the vicinity. Potential nesting habitat for this species is in the juniper stringers in Packard Flat, in juniper trees at the slope break above Packard Flat, and in juniper trees along the slope break of Buena Vista Valley. In addition, ferruginous hawks could nest on rock outcrops close to the valley floors.

Western Burrowing Owl

In 2016 and 2017, WRC checked all previously active and inactive burrows for activity and made broadcast call surveys. The detailed burrowing owl survey method is in Section 3.4 of the wildlife baseline surveys (WRC 2017a, 2017b).

Three active nests were observed in Packard Valley in 2017, two of which fledged young (WRC 2017b). No active nests were observed in the rest of the project area.

No burrowing owls or their sign were found during the 2018 survey of the additional utility corridor parcels; however, suitable habitat was present in Parts A and B of the 2018 survey area (see Figures 2 and 3 of the WRC 2018d survey report).

Delineation of potential nesting habitat in Buena Vista Valley and Packard Flat was based on next locations in Packard Flat, the vegetation type and character, and the slope (Figure 6 in the wildlife baseline reports [WRC 2017a, 2017b]). The portion of Packard Flat with burrowing owl nests is typified by extensive patches of annual grasses and weedy forbs, with shrubs present as stringers along drainages or as distinct patches.

Greater Sage Grouse

In 2015, the BLM released the Nevada and Northeastern California Approved RMP Amendment, which provided Greater Sage-Grouse habitat data (BLM 2015b). In 2019, the agency released the Nevada and Northeastern California Greater Sage-Grouse RMP Amendment, which provided updated Greater Sage-Grouse habitat data (BLM 2019). In October 2019, the US District Court for Idaho issued a preliminary injunction that suspends implementation of the 2019 Greater Sage-Grouse RMP Amendment, including in Nevada and Northeastern California. As a result, the 2015 Greater Sage-Grouse RMP Amendment remains in effect until the injunction is resolved.

The 2015 and 2019 BLM data identify Greater Sage-Grouse habitat types as Priority Habitat Management Area (PHMA), General Habitat Management Area (GHMA), and Other Habitat Management Area (OHMA). This POA 11 EIS uses both the 2015 and 2019 BLM GIS habitat data, to identify Greater Sage-Grouse habitat (BLM GIS 2019).

According to the 2019 Greater Sage-Grouse habitat data, there are approximately 2,152 acres of GHMA and 5,924 acres of OHMA in the project area on BLM-administered public lands (BLM GIS 2019; **Figure 3-13**). According to the 2015 Greater Sage-Grouse habitat data, there are approximately 1,403 acres of GHMA and 3,774 acres of OHMA in the project area on BLM-administered public lands (BLM GIS 2015; **Figure 3-14**).

Available data from the Nevada Department of Wildlife (NDOW) indicate that Greater Sage-Grouse populations in the Humboldt Mountains are very low. According to NDOW records, four Sage-Grouse leks

(Humboldt #1, #2, and #3 and Indian #1) have been observed north of the project area, although only the Indian #1 lek is within 4 miles of the project area and is considered inactive by NDOW.

WRC biologists conducted aerial surveys to identify new leks and ground surveys to detect individuals or their sign. Section 3.2 of the wildlife baseline report includes detailed methods for the aerial and ground surveys (WRC 2017a).

WRC observed no Greater Sage-Grouse or their sign at the Indian #1 lek during the three ground surveys or during the aerial survey; they observed no Greater Sage-Grouse at the Humboldt #1 and #2 leks during the aerial survey, thus no new leks were found. In addition, no Greater Sage-Grouse or their sign were observed during the ground surveys.

CRI used the Nevada Greater Sage-Grouse Habitat Quantification Tool (HQT) to quantify habitat function for Greater Sage-Grouse in the proposed POA 11 project area. The HQT quantifies habitat function for a range of purposes, including a determination of potential temporary and permanent impacts of a project such as POA 11 on potential Sage-Grouse habitat and a calculation of debits generated by the project under the Nevada Conservation Credit System (State of Nevada 2016). The HQT results for the project area are discussed further in **Section 3.14.2**.

Sensitive Small Mammal Species

The BLM sensitive small mammal species—pygmy rabbit (*Brachylagus idahoensis*), dark kangaroo mouse (*Microdipodops megacephalus*), pale kangaroo mouse (*M. pallidus*), and Preble's shrew (*Sorex preblei*)—were identified with potential habitat in the project area. CRI biologists trapped for dark and pale kangaroo mice and Preble's mice and conducted surveys for the pygmy rabbit. See Sections 3.9.1, 3.9.2, and 3.9.3 of the wildlife baseline report (WRC 2017a) for details of the methods used.

None of these species were identified during trapping or survey in the project area, and no suitable habitat was observed for the dark and pale kangaroo mice (WRC 2017a, 2017b). These species are not analyzed further in this EIS.

Sensitive Bat Species

Table 6 of the wildlife baseline reports include sensitive bat species with the potential to occur in the project area (WRC 2017a, 2017b). The methods used to delineate potentially suitable bat habitat and to perform biological surveys are based on the Revised Nevada Bat Conservation Plan (Bradley et al. 2006). In accordance with the Record of Decision and Resource Management Plan for the Winnemucca District Planning Area (BLM 2015a), restrictions and limitations apply to activities within 200 yards of suitable occupied bat habitat; thus, the survey area for potentially suitable bat habitat included a 200-yard buffer around the project area.

Since the Proposed Action would not destroy natural cave or mine roosting habitat, internal surveys were not required, based on consultation with the BLM. Instead, the primary objective of biological surveys was to develop a comprehensive species list at the time of the surveys, using acoustic detectors. A detailed description of the survey protocol and potential habitat mapping is in Section 3.8 of the wildlife baseline report (WRC 2017a). Table 12 of the wildlife baseline report for the utility corridor and Packard Flat Road lists bat species observed during the acoustic surveys (WRC 2017b). Active roosts were observed in American, Rochester, and Limerick Canyons, Spring Valley Pass, and Packard Flat (WRC 2017a, 2017b).

Great Basin spadefoot toad

All ponds mapped on the US Geological Survey quadrangles, as well as water troughs and any unmapped ponds found during the reconnaissance surveys, were examined to determine if amphibians were present. Locations with flowing water, such as American Canyon and the unnamed flowing spring south of Woody

Canyon, were surveyed; this was done because amphibians could breed in quiet pools of water in the channels.

WRC also checked several locations outside the project area boundary, since the Great Basin spadefoot toad (*Spea intermontana*) could disperse from such sites into the project area. These locations included pooled water in Lower Rochester, Weaver Canyon, and a constructed pool north of Willow Creek Canyon. The survey protocol is in Section 3.10 of the wildlife baseline report (WRC 2017a).

Recent metamorphs of the Great Basin spadefoot toad were found in the Buena Vista Valley, east of the project area (WRC 2017a).

Springsnails

WRC surveyed springs in the project area for springsnails and observed them at five springs in or next to the project area (WRC 2017a, 2017b). Springsnails in the project area were identified as *Pyrgulopsis gibba*, which is a regionally widespread species; thus, springsnails are not considered further in the EIS.

3.14.2 Environmental Consequences

No threatened or endangered wildlife species occur in the project area (WRC 2017a, 2017b); one BLM-sensitive plant species was observed there (SRK 2017b, 2017c, 2018d).

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, the permitted disturbance area would not be expanded. Mining would continue on up to 2,203 acres of authorized disturbance in the POA 10 boundary, using existing standard operating procedures, operating plans, and previously committed environmental protection measures. Reclamation and closure would continue, based on approved authorizations.

Construction and operation under the No Action Alternative would continue to directly affect special status species habitat through noise disturbance, traffic, and vegetation removal in areas authorized for surface disturbance. Most of the disturbed surface under the No Action Alternative would be reclaimed, with the exception of the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures.

Proposed Action

In general, the Proposed Action would directly affect special status species habitat by removing vegetation in areas proposed for surface disturbance and by increasing human and equipment presence in habitat areas or close to active nest or burrow sites. These impacts would remove available denning, nesting, and foraging habitat.

The loss of habitat would be temporary in most locations because surface disturbed by the Proposed Action would be reclaimed. Surface disturbance subject to revegetation would be seeded with a BLM-approved seed mix. The mix would contain native seeds or plants that are compatible with native soils in the project area and forb and shrub species to provide forage for wildlife.

To minimize potential impacts on special status wildlife, CRI would adhere to the environmental protection measures for wildlife, including special status wildlife, which are fully described in **Appendix B**. In summary, these are as follows:

- Preventing chemical exposure to wildlife from ponds by covering or fencing ponds and open waters containing chemical solutions or drilling fluids that may be harmful to wildlife
- Adhering to speed limits
- Preventing disturbance to nesting migratory birds and raptors

- Incorporating raptor protection guidelines into power line construction
- Incorporating measures to minimize impacts on Greater Sage-Grouse

Specific effects on special status species observed in, or with a potential to occur in, the project area are described below.

Special Status Plant Species

Lahontan beardtongue was observed east of the POA 11 Boundary in American and Woody Canyons (Figure 9 in SRK 2017b and 2017c). Along Rochester Canyon, SRK botanists observed Lahontan beardtongue individuals with flower lengths that varied between Lahontan beardtongue and the common Palmer's penstemon (*Penstemon palmeri*) and identified them as hybrids due to the inconclusive flower lengths. These populations were different than the populations observed in American and Woody Canyons.

The Proposed Action would not disturb areas east of the POA 11 boundary, so no impacts are expected to the Lahontan beardtongue populations in American and Woody Canyons. The power line corridor would follow Rochester Canyon west to the Oreana Substation, including the area where the beardtongue hybrids were observed. The West RDS expansion and new power line corridor would directly affect these hybrid populations.

CRI and the BLM would conduct further surveys to determine if these hybrid populations are Lahontan beardtongues or common Palmer's penstemon. If they determine them to be the sensitive plant species, the CRI would avoid impacts on Lahontan beardtongue by flagging or fencing them and by applying an appropriate buffer determined by the qualified botanist and the BLM. If avoidance is not feasible, mitigation required for no net loss of the species would be determined by the BLM, which could include transplantation, seed collection, grow out and plantings, or other methods that it determines to be appropriate. Indirect effects could result from increased dust accumulation on plants and potential establishment of noxious weed populations on previously undisturbed areas. Effects from fugitive dust would be reduced through dust abatement measures outlined in **Appendix B**.

SRK observed potential habitat for other sensitive plant species but no individuals. **Table 3-22** includes mapped potential habitat for plant species with potential to occur in the project area and surface disturbance from the Proposed Action. See Section 4.3 of the botanical baseline survey reports for more information on the known populations and potential habitat (SRK 2017b; SRK 2017c; SRK 2018d). Disturbance would reduce the potential for special status plant species to inhabit these areas; however, there is similar habitat within and adjacent to the project area for all species.

Table 3-22
Special Status Plant Species Potential Habitat and Proposed Surface Disturbance

Special Status Plant Species	Project Area (Acres)	Mining Activities (Acres)		Power Line (Temporary Disturbance; Acres)		Power Line (Permanent Disturbance; Acres)		Packard Flat Road Improvements (Acres)	
		BLM	Private	BLM	Private	BLM	Private	BLM	Private
Holmgren smelowskia (*Smelowskia holmgrenii*)	1,342.3	49.3	1.6	0	0	0	0	0	0
Lahontan beardtongue (*Penstemon palmeri* var. *macranthus*)	763.9	0	0	16.9	9.4	177.0	71.0	3.1	3.6

Special Status Plant Species	Project Area (Acres)	Mining Activities (Acres)		Power Line (Temporary Disturbance; Acres)		Power Line (Permanent Disturbance; Acres)		Packard Flat Road Improvements (Acres)	
		BLM	Private	BLM	Private	BLM	Private	BLM	Private
Lahontan milkvetch (*Astragalus porrectus*)	1,432.2	0	0	10.0	7.8	112.9	58.3	3.1	3.6
Nevada suncup (*Camissonia nevadensis*)	109.1	0	0	0	0.6	0	4.5	0	0
Obscure scorpionflower (*Phacelia inconspicua*)	46.4	0.0	10.1	3.1	94.1	21.7	0	0	46.4
Sand cholla (*Grusonia pulchella*)	0	0	0	0	0	0	3.1	3.6	0
Schoolcraft buckwheat (*Eriogonum microthecum* var. *schoolcraftii*)	4.4	5.1	2.5	0	19.0	0.4	0	0	4.4
Windloving buckwheat (*E. anemophilum*)	45.8	0	0	0	0	0	0	0	0

Source: BLM GIS 2019

Residual impacts on special status species would include the loss of vegetative productivity and associated habitat from the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures that would not be revegetated. Habitat that would be disturbed and revegetated would have more grass and forb forage and less mature shrub forage initially, which may result in a shift of species composition in these areas.

Special Status Raptors

As described above, no sensitive raptor species nests were observed in the project area. One golden eagle nest was observed within approximately 3,000 feet of the Packard Flat Road ROW, and ferruginous hawks may nest in juniper trees or rock outcrops in the project area (WRC 2017a, 2017b). Increased human and equipment presence and noise associated with the Proposed Action could result in raptors avoiding otherwise suitable nesting or foraging habitat in the project area. To avoid or minimize impacts on golden eagles and other special status raptors, before the land is disturbed, CRI would survey to determine presence or absence of nesting raptors during the breeding or nesting season. If they are present, the area would be avoided by a buffer zone developed in coordination with BLM, NDOW, and the USFWS (see **Appendix B**).

Western Burrowing Owl

As described above, active nests have been observed in the Packard Flat Road portion of the project area, and suitable habitat also occurs in the Buena Vista Valley east of the project area (WRC 2017b). Surface disturbance, human presence, and noise in suitable or occupied habitat could displace owls, cause nest abandonment, or reduce available nesting or foraging habitat. To avoid or minimize impacts on western burrowing owls, before the land is disturbed in potential habitat, CRI would conduct clearance surveys during the nesting season (March to late August), following BLM survey protocol (**Appendix B**). Avoidance measures would be developed as necessary, in coordination with the BLM and NDOW, if burrowing owls are detected during surveys.

Trash or food litter left during site development could attract burrowing owl predators, increasing the potential for predation on adult or young owls. Further, all non-hazardous project-related refuse would be collected in approved trash bins or containers with lids and would be removed from the project area for disposal (see **Appendix B**).

Greater Sage-Grouse

As described above, there are approximately 2,152 acres of GHMA and 5,924 acres of OHMA in the project area on BLM-administered public lands, according to the 2019 Greater Sage-Grouse habitat data (BLM GIS 2019); HQT analysis indicates this habitat is of generally poor quality. The Proposed Action would disturb up to approximately 860 acres (40 percent) of GHMA and 1,266 acres of general habitat (21 percent) in the project area. Of this, 1,346 total acres of both habitat management areas would be reclaimed, indicating a temporary loss of habitat, while 780 acres would not be reclaimed and would be a permanent loss of habitat (BLM GIS 2019).

As stated above, there are approximately 1,403 acres of GHMA and 3,774 acres of OHMA in the project area on BLM-administered public lands, according to the 2015 Greater Sage-Grouse habitat data (BLM GIS 2015). The Proposed Action would disturb up to approximately 1,124 acres (80 percent) of GHMA and 557 acres of general habitat (15 percent) in the project area. Of this, 931 total acres of both habitat management areas would be reclaimed, indicating a temporary loss of habitat, while 749 acres would not be reclaimed and would be a permanent loss of habitat (BLM GIS 2015).

There is one lek (Indian #1) within 4 miles of the project area and approximately 1.7 miles north of the POA 11 boundary (WRC 2017). Human-caused noise at leks can disturb mating behavior. Noise levels produced by mining and construction are predicted to result in maximum noise level increases of 5 to 8 a-weighted decibels (dBA) at this lek (Saxelby Acoustics 2018). This is less than the 10 dBA increase criterion established for Greater Sage-Grouse lek sites (Patricelli et al. 2013); therefore, no potential impacts on lekking Greater Sage-Grouse from noise are anticipated, and no additional noise reduction measures are included in the Proposed Action.

Greater Sage-Grouse surveys in proposed POA 11 disturbance areas (WRC 2017a) were negative, and habitat is poor, as described above; thus, the potential is low that Greater Sage-Grouse would be affected by surface disturbance, noise, human presence, or other human-caused factors potentially associated with the Proposed Action. Nonetheless, CRI would incorporate environmental protection measures, in accordance with the Strategic Plan for Conservation of Greater Sage-Grouse in Nevada (Greater Sage-Grouse Advisory Committee 2012) to further reduce the potential for adverse effects on Greater Sage-Grouse. These include limiting disturbance areas, performing breeding bird surveys before ground disturbance, reclaiming disturbed areas after use, and working with agencies to make long-term habitat improvements through reclamation (see **Appendix B**).

Further, CRI would offset temporary and permanent impacts on Greater Sage-Grouse habitat, commensurate with habitat function, as determined by the HQT. The HQT calculated a total of 594 debits for the Proposed Action: 588 term debits and 6 permanent debits. This was based on the Nevada Conservation Credit System (State of Nevada 2016). CRI proposed removing project features; this generated 7 credits, which will be applied to CRI's credit obligation after the features are removed. Implementation actions would be determined in coordination with the BLM.

Sensitive Bat Species

Bats may use vegetation in the project area for foraging. The Proposed Action would remove up to 3,105 acres of foraging habitat, representing approximately 25 percent of available foraging habitat in the project area (**Table 3-23**). The Proposed Action would not directly affect any springs or seeps or adjacent riparian and wetland vegetation in the area. Indirect impacts on seeps, springs, and wetland vegetation may occur if mining in surrounding areas causes incidental dewatering (see **Section 3.8.2** for greater detail). This could affect up to 4 acres of high-quality foraging habitat in the project area.

All of this acreage would not be disturbed at one time due to incremental mining and interim reclamation. Reclaimed land would have more grass and forb forage and less mature shrub forage in the short term, which may shift bat species' use in these areas. As the plant communities in reclaimed areas mature, larger shrubs may provide additional foraging opportunities.

Approximately 1,043 acres of habitat would not be reclaimed following mine closure (**Figure 2-3**). This represents a permanent impact of approximately 3 percent of bat foraging habitat.

Roosting areas consisting of cave and mine features, rock outcrops, and trees, are present in American, Rochester, and Limerick Canyons, Spring Valley Pass, and Packard Flat (WRC 2017a, 2017b). The Proposed Action would not destroy natural cave or mine roosting habitat; however, removal of rock outcrops or trees could result in the loss of potentially suitable roosting areas. Removing roosts could cause bat mortality if they were unable to leave the roost. Evicted bats would be expected to relocate to another roost. Additional roost locations are likely present in the wider project area vicinity.

In accordance with the Record of Decision and Resource Management Plan for the Winnemucca District Planning Area (BLM 2015a), restrictions and limitations apply to activities within 200 yards of suitable occupied bat habitat. Several roosting features in Packard Flat and Rochester Canyon are within 200 yards of proposed project features, including road and electrical utility system upgrades. As a result, CRI would inventory bat roosting use at these locations and would implement measures, determined in coordination with the BLM and NDOW, to avoid or reduce adverse effects during project construction. Measures could include construction timing limitations, including working outside of critical life history stages for construction near roosting features.

There is the potential for bats to be poisoned from ingesting process solution in industrial ponds, which can attract bats in the arid Great Basin (Clark and Hothem 1991) for drinking and foraging (O'Shea et al. 2000); however, potential sources of open water are fenced, covered, or otherwise restricted from wildlife access, in accordance with CRI's NDOW Industrial Artificial Pond Permit (see **Appendix B**); thus, this impact is not expected to occur.

The Rochester Pit lake would be accessible to bats for foraging and may develop a biological system over time. **Section 3.18.2** includes analysis from the ERA. It is unlikely that ingesting pit lake water would be toxic to bats, because constituent levels are predicted to be below LOAEL thresholds (SRK 2018a).

Bats can be affected by project construction and operation noise. For example, noise could affect their foraging ability because they use ultrasonic signals above the spectrum of human noise. Some bats that locate prey by auditory cues avoid noisy areas (Francis and Barber 2013). Noise or human presence may also cause bats to abandon day roosting sites.

There is also a potential for bat injury or mortality from vehicle strikes, due to increased vehicular traffic associated with the Proposed Action; however, because most bats emerge and begin to forage after dusk, the potential interaction between bats and vehicles is low, since construction would occur during the day.

Additionally, CRI would minimize adverse impacts on bat species and habitat by adhering to other environmental protection measures, specifically, limiting disturbance areas (see **Appendix B**) and reclaiming disturbed areas after use (see **Appendix B**).

Lights would be used in the pit for night operations, which could attract aerial insects and, thereby, attract foraging bats. Due to the continuous mining disturbance, any significant bat roosting, such as hibernation and maternity use, is not expected at this location; however, bats might temporarily roost on the walls at night between bouts of foraging.

<u>Great Basin spadefoot toad</u>

Great Basin spadefoot toads have the potential to occur in the Buena Vista Valley <u>east of the project area</u> (WRC 2017a). As described in **Section 3.8.2**, proposed groundwater pumping under POA 11 is not expected to draw down spring discharge or surface water features in the Buena Vista Valley. Further, no surface disturbance is proposed in the Buena Vista Valley; thus, the potential for project impacts on spadefoot toads is not expected to occur.

Alternative 1—Management of PAG material in the West RDS

Impacts on special status species under Alternative 1 would be the same as the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

Partial backfill of sub-pits 2 and 3 and lime amendments would improve the water quality of the Rochester Pit lake (see **Section 3.8.2**). The ERA modeled Alternative 2 and determined that no constituents would exceed the NOAEL TRVs, whereas the Proposed Action would exceed the NOAEL TRVs for aluminum (SRK 2018a). This would reduce the risk of toxicity for bats and other special status species ingesting water from the pit lake.

Cumulative Impacts

Past and Present Actions

Past and present actions that have affected special status species are generally the same as those described in Section 5.2.7 of the BLM's EIS for the Coeur Rochester Mine POA 10 (BLM 2016a). In summary, these are grazing and rangeland conversion, utilities and other ROW construction, mineral development and exploration, and wildland fires. These actions have affected special status species from loss of or modification of habitat and habitat connectivity, harassment or disturbance of individuals, noise disturbance, and direct impacts on individuals from collision, electrocution, trampling, or other injury.

Reasonably Foreseeable Future Actions

Reasonably foreseeable projects, plans, or actions in the general wildlife and raptor CESAs are summarized in **Table 3-5**; however, the raptor CESA lacks potential impacts from expansion of irrigation facilities and water pipelines, railroads, and mineral development and expansion. Additional reasonably foreseeable projects, plans, or actions in the raptor CESA are sand and gravel extraction operations (78 acres).

Cumulative Impacts

The Proposed Action would affect approximately 3,105 acres of undisturbed habitat in the project area. When added to the past, present, and reasonably foreseeable future action disturbance areas (see **Table 3-4** and **Table 3-5**), the cumulative total disturbance for the general wildlife CESA is 48,630 acres, and the cumulative total disturbance for the raptor CESA is 32,501 acres (representing 24 percent and 8 percent of the total CESA for general wildlife and raptors, respectively).

Based on survey results, the Proposed Action would not contribute to cumulative effects for the sand cholla. The BLM and CRI would mitigate impacts on the Lahontan beardtongue hybrids in Rochester Canyon if they are determined to be a sensitive species, and there would be no expected cumulative effects on the species.

Special status raptor nests would be avoided by buffer zones determined in coordination with BLM, NDOW, and the USFWS, and utility infrastructure would follow avian protection measures; thus, the most likely potential impact on special status raptors from the Proposed Action is temporary loss of foraging habitat from phased vegetation removal in the project area. Eventual reclamation and revegetation would limit this impact over time. Because the Proposed Action is localized and discrete and because of the relatively small amount of undisturbed foraging habitat that would be permanently lost relative to abundant adjacent undisturbed foraging habitat, the contribution to cumulative effects on special status raptors from the Proposed Action would be relatively minor.

Burrowing owl avoidance measures would be developed and incorporated if these species are detected in or near disturbance areas, reducing to a minor level, but not completely eliminating, the potential for temporary displacement from habitat by noise or human presence.

The Proposed Action would remove habitat for Greater Sage-Grouse, and though no Greater Sage-Grouse have been observed in the project area, this habitat removal would prevent the potential use of this area by Greater Sage-Grouse until vegetation is reclaimed. CRI would offset the Proposed Action's contribution to cumulative impacts on Greater Sage-Grouse habitat by contributing to off-site habitat restoration and enhancement.

The Proposed Action would remove foraging and roosting habitat for sensitive bat species due to phased vegetation removal in the project area. Conducting bat roost inventories and implementing measures to avoid or reduce adverse effects during project construction would limit cumulative effects on bats.

Because the Proposed Action would not contribute to direct or indirect impacts on Great Basin spadefoot toad, no cumulative impacts on this species would occur.

The Proposed Action's contribution to cumulative impacts on special status species would be partially minimized by adhering to environmental protection measures (CRI 2017a). These include reclaiming most disturbed areas, treating weeds, conducting clearance surveys for special status species, adhering to raptor protection guidelines, conforming with the NDOW industrial pond permit, and others as described above.

Based on the above analysis, incremental impacts on special status species from the Proposed Action would be relatively minor, representing approximately 2 percent and less than 1 percent of potential cumulative disturbance when added to past, present, and reasonably foreseeable future actions in the wildlife and raptor CESAs.

3.15 Transportation, Access, and Public Safety

3.15.1 Affected Environment

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

Limerick Canyon Road is the primary point of access to the project area. It originates at Exit 119 on I-80 and travels east for approximately 9 miles until the turnoff onto the mine's main entrance road. Limerick Canyon Road is considered a major collector road in that it connects larger arterial roads to smaller local roads.

Access to the Packard Mine is via the Rochester Mine and Packard haul road from the north and via an unpaved county road, Packard Flat Road, from the south. The width of Packard Flat Road varies from 15 to 20 feet.

CRI also maintains light vehicular access and haul roads in the project area that provide access to operations. Nearby, there are several smaller two-track roads on BLM-administered public land 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 four-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.

Existing daily traffic volumes were obtained from traffic counts conducted on Limerick Canyon Road and Packard Flat Road in December 2017. Ninety-two percent of the 502 vehicles per day on Limerick Canyon Road, between I-19 and the mine entrance, was Coeur mine traffic. One hundred percent of the 298 vehicles per day on Packard Flat Road was Coeur or other mining company traffic. Overall, daily CRI traffic to support current operations is 478 trips per day: 454 daily trips on Limerick Canyon Road, 8 daily trips on Unionville Road, and 16 trips on Packard Flat Road (Solaegui 2018).

Level of service (LOS) is a qualitative measure of traffic operating conditions, where a letter grade A through F, corresponding to progressively worsening traffic operation, is assigned to the roadway. Local Nevada agencies have established LOS on roadways in terms of the ratio of the volume of traffic to the capacity of the road. A roadway capacity of 9,600 vehicles per day is widely used for a standard two-lane collector roadways in northern Nevada. Limerick Canyon Road and Coal Canyon Road are designated as collectors. A capacity of 2,000 vehicles per day is widely accepted for a lower tier two-lane collector road. Relief Canyon Road more closely fits the description of a lower tier collector (Solaegui 2018).

Solaegui (2018) reviewed Limerick Canyon Road, Coal Canyon Road, and Packard Flat Road for capacity as two-lane collector roadways. The existing traffic counts indicate that Limerick Canyon Road serves 474 vehicles per day, Coal Canyon Road serves 430 vehicles per day, and Relief Canyon Road serves 298 vehicles per day. These traffic volumes are well under the 9,600 or 2,000 vehicle per day capacity of these roads and correspond to LOS A operation. This indicates free-flow traffic conditions with very little delay, which is confirmed, based on actual roadway observations (Solaegui 2018).

3.15.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, the proposed POA 11 expansion and associated impacts on transportation and access would not occur. Under this alternative, CRI would continue operations under POA 10, and current traffic would continue for the life of the mine.

Proposed Action

Construction traffic is estimated at 375 trips daily. Distribution of construction traffic would be approximately 95 percent on Limerick Canyon Road (356 vehicles per day) and 5 percent on Coal Canyon Road and Packard Flat Road (19 vehicles per day) (Solaegui 2018). Although the 375 additional trips daily during construction would increase CRI traffic by 78 percent, Limerick Canyon and Packard Flat Roads would remain at LOS A during construction, because the existing traffic volume is light. Traffic volumes would decrease to near current levels after construction is complete and for the life of operations. Construction effects on transportation in the area would be localized and short term.

Under the Proposed Action, CRI would reroute and widen Packard Flat Road south of the mine. The net result would provide a benefit to traffic safety by widening the road, relocating traffic away from proposed mining operations, and reducing conflict between mine traffic and the public.

The improvements to Packard Flat Road may increase access; however, due to the remote nature of the land, the lack of developed recreation facilities, and the dispersed nature of recreation, no increase in users is expected.

Transportation safety concerns related to traffic generated by the proposed project would be minor. The project-related increase in traffic during construction would remain well within the capacity of the roadways. The mix of heavy vehicles in the traffic stream would increase slightly but not substantively. As such, any increase in the risk of traffic accidents would be minor to negligible and proportional to the overall increase in traffic. In summary, development of the proposed project would not substantially affect traffic in the vicinity and would be beneficial to those traveling the widened and relocated portion of Packard Flat Road.

Alternative 1—Management of PAG material in West RDS
Impacts would be the same as those described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake
Impacts would be the same as those described under the Proposed Action.

Cumulative Impacts

Past and Present Actions
Primary use of transportation CESA roadways is for access to the CRI Mine and Relief Canyon Mine to the south. Traffic to Relief Canyon Mine accounts for 95 percent of vehicles traveling on Coal Canyon and Relief Canyon Roads in the transportation CESA. These mines increase traffic on the surrounding road network, and traffic levels depend on current production levels and whether the mines are being expanded or not. These actions are included in the traffic analysis study and incorporated into the vehicle counts under *Affected Environment* (Solaegui 2018). All roads in the CESA have LOS A, indicating free-flowing traffic, with little to no impediments to movement.

Other past and present actions in the CESA are grazing, oil and gas development, and utility work. These actions do not appreciably increase traffic levels in the CESA. Cattle may temporarily affect traffic patterns when they are crossing area roads.

RFFAs
RFFAs for the CESA are mineral development and exploration projects, utilities, and public purpose activities. Wildland fires in and next to the CESA may occur in the future, as would livestock grazing and dispersed recreation. These actions would have impacts similar to those stated for past and present actions.

Proposed Action
The Proposed Action would increase vehicular traffic during construction of new facilities and the power line and widening and realigning Packard Flat Road, with vehicle counts as described under *Direct and Indirect Impacts*. There would be few, if any, cumulative effects on access, traffic conditions, or public safety from the Proposed Action and other past, present, and RFFAs. This is because all actions are relatively small traffic generators and would not decrease the LOS from the current A rating.

3.16 VEGETATION

3.16.1 Affected Environment

The study area for vegetation and noxious weeds is the project area (**Figure 1-1**). SRK Consulting conducted floristic surveys between May and July 2016 for the project area, in June 2017 for the proposed utility corridor and Packard Flat Road corridor, and in May 2018 for three unsurveyed areas of the proposed utility corridor (SRK 2017b, 2017c, 2018b). All floristic surveys included vegetation community mapping, a floristic inventory, surveys for target special status plant species (results discussed in **Section 3.14**), and an inventory of noxious and invasive, nonnative weeds. The survey method is described in the reports. Baseline biological data on seeps and springs in and around the project area were collected by Wildlife Resource Consultants LLC (WRC 2018b).

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 (*Pinus monophyllus*) (Cronquist et al. 1972).

Table 3-23 lists each vegetation community in the project area, its associated Southwest Regional Gap Analysis Project identification code, acres of each community in the project area, and anticipated impacts from the Proposed Action. **Figure 3-15** shows the vegetation communities in the project area. Section 4.2 of the botanical surveys (SRK 2017b, 2017c) includes detailed descriptions of the vegetation communities.

Table 3-23
Vegetation Communities and Proposed Surface Disturbance

Potential	Project Area (Acres)	Mining Activities (Acres)		Power Line (Temporary Disturbance; Acres)		Power Line (Permanent Disturbance; Acres)		Packard Flat Road Improvements (Acres)	
		BLM	Private	BLM	Private	BLM	Private	BLM	Private
Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland	14.8	0	0	0	0	0	0	0	0
Great Basin Pinyon-Juniper Woodland	3,536.2	498.4	21.2	1.5	0.3	10.2	2.1	0	0
Great Basin Xeric Mixed Sagebrush Shrubland	2,920.1	500.2	5.8	1.5	0.0	12.9	0.7	0	0
Inter-Mountain Basins Big Sagebrush Shrubland	3,507.8	1,233.9	353.3	16.1	6.8	126.4	52.0	1.1	8.5
Inter-Mountain Basins Big Sagebrush Steppe	3.0	1.5	0	0	0	0	0	0	0
Inter-Mountain Basins Cliff and Canyon	234.5	0	0	0	0	0	0	0	0
Inter-Mountain Basins Mixed Salt Desert Scrub	367.3	50.6	5.0	1.9	4.8	36.8	33.6	2.6	3.8

Potential	Project Area (Acres)	Mining Activities (Acres)		Power Line (Temporary Disturbance; Acres)		Power Line (Permanent Disturbance; Acres)		Packard Flat Road Improvements (Acres)	
		BLM	Private	BLM	Private	BLM	Private	BLM	Private
Inter-Mountain Basins Montane Sagebrush Steppe	115.1	14.6	0.3	0	0	0	0	0	0
Inter-Mountain Basins Playa	5.3	3.9	0	0	0	0	0	0	0
Inter-Mountain Basins Semi-Desert Grassland	17.7	0	0	0.1	0	0.5	0	0	0
Inter-Mountain Basins Semi-Desert Shrub Steppe	53.9	2.5	0.3	0	0	0.0	0	0	0
Invasive Annual and Biennial Forbland	18.8	0	0	0.0	1.7	0.9	12.9	0	0
Invasive Annual Grassland	242.2	25.5	1.9	3.3	3.7	19.6	29.3	0.0	0.1
Recently Mined or Quarried	1,313.0	29.2	0	0	0	0	0	0	0

Source: SWReGAP GIS 2004

Isolated Wetlands (Seeps and Springs)

WRC mapped 109 seeps and springs in and next to the project area (**Figure 3-3**; WRC 2018b). These springs support wetlands that ranged in size from <0.01 acre to 6.75 acres.

Noxious and Nonnative, Invasive Weeds

In the two floristic surveys and the June 2017 weed inventory, nine noxious weeds were observed that are listed by the State of Nevada, as per NAC 555.010: Scotch thistle (*Onorpodum acanthium*), Russian knapweed (*Acroptilon repens*), hoary cress (*Cardaria draba*), salt cedar (*Tamarix ramosissima*), hoary whitetop (*Cardaria pubescens*), perennial pepperweed (*Lepidium latifolium*), leafy spurge (*Euphorbia esula*), musk thistle (*Carduus nutans*), and diffuse knapweed (*Centaurea diffusa*) (CRI 2017b; SRK 2017b, 2017c).

CRI contracts for spring and fall weed treatments in concert with weed inventories by a licensed, certified pesticide company. Treatments are scheduled to optimize the effectiveness of the selected herbicide on the identified weeds (CRI 2017b).

3.16.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, mining to access precious metals reserves and reclamation would continue, based on current authorizations. CRI would continue to use standard operating procedures, operating plans, and previously committed environmental protection measures. Vegetation in the project area would continue to be directly and indirectly affected by mining.

Implementing the No Action Alternative would result in direct and indirect impacts on vegetation. The authorized disturbance of up to 2,203 acres in the existing authorized mine plan boundary (see **Figure 1-2**) could still occur.

Reclamation and closure would also continue, based on existing approved authorizations.

<u>Fugitive Dust Deposition on Vegetation</u>
Indirect impacts on vegetation from fugitive dust are the same as those described for the Proposed Action. Standard operating procedures, operating plans, and previously committed environmental protection measures would remain in place.

<u>Temporary Modification of Vegetation Structure</u>
Impacts on vegetation from a temporary modification of vegetation structure until shrubs reestablish during reclamation are similar to those described for the Proposed Action.

<u>Increased Potential for Noxious Weed Establishment</u>
Currently authorized soil disturbance from mining would still occur under the No Action Alternative; therefore, indirect impacts on vegetation from noxious weed establishment are similar to those for the Proposed Action. Standard operating procedures, operating plans, and previously committed environmental protection measures would remain in place.

<u>Increased Potential for Wildfire</u>
Currently authorized vehicle activity and other mining operations would still occur under the No Action Alternative; therefore, indirect impacts on vegetation from human-caused wildfire are similar to those of the Proposed Action. Standard operating procedures, operating plans, and previously committed environmental protection measures would remain in place.

<u>Seeps and Springs</u>
Under the No Action Alternative, seeps, springs, and associated wetland vegetation would remain in place. No additional impacts on springs are expected under the No Action Alternative.

Long-term impacts on vegetation are the permanent loss of vegetative productivity from pit walls that would not be reclaimed and a long-term change in vegetation composition, such as tree- and shrub-dominated communities to grass- and forb-dominated communities, as a result of project development and operation.

Proposed Action
Implementing the Proposed Action would result in direct and indirect impacts on 3,105 acres of vegetation over the estimated 10-year mine life. This does not include impacts on disturbed or recently mined or quarried areas. Proposed disturbance to vegetation communities in the project area is shown in **Table 3-23**; these communities have the potential to be affected by the Proposed Action. The communities provide habitat for special status and general wildlife, as discussed in **Sections 3.14** and **3.18**, respectively. Additionally, undisturbed habitats in the project area have the potential to support special status plant species, as discussed in **Section 3.14**.

Vegetation in the project area would be directly affected by activities associated with construction involving ground disturbance, including open pits, ore, waste, and growth media stockpiles and access and haul roads. Most of the project area would be reclaimed at the end of the project, and not all surface disturbance would occur at the same time. As areas are mined out, they would be recontoured and seeded during interim reclamation.

Reclamation and revegetation would minimize direct impacts on vegetation communities in the project area. Revegetation would be conducted as outlined in Section 3 of POA 11 (CRI 2017a). Because reclamation would be ongoing, CRI would report annually to the BLM the location and extent of reclamation that occurred in the reporting year. Where appropriate, disturbed areas would be recontoured, treated with reserved growth medium (see Growth Medium Management Environmental Protection Measure in **Appendix B**), and seeded with an approved seed mix. Noxious weeds would be monitored and controlled under an annually updated weed management plan, as described in **Appendix B**.

Loss of Wetland Vegetation in Springs

The Proposed Action would not result in direct loss of wetland vegetation, as all seeps, springs, and associated wetland vegetation would be avoided.

Indirect impacts on seeps, springs, and adjacent riparian and wetland vegetation may occur if surrounding mined areas cause incidental dewatering (see **Section 3.8.2** for greater detail). Construction of the Stage VI HLP and expansion of the West, South, and Packard RDS facilities could reduce flows to ephemeral streams in Limerick Canyon, Rochester Canyon, Weaver Canyon, and Packard Flat basins (Limerick Canyon Spring 4, McCarty Spring, Weaver Springs 2 and 3, and Packard Flat artesian spring [**Figure 3-3**]). Impacts from reduced flows and discharge rates could include loss of riparian and wetland vegetation associated with these springs, including up to 4 acres of wetland and riparian vegetation for the five identified springs (WRC 2018b).

Fugitive Dust Deposition on Vegetation

Project mining and vehicular traffic would directly and indirectly affect vegetation by increasing the amount of dust deposited onto adjacent vegetation. This could lower primary production in plants due to reduced photosynthesis and decreased water use efficiency. The potential effects on vegetation from dust would be reduced by wind and periodic precipitation, which would remove accumulated dust. In addition, the dust abatement measures outlined in **Appendix B** would reduce the amount of dust deposited onto vegetation.

Temporary Modification of Vegetation Structure

During the 10-year time frame, vegetation removal and subsequent reclamation could result in plant community simplification and conversion from shrub-dominated communities to grass/forb-dominated communities. Although the structure of the vegetation would be temporarily modified, the reclaimed plant community is expected to produce adequate cover to stabilize soils and provide forage for wildlife, thereby meeting reclamation goals. Seeded shrubs are expected to eventually become a codominant or dominant community component in reclaimed areas; however, this process would take several years and depends on precipitation and growth media characteristics.

Increased Potential for Noxious Weed Establishment

Ground disturbance during mining could indirectly affect vegetation by facilitating the invasion or spread of nonnative, invasive, or noxious weeds. Further, humans and vehicles accessing the site could inadvertently carry seeds from weed species on their clothing, shoes, tires, and the undercarriages of vehicles. Invasive weeds could outcompete native species for water, nutrients, light, and space. This could change the structure and ecological function of vegetation communities in the project area and surrounding area. In order to reduce the potential for weed establishment and invasion, weeds would be monitored and controlled by implementing an annually updated weed management plan, as described in **Appendix B**.

Increased Potential for Wildfire

The Proposed Action could indirectly affect vegetation in the project area through increased potential for wildfire. Wildfires can ignite from unauthorized vehicle ingress into vegetated areas, arcing electrical equipment or transmission lines, or unauthorized littering, such as someone discarding a lit cigarette butt in vegetated areas or areas where sparks may blow into vegetation. Wildfire can be particularly damaging in sagebrush communities, especially if annual weedy grasses are present in the understory. Cheatgrass is a significant understory component of many of the vegetation communities in the project area; if started, a wildfire may burn faster over larger areas and may replace sagebrush or other shrubs with an annual forb-dominated community.

The Proposed Action includes several measures to reduce the potential for wildfire caused by human activities in the project area. Environmental protection measures for fire protection (see **Appendix B**) include several fire prevention and risk-reduction measures. Additionally, an emergency response plan (Appendix H of POA10 [CRI 2015a]) outlines emergency response procedures for fire.

Residual impacts on vegetation would be the permanent loss of vegetative productivity from the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures that would not be revegetated. These areas include 1,043 acres and represent approximately 3 percent of vegetated habitat in the project area. Habitat that would be disturbed and revegetated would have more grass and forb forage and less mature shrub forage initially. As the revegetated plant communities mature, vegetation composition would shift from grasses and forbs to larger shrubs.

Alternative 1—Management of PAG material in West RDS
Impacts would be the same as those described under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake
Impacts would be the same as those described under the Proposed Action.

Cumulative Impacts

Past and Present Actions
Past and present actions that have potentially affected vegetation are grazing and rangeland conversion, utilities and other ROW construction, mineral development and exploration, and wildland fires.

Generally, impacts on vegetation from the actions described above could be due to loss or modification of unique vegetation communities, alterations in species composition and vegetation structure, transportation and establishment of noxious weeds, and soil disturbance, including compaction, topsoil removal, erosion, and loss of native seed banks.

Irrigation facilities and water pipelines associated with grazing and agricultural operations occupy approximately 137 acres in the general wildlife CESA (**Table 3-4**). Approximately 35 miles of fences, with an average width of 10 feet, exist in the general wildlife CESA, occupying approximately 42 acres (**Table 3-4**). Though these represent a relatively small proportion of the CESA, linear features, such as fences, are subject to periodic vegetation removal for maintenance. Linear disturbances also serve as conduits for weed distribution and establishment.

Utilities and infrastructure are relatively widespread in the general wildlife CESA, as summarized in **Table 3-4**. There are approximately 32 miles of roadways, with an average width of 40 feet, occupying approximately 155 acres; there are approximately 34 miles of transmission lines, with an average width of 60 feet, occupying over 247 acres of the CESA. Communication sites, including towers and associated outbuildings, occupy approximately five acres of the CESA. Again, these linear ROWs are subject to periodic vegetation removal for maintenance and serve as conduits for weed distribution and establishment.

Mineral development and exploration are widespread in the general wildlife CESA. There are approximately 1,223 acres of mining and exploration plans, exploration notices, and sand and gravel extraction operations in the CESA, as summarized in **Table 3-4**. State and federal regulations require that surface disturbance associated with mining are reclaimed, so this acreage would eventually be reclaimed with an approved seed mix; however, it is reasonable to assume that not all of these acres would be reclaimed in the time frame used for this analysis.

Wildland fires burned approximately 41,779 acres in the general wildlife CESA between 1997 and 2011 (**Table 3-4**). Wildfire may have had the largest potential impact on vegetation in the CESA due to widespread habitat destruction or modification and the large area in the CESA burned. Wildfire is intimately tied to loss of native habitat and conversion to nonnative annual grasslands. Wildfire fuels treatments also contribute to impacts in the general wildlife CESA; fuel breaks in the CESA would double, from 20 to 40 acres of vegetation impacts. These fuel breaks are subject to frequent and recurring removal of vegetation to maintain effectiveness.

No specific data exist quantifying potential impacts on vegetation from grazing in the CESA. Portions of seven grazing allotments totaling 173,700 acres in the CESA are grazed by cattle. Additionally, native and naturalized free-roaming pronghorn antelope, mule deer, and wild horses and burros graze in the CESA. Impacts on vegetation from grazing, particularly associated with cattle and introduced free-roaming species, are damage or removal of vegetation, damage to biological soil crusts, soils disturbance, erosion, and spread of weeds. This is particularly true in riparian areas near springs and streams.

Similarly, no specific data quantify potential impacts on vegetation from off-highway vehicles in the CESA. Impacts from their unauthorized use also degrade vegetation off established roads or trails. Impacts can include crushing vegetation, damaging biological soil crusts, disturbing soils, causing erosion, and spreading weeds.

RFFAs

Reasonably foreseeable projects, plans, and actions in the general wildlife CESA are summarized in **Table 3-5** and are described above in **Section 3.5.2**, Migratory Birds.

Cumulative Impacts

The Proposed Action would affect approximately 3,105 acres of undisturbed vegetation in the project area. When added to the past, present, and reasonably foreseeable future action disturbance areas (see **Table 3-4** and **Table 3-5**), the cumulative total disturbance is 48,630 acres (representing 24 percent of the total CESA for general wildlife). Based on the above analysis and findings, incremental cumulative impacts on vegetation as a result of the Proposed Action would represent an incremental disturbance of 2 percent in the CESA.

Impacts on vegetation from the Proposed Action potentially include loss of wetland vegetation with loss of flow from seeps and springs, general vegetation removal, alterations in species composition and vegetation structure, transportation and establishment of noxious weeds, and soil disturbance, including compaction, topsoil removal, erosion, and loss of native seed banks.

Potential impacts on vegetation would be minimized by reclamation and revegetation and by adhering to CRI's environmental protection measures listed in **Appendix B**: revegetating most disturbed habitats and treating weeds in reclaimed areas; however, CRI and the BLM would not be able to minimize the impacts from the loss of wetland vegetation associated with springs and seeps and the relatively small amount of lost vegetation associated with the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures that would not be reclaimed.

Based on the above analysis and findings, incremental impacts on vegetation from the Proposed Action represent approximately 2 percent of potential cumulative disturbance, when added to past, present, and reasonably foreseeable future actions in the CESA.

3.17 VISUAL RESOURCES

3.17.1 Regulatory Framework

FLPMA Section 102(a) (8) emphasizes protecting the quality of scenic resources on public lands. The National Environmental Policy Act (NEPA) Section 101(b) requires that measures be taken to ensure that aesthetically pleasing surroundings be retained for all Americans. Based on these requirements, the BLM developed the VRM System (BLM 1984). Visual resources are the visible physical features on a landscape: land, water, vegetation, animals, structures, and other features. The VRM system is used to identify and evaluate scenic values to determine the appropriate levels of management. It also provides a way to analyze potential visual impacts and apply visual design techniques to ensure that surface-disturbing activities are in harmony with their surroundings. BLM-administered public lands are assigned to a management class (I, II, III, or IV), with established objectives (BLM 1986).

The VRM Class IV objective is to provide for management activities that require major modification of 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 repeating the basic elements (BLM 1986).

The VRM Class III objective is to partially retain 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 view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape (BLM 1986).

The VRM Class II objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. (BLM 1986).

The VRM Class I objective is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention (BLM 1986).

3.17.2 Affected Environment

The CRI Mine is in the Basin and Range physiographic province at the southern extent of the Humboldt Mountain Range, between Star Peak to the north and Buffalo Mountain to the south. The elevation of the project area ranges from approximately 4,960 to 7,300 feet amsl. Locally, Rochester, Limerick, and Weaver Canyons and Packard Wash are to the west, and American and South American Canyons are to the east. Packard Flat is just south of the western edge of the CRI Mine. The area to the south of the Humboldt Range is a broad, flat to gently rolling landscape, with abruptly rising foothills and mountains.

Vegetation in the valley consists of a shadscale-bunchgrass community with considerable cheatgrass in the understory and a greasewood community next to Packard Wash. Low sagebrush and Wyoming big sagebrush-bunchgrass communities are on the upper valley floor and foothills. The higher elevations at the CRI Mine are dominated by juniper, mixed with mountain big sagebrush, which grows up to 3 feet tall, interspersed with patches of black sagebrush, a lower-growing sagebrush species, roughly 12 to 18 inches tall. A mosaic of dark green juniper mixed with gray-green mountain big sagebrush creates a coarse texture on the landscape, with patches of dark-gray black sagebrush contributing a finer texture.

Rock outcrops (reddish brown to brown) are common in the area. The CRI Mine area lacks notable vegetation and is generally a mixture of pale tans and browns due to exposed soil or bedrock. The general line of the horizon ranges from curvilinear to jagged, depending on location.

The CRI Mine is in an area characterized by visually dominant disturbances associated with the historic and existing mine operations. These have added artificial elements, such as pit benches, heap leach pad benches, a conveyor, fences, roads, power lines, and buildings, which introduce blocky, regular shaped objects into a background of irregularly shaped vegetation and a curvilinear landform. There are also mining activities, creating visible commotion that is in stark contrast to areas that are more still and calm.

Outside lighting is maintained for safety and access at numerous CRI Mine facilities and roads. The lighting is shielded downward to reduce light pollution in accordance with the lighting plan prepared for POA 10 in 2013. Most of the lights are operated by a photocell and turn on automatically under low light conditions. The crusher facility lights are manually controlled. Due to the terrain and mine location, facility lighting is obstructed from direct public viewing.

CRI has performed an inventory of the existing lighting at the mine (CRI 2017c). All lights were reviewed for their need for nighttime safety. It was determined that the existing lights are the minimum required by the Mine Safety and Health Administration regulation for safe operating conditions at the mine. Modifications to the lighting will be made by using the BMPs described below as a guide, as applicable. CRI will submit an updated Lighting Management Plan to the BLM upon completion of a significant and substantial change/modification to the existing lighting infrastructure.

Figure 3-16 shows the VRM classes for the project area. **Table 3-24** lists the VRM class acres within the project area; only BLM-administered public lands receive VRM management classes.

Table 3-24
Visual Resource Management Classes

VRM Class	Acres of BLM-Administered Public Land
I	0
II	4,254.5
III	134.3
IV	4,446.1
Grand Total	**8,834.9**

Source: BLM GIS 2019

3.17.3 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, CRI would continue operations as authorized under POA 10. Reclamation and mining to access precious metal reserves would continue, based on current authorizations in previously approved plans of operation and reclamation and closure plans. Reclamation and closure would also continue, based on existing authorizations. There would be no change to existing conditions so no new impacts on visual resources. Ongoing impacts from mining and reclamation, such as changes in landforms and vegetation cover, would continue.

Proposed Action

The BLM based the proposed project's conformance with VRM class objectives on the overall degree of contrast identified in the completed contrast rating worksheets (**Appendix E**). Summary descriptions of conformance with VRM class objectives are provided in **Table 3-25**, below.

Table 3-25
VRM Class Conformance Determination Summary

KOP	Degree of Contrast and VRM Class Conformance Determination
A	During construction and operation, the changes to visual resources would create a moderate to strong degree of contrast. It would not conform with VRM Class II objectives. In the long term, after reclamation, the remaining degree of contrast would be weak, which would conform with VRM Class II objectives. The proposed project would meet VRM Class IV objectives.
B	During construction and operation, the changes to visual resources would create a moderate to strong degree of contrast. It would not conform with VRM Class II objectives. In the long term, after reclamation, the remaining degree of contrast would be weak, which would conform with VRM Class II objectives.
C	During short-term construction activities, the changes to visual resources would create a moderate degree of contrast. It would not conform with VRM Class II objectives. In the long term, after reclamation, the remaining degree of contrast would be weak, which would conform with VRM Class II objectives.
D	During short-term construction activities, the changes to visual resources would create a moderate degree of contrast. It would not conform with VRM Class II objectives. In the long term, after reclamation, the remaining degree of contrast would be weak, which would conform with VRM Class II objectives.
E	During short-term construction activities, the changes to visual resources would create a moderate degree of contrast. It would not conform with VRM Class II objectives. In the long term, after reclamation, the remaining degree of contrast would be weak, which would conform with VRM Class II objectives. The proposed project would meet VRM Class IV objectives.
F	During short-term construction activities, the changes to visual resources would create a moderate degree of contrast. It would not conform with VRM Class II objectives. In the long term, after reclamation, the remaining degree of contrast would be weak, which would conform with VRM Class II objectives. The proposed project would meet VRM Class IV objectives.
G	This KOP only observes a portion of the power line on private land and is not subject to BLM VRM class objectives.
H	Due to distance, no changes to the landscape are visible from this KOP. There would be no degree of contrast. The proposed project would meet VRM Class II and IV objectives.

Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands (BLM 2013) presents BMPs to avoid or reduce visual impacts associated with the siting, design, construction, operation, and decommissioning of utility-scale renewable energy generation facilities, including wind, solar, and geothermal facilities. Although the publication is for renewable energy generation facilities, the BMPs are also applicable to other large-scale developments, such as mines. Similarly, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (also known as the Gold Book) (United States Department of the Interior and United States Department of Agriculture 2007) also has applicable reclamation. Implementing the BMPs and reclamation or using them as mitigation would reduce impacts on visual resources.

The Proposed Action incorporates environmental protection measures outlined in **Appendix B** as well as the measures outlined in the current Lighting Management Plan (CRI 2017c) to reduce light pollution and maintain dark sky attributes. The Lighting Management Plan outlines management procedures for the control of light emissions associated with the mine. It summarizes CRI's light-generating activities, identifies light spill mitigation measures, and considers management procedures for the potential impacts.

CRI has made voluntary improvements to lighting at the mine that include replacing spotlights with downward facing, shielded flood lights, as well as replacement of high-intensity discharge lighting with light-emitting diode lighting. When designing the new facilities for POA 11, as new projects are proposed and new lighting is required, and as the need arises to replace existing lighting, CRI will utilize appropriate lighting through the following BMPs where applicable:

- Outdoor lighting fixtures will be installed in conformance with the provisions of the Federal Energy Regulatory Commission and the National Electrical Code.
- Lighting will follow the standards for maximum lumens per acre output as recommended by the International Dark Sky Association when it does not compromise safety or as other regulations apply, such as Mine Safety and Health Administration minimum lighting requirements.
- To the extent possible, lighting fixtures will be light-emitting diode lighting.
- Uplighting will not be utilized, except in cases where the fixture is shielded from the sky by a roof overhang or similar structure and where the fixture does not cause light to extend beyond the structural shield.
- Lighting, where appropriate, will be on timers or sensor activated during nighttime operating hours.
- Temporary lighting, such as that used during operation, is exempt from these practices, provided that all temporary lighting will be aimed to minimize glare and light trespass and turned off after completion of the work.
- A regular maintenance schedule will be implemented to keep fixtures clean from dust, dirt, and debris. Such conditions can potentially reduce light output up to 50 percent.
- Installation and use of swivel-mounted floodlights will be discouraged due to the potential for adjustment, either inadvertently or intentionally. If floodlights are utilized, they will be fully shielded, properly aimed, and subject to regular maintenance and inspection.

Wherever construction or operation occurs, artificial light and glare from vehicles and facilities would be present. Construction would use vehicle lights and temporary lights, which would likely include portable lights, to illuminate work sites for visibility and safety. Also, reflective surfaces on construction equipment and vehicles would create glare. During operations, lights would also be used to illuminate sites for visibility and safety. Reflective surfaces on buildings and structures would also create glare. The intensity and amount of light and glare would vary, depending on, for example, the light source and its orientation, the intensity and angle of sunlight, and the time of day.

Construction and operations would produce new nighttime light and glare. The location, intensity, and type of new lights are unknown. The new artificial light and glare, however, would be most noticeable at night. Also, it would be most noticeable in areas that are nearly absent of artificial light, which are Limerick Canyon and Packard Flat. The nighttime light would create skyglow (light that is scattered back to Earth by aerosols and clouds). Without modeling, it is not possible to determine the extent of skyglow. As with existing lights, it is assumed new lights would be the minimum required by the Mine Safety and Health Administration regulation for safe operating conditions at the mine. The BMPs described above would minimize impacts from all new lights.

The Lighting Management Plan minimizes, but does not prevent, the impacts from nighttime light and glare because, most notably, new sources of nighttime light would be added to areas that are nearly absent of artificial light. The impacts from construction lights would occur only when construction equipment and vehicles are present. The impacts from operations lights would last for the 10 years of active mining operations.

Disturbance associated with the HLPs, RDS and other facilities would be reclaimed within approximately 5 years after the end of mining. Reclamation would include earthwork consisting of recontouring and regrading disturbed areas, ripping compacted surfaces to promote revegetation, and blending earthwork to ensure both long--term slope stability and visual compatibility with surrounding landforms. The resultant appearance

<u>and topography of the reclaimed areas will be compatible with the natural topography of the area prior to mining activities and blend with the existing topography of lands adjoining the Project Area.</u>

Alternative 1—Management of PAG material in West RDS

The visual impacts from POA 11 under Alternative 1 would be similar to those described for the Proposed Action. This is because proposed mining expansion operations and long-term reclamation and closure actions would be similar. Alternative 1 differs from the Proposed Action in that CRI would place mined PAG material at the West RDS only instead of in the West and South RDSs (**Figure 2-4**). Although this alternative has not been simulated from the KOPs, the BLM anticipates that there would be no discernable difference in contrast from the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

The visual impacts from POA 11 under Alternative 2 would be similar to those described for the Proposed Action. This is because proposed mining expansion operations and long-term reclamation and closure actions would be similar. Alternative 2 differs from the Proposed Action in that CRI would manage the pit lake projected for the Rochester Pit by placing some non-PAG backfill in sub-pits 2 and 3 instead of in the West and South RDSs. Although this alternative has not been simulated from the KOPs, the BLM anticipates that there would be no discernable difference in contrast from the Proposed Action.

Cumulative Impacts

Proposed Action

Past, present, and reasonably foreseeable projects, plans, or actions would occur on BLM-administered public land and non-BLM-administered public land. Only those on BLM-administered public land would be subject to conformance with VRM class objectives.

Past and present projects, plans, or actions that have affected visual resources are grazing and agriculture, such as irrigation facilities and fences, and utilities and infrastructure, such as roads, railroads, and transmission lines, and mineral development and exploration. These have modified the scenic quality of the landscape by, for example, altering vegetation and landforms and introducing artificial elements into the natural landscape. Some past developments are being reclaimed, and visual impacts are lessening.

Future projects, plans, or actions that can affect visual resources are also grazing and agriculture, utilities and infrastructure, and mineral development and exploration. Any future projects, plans, or actions that disturb the surface or introduce artificial elements could affect scenic quality. They can change landform, vegetation, color, and adjacent scenery, similar to past and present projects, plans, or actions. Depending on the location and scale of the projects, plans, or actions, the scenic quality of an area can be diminished.

Considering past, present, and RFFAs within the CESA, combined with the Proposed Action, cumulative effects on visual resources would include line, form, color, and texture elements that would contrast with the existing landscape. As reclamation would be completed on most present and foreseeable future actions, visual impacts would be reduced in the long term. The Proposed Action would result in a strong degree of contrast with the visual landscape during mining in some locations. Visual impacts would be reduced in the long term because reclamation would be completed <u>within approximately 5 years</u> on the majority of the Proposed Action and restore lands to their previous condition. The cumulative effects from the Proposed Action, in addition to the past, present, and RFFAs on the Visual Resources CESA, would be minor.

Cumulative Impacts from Alternatives 1 and 2

Under Alternatives 1 and 2, cumulative impacts on visual resources would be similar to those described for the Proposed Action. This is because the BLM and CRI anticipate no discernible difference in impacts from the action alternatives; therefore, cumulative impacts under Alternatives 1 and 2 would be similar to the Proposed Action, described above.

3.18 WILDLIFE

3.18.1 Affected Environment

The assessment area for wildlife is the project area, with the exception of the survey area for the golden eagle, which is a 10-mile radius around the project area. Golden eagles are discussed in **Section 3.14**. Migratory birds observed in the project area are discussed in **Section 3.5**, and special status wildlife species observed in the project area are discussed in **Section 3.14**.

WRC observed general wildlife and game species during surveys for special status wildlife, including raptors, and during surveys of springs and seeps. All wildlife and their signs, such as scat, tracks, feathers, nests, burrows, prey remains, and carcasses, detected in the project area were recorded, and a species list was developed (WRC 2017a, 2017b, 2018a).

General wildlife species observed in the project area are summarized in Table 10 (WRC 2017a), Table 9 (WRC 2017b), and Table 1 (WRC 2018a) of WRC's wildlife survey reports. Sixty-nine bird, 21 mammal, 12 reptile, 2 amphibians, and at least 2 fish species were detected visually, by their call or song, or by their sign in and next to the project area. See WRC's wildlife survey reports for more detail (WRC 2017a, 2017b, 2018a).

3.18.2 Environmental Consequences

Direct and Indirect Impacts

No Action Alternative

Under the No Action Alternative, the existing permitted disturbance area would not be expanded. Mining would continue on up to 2,203 acres of authorized disturbance in the existing POA 10 boundary, using existing standard operating procedures, operating plans, and previously committed environmental protection measures. Reclamation and closure would continue, based on existing approved authorizations.

Construction and operation under the No Action Alternative would continue to directly affect wildlife and wildlife habitat through noise disturbance, traffic, and vegetation removal in areas authorized for surface disturbance. Most of the disturbed surface under the No Action Alternative would be reclaimed, with the exception of the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures.

Proposed Action

In general, the Proposed Action would directly affect wildlife and wildlife habitat by removing vegetation in areas proposed for surface disturbance and by increasing human and equipment presence in habitat areas. These impacts would remove or reduce the quality of available breeding, foraging, or other habitat.

The Proposed Action would remove up to 3,105 acres of wildlife habitat, representing approximately 25 percent of available habitat in the project area. This acreage would not all be disturbed at one time due to incremental mining and interim reclamation.

There would be 341 acres of temporary disturbance for power line construction reclaimed within 5 years. Reclaimed land would have more grass and forb forage and less mature shrub forage in the short term, which may result in different wildlife species use, compared with pre-disturbance conditions. As the plant communities in reclaimed areas mature, larger shrubs may provide additional cover, breeding, and foraging opportunities. The areas would be reclaimed using a BLM-approved seed mix, which would contain native seeds or plants that are compatible with native soils in the project area and forb and shrub species to provide forage for wildlife.

Mule deer and pronghorn antelope habitat span the entire project area, including crucial summer and winter range for mule deer and year-round habitat and winter range for pronghorn antelope. Approximately 3,105 acres of mule deer and pronghorn antelope habitat would be affected, as detailed above.

Table 3-26 includes impacts for each type of habitat affected by the Proposed Action. The 2016 Wildlife Baseline Report includes distribution maps for mule deer and pronghorn antelope (WRC 2017a). Reclamation would reduce the temporal scale of the impact, but fencing may obstruct the movement of deer and other large mammals into reclaimed habitat.

Table 3-26
Big Game Habitat and Proposed Surface Disturbance

Big Game Habitat	Project Area (Acres)	Mining Activities (New Disturbance)		Power Line (Temporary Disturbance)		Power Line (Permanent Disturbance)		Packard Flat Road Improvements (Permanent Disturbance)	
		BLM	Private	BLM	Private	BLM	Private	BLM	Private
Mule Deer									
Crucial summer range	4,203.1	574.4	129.7	0	0	0	0	0	0
Crucial winter range	5,633.9	1,049.4	100.1	23.1	12.1	195.8	90.8	2.0	1.2
Pronghorn Antelope									
Year-round range	4,962.9	1,898.5	296.9	15.0	6.5	101.8	47.4	3.7	12.2
Winter range	7,386.8	461.8	90.9	9.5	10.9	105.5	83.2	0	0.2

Source: BLM GIS 2019

Approximately 1,043 acres of habitat would not be reclaimed following mine closure. This represents a permanent impact of approximately 3 percent of general wildlife habitat in the project area. Approximately 3 percent of mule deer and pronghorn antelope habitat would not be reclaimed.

To minimize potential impacts on wildlife, CRI would adhere to the environmental protection measures for wildlife, which are fully described in **Appendix B**. In summary, these include preventing chemical exposure to wildlife from ponds by covering or fencing ponds and open waters containing chemical solutions or drilling fluids that may be harmful to wildlife, hand spraying herbicides when possible, and adhering to speed limits. Adhering to environmental protection measures for air quality and noxious weeds and nonnative species would indirectly conserve wildlife habitat. In summary, these include controlling fugitive dust, minimizing vegetation removal, and abating weeds. They are fully described in Sections 2.8.5 (Air Quality) and 2.8.7 (Noxious Weeds and Non-native Species) of the POA 11 (CRI 2017a).

Pit Lake

The BLM and CRI anticipate that the Proposed Action would form a lake in the Rochester Pit. As a requirement of NAC 445A.429(3)(b), CRI must demonstrate that bodies of water that result from mine pits penetrating the water table do not have "the potential to affect adversely the health of human, terrestrial or avian life." CRI developed an ERA to evaluate potential adverse effects on human health and toxicological threats posed to mammalian and avian wildlife by the pit lake water (SRK 2018a), modeled by Piteau Associates (2019a).

The ERA evaluates future predicted pit lake water quality (Piteau Associates 2019a) against toxicity criteria for known receptor species from approximately 3 to 300 years after mine closure. Chemical constituents predicted for the Rochester Pit lake would exceed BMRR Profile III thresholds for ecological risks associated with consumption of water from the open pit lake. Constituents exceeding reference values are aluminum, cadmium, copper, fluoride, lead, selenium, and pH (SRK 2018a). These constituents were evaluated based on mammalian and avian species known to inhabit the area. (See the ERA for the full list of mammalian and avian species used in the analysis.) Toxicity benchmark criteria for each receptor species were then calculated using the body weight, water ingestion rate, and generally accepted NOAEL TRVs. NOAEL is the level of exposure that does not cause observable harm or effects.

Aluminum had higher values than the baseline and was brought forward for additional assessment against species-specific toxicity benchmark criteria for the LOAEL TRVs. LOAEL is the lowest dose in a toxicity study resulting in adverse health effects. Exceeding a LOAEL does not necessarily mean that the studied effect would occur in the target organism but that there is an increased possibility of it occurring. Predicted aluminum levels did not exceed the LOAEL-based toxicity benchmark criteria for any of the mammalian or avian species evaluated.

The interior of the future open pit is deemed especially low-quality habitat for long-term residence of terrestrial animals. This is due to its sheer steepness, the anticipated lack of adequate protective cover and food resources, and the minimum distance from the pit rim to the surface of the pit lake (approximately 250 feet down, once the pit lake filling has equilibrated) (SRK 2018). The pit lake would be fenced off to larger wildlife species and cattle after mine closure, although the fence would degrade over time. Eventually, larger wildlife species and cattle would have access to the pit lake. Immediate access would be limited to bats, avian species, and small mammals that could pass the perimeter fence.

Alternative 1—Management of PAG material in the West RDS

Impacts on wildlife under Alternative 1 would be the same as those under the Proposed Action.

Alternative 2—Partial Backfill of Pit Lake

Partial backfill of sub-pits 2 and 3 and lime amendments would improve the water quality of the Rochester Pit lake (see **Section 3.8.2**). The ERA modeled Alternative 2 and determined that no constituents would exceed the NOAEL TRVs, whereas the Proposed Action would exceed the NOAEL TRVs for aluminum (SRK 2018l). This would reduce the risk of toxicity for wildlife ingesting water from the pit lake.

Cumulative Impacts

Past and Present Actions

Past and present actions that have affected wildlife are generally the same as those described in Section 5.2.9 of the BLM's EIS for the Coeur Rochester Mine POA 10 (BLM 2016a). In summary, these are grazing and rangeland conversion, utilities and other ROW construction, mineral development and exploration, and wildland fires.

Reasonably Foreseeable Future Actions

Reasonably foreseeable projects, plans, or actions in the general wildlife CESA are summarized in **Table 3-5** and are described in **Section 3.5.2**, Migratory Birds.

Proposed Action

The Proposed Action would affect approximately 3,105 acres of undisturbed habitat in the project area. When added to the past, present, and reasonably foreseeable future action disturbance areas (see **Table 3-4** and **Table 3-5**), the cumulative total disturbance for the general wildlife CESA is 48,630 acres, representing 24 percent of the total CESA. Based on the above analysis and findings, incremental cumulative impacts on wildlife as a result of the Proposed Action would represent an incremental disturbance of approximately 2 percent of the general wildlife CESA.

Impacts on wildlife from the Proposed Action, as described above, would be minimized by reclamation and revegetation and by adhering to CRI's environmental protection measures; however, temporal losses in wildlife habitat would be realized until habitats are revegetated. If revegetation is unsuccessful, habitat losses could become permanent, unless additional mitigations are applied to revegetation. Though wildlife may be dissuaded from using the project area during operations, generally species would be able to return to these habitats once reclaimed; however, if altered habitat conditions are present after reclamation, these individuals may experience reduced foraging ability and breeding success. Covering all artificial ponds would prevent risk to wildlife from such facilities.

3.19 Unavoidable Adverse Effects

Section 102(C) of NEPA mandates disclosure of "any adverse environmental effects which cannot be avoided should the proposal be implemented." These are impacts for which there are no mitigation measures or impacts that would remain, even after mitigation measures are implemented. Implementing the Proposed Action or one of the action alternatives would result in unavoidable adverse impacts on some resources. These impacts are described in detail above and are summarized herein.

The Proposed Action would include 1,043 acres that would not be reclaimed at the end of mining. These features would remain: <u>the open pits, the main access road to the mine, public access roads, contingency ponds, closure e-cells, and closure stormwater diversion structures</u>.

3.20 Relationship Between Local Short-Term Uses and Long-Term Productivity

Section 102(C) of NEPA requires a discussion of the relationship between local, short-term uses of the human environment and the maintenance and enhancement of long-term productivity of resources. "Short term" begins and ends within the first 5 years after the action is implemented; "long term" lasts beyond 5 years to the end of or beyond a 50-year project horizon.

The Proposed Action and two action alternatives would directly affect 3,105 acres through expansion of mining activities under POA 11, construction of the new power line corridor, and widening and relocating portions of Packard Flat Road (**Tables 2-1** and **2-2**; **Figures 2-1** and **2-2**). These impacts would reduce the long-term productivity of soils and change the vegetation communities after reclamation is complete. The altered vegetation communities would affect wildlife movement and foraging habits, including migratory bird and special status species and livestock grazing patterns; 1,043 acres would not be reclaimed and maintained as permanent infrastructure after reclamation. This would be done to allow for long-term monitoring and maintenance of the site. These acres would not be revegetated and would be lost as wildlife habitat and grazing lands.

Geologic resource features under the mines would be lost for the duration of mining and could be lost permanently after mining and reclamation are complete.

3.21 Irreversible and Irretrievable Commitments of Resources

Section 102(2)(C) of NEPA and Section 1502.16 of the Council on Environmental Quality (CEQ) regulations for implementing NEPA require that the discussion of environmental consequences include a description of ". . . any irreversible or irretrievable commitment of resources which would be involved in the proposal should it be implemented."

Approximately 3,105 acres would be disturbed (**Tables 2-1** and **2-2**; **Figure 2-1**) with irreversible effects on soils through mixing, compaction, and movement to different locations. The 3,105 acres of surface disturbance could have irretrievable and possibly irreversible effects on vegetation, wildlife habitat, and livestock grazing, if reclamation proved unsuccessful.

Hydrology would be irreversibly affected, with groundwater flow permanently altered through creation of a groundwater sink in the Rochester Pit and creation of a pit lake. If the pit lake were flow-through, groundwater flow through the pit lake could affect downgradient groundwater quality.

There is the potential loss of geologic resources beneath mine features, such as RDSs and HLPs, as well as the Rochester and Packard Pits.

Chapter 4. Mitigation and Monitoring

4.1 Proposed Action

4.1.1 Recommended Mitigation Measures

In addition to the environmental protection measures discussed in **Appendix B**, the BLM proposes the mitigation measures below.

Greater Sage-Grouse

In accordance with BLM Instruction Memorandum 2019-018, the mitigation required by the State of Nevada has been included in the analysis for Greater-Sage Grouse (see **Chapter 3**). CRI will continue to consult with the Sagebrush Ecosystem Technical Team (SETT) on a mitigation plan based on the HQT analysis. The SETT will develop the mitigation plan, and it will be consistent with the Nevada Conservation Credit System or other applicable state requirements.

Cultural Resources

A historic properties treatment plan for POA 11 aligning with the PA (BLM et al. 1992) is in development. It will align with cultural resource eligibility determinations presented in SHPO's letter to the BLM on May 13, 2019 (SHPO 2019). The plan will include specific descriptions of how impacts on historic properties will be mitigated. Treatment measures could include avoidance, data recovery at selected sites, public outreach and interpretation, or other methods meeting the approval of the PA parties. Due to the scope of cultural resource mitigation and the multi-year timeline of the project, CRI shall post a surety in an amount sufficient to cover all costs associated with implementing the historic properties treatment plan. Any cultural resources mitigation or treatment for POA 11 would be considered separately from ongoing mitigation for POA 10 disturbances.

Water Resources/Geochemistry and Wildlife

During groundwater pumping and at the start of pit lake recovery after mining, CRI will regularly monitor groundwater levels in designated wells as part of the mine's WPCP. Permit issuers routinely require groundwater model updates, which use monitoring data. The BLM recommends the continued monitoring in conjunction with the mine's WPCP, and may require additional monitoring of seeps, springs, and non-mining wells along the BRF up to five miles outside of the model boundary, if necessary. If monitoring finds that the project results in drawdown to seeps and springs within the plan boundary, BLM will require CRI to develop alternative water sources for wildlife and livestock."

As data are collected from the field, CRI can update the model with firsthand information. If such updated models continue to support the assumption that the lake would be terminal with no flow-through, no mitigation strategies are needed for groundwater; however, if remodeling results suggest flow-through is more likely, CRI can adopt mitigation strategies early to minimize or eliminate the risk of groundwater impairment through biological means or other strategies determined by the BLM and the NDEP. Biological means, such as following, can be used:

- If the lake does not maintain pH levels consistent with the modeling, or if pH needs to be adjusted to optimize conditions for biological functions, lime can be added. The pH conditions should be maintained in the lake to provide conditions ideal for the growth of algae and other species that are ideal for sequestering ARD materials. For example, algal detritus can foster a robust community of sulfur-reducing bacteria, common in natural lakes, which can effectively generate alkalinity and inhibit metals and sulfate from entering the groundwater.

- After ensuring pH is conducive to algal or other biological growth, phosphorus and nitrogen nutrient levels can be adjusted to manage biological production rates. This would promote growth of a benthic layer of organic detritus that would inhibit flow of ARD constituents to the groundwater by the following:
  - Physically slowing output to groundwater with low conductivity organic and carbonate-rich materials
  - Geochemically sequestering ARD constituents by the biological action of sulfur-reducing bacteria.

4.1.2 Applicant Committed Monitoring

CRI would monitor the proposed activity to identify or prevent impacts according to the operating permits and plans in the table below.

Table 4-1
Monitoring Plan

Monitoring Component	Permit or Plan and Agency
Air quality	• Throughput, emissions, fuel use, and stack testing • NDEP Bureau of Air Pollution Control
Solid and hazardous waste	• 90-day storage area inspections • Satellite storage area weekly inspections • NDEP Bureau of Waste Management
Explosives	• Weekly magazine inspection • Bureau of Alcohol, Tobacco, Firearms, and Explosives
Water	• Process water, surface water, and groundwater quality and quantity • BMRR • Inspection of stormwater BMPs • NDEP Bureau of Water Pollution Control • Water use • NDWR
Noxious weeds	• Periodic noxious weed surveys and updated weed management plan on an as-needed basis • BLM (under the plan of operations)
Reclamation	• Reclamation revegetation success • BLM and BMRR
Slope stability	• Inspections • BLM and BMRR
Waste and ore rock chemistry	• Waste rock and ore analysis • NDEP BMRR
Wildlife	• Wildlife mortality • NDOW

4.1.3 No Action Alternative

There are no mitigation measures or monitoring recommended as part of the No Action Alternative, other than those activities already associated with the mining operations.

4.1.4 Alternative 1—Management of PAG in the West RDS

The mitigation measures and monitoring recommended for the Proposed Action would apply to Alternative 1 as well. There are no additional mitigation or monitoring measures for Alternative 1.

4.1.5 Alternative 2—Partial Backfill of Pit Lake

The mitigation measures and monitoring recommended for the Proposed Action would apply to Alternative 2 as well. There are no additional mitigation or monitoring measures for Alternative 2.

This page intentionally left blank.

Chapter 5. Consultation and Coordination

5.1 INTRODUCTION

During the NEPA process for this EIS, the BLM formally and informally consulted and coordinated with other federal agencies, state and local governments, Indian tribes, and interested members of the public.

The following sections describe the public involvement, consultation, and coordination process. Included are key consultation and coordination activities undertaken to ensure the BLM's compliance with, in both the spirit and intent, 40 CFR 1501.7, 1502.19, and 1503.

5.2 NOTICE OF INTENT

Throughout the public involvement process for this EIS, the BLM has sought information from individuals and organizations with knowledge of or concern for resources in the project area. The process included a thorough and ongoing public participation process.

The BLM published a notice of intent to prepare an EIS in the *Federal Register* on March 6, 2019 to notify the public of the BLM's intent to prepare an EIS. It provided information on the open houses and included an overview of the Proposed Action and a list of BLM-identified preliminary issues. The scoping period conducted for the CRI EIS was from March 6 to April 5, 2019. The BLM held two open houses during this time frame, the first in Winnemucca on March 19 and the second in Lovelock on March 21. The meetings, held from 5:00 to 7:00 p.m,, provided opportunities for the public to learn about the project and to provide comments.

As outlined in **Section 1.7**, the preliminary issues identified were as follows: mitigation and monitoring; air quality and climate; cultural resources; geology and minerals; migratory birds; soil resources; solid and hazardous waste; special status species; vegetation and water resources; wildlife; Native American concerns; and socioeconomics (EMPSi 2019).

5.3 PUBLIC COMMENTS ON THE DRAFT EIS

The BLM published a notice of availability for the Draft EIS in the *Federal Register* on October 18, 2019, which initiated the 45-day comment period that ended on December 2, 2019. The agency held two public meetings during the comment period on November 5, 2019 in Winnemucca and on November 6, 2019 in Lovelock.

Appendix F is a record of BLM responses to substantive comments and includes the public comments as Attachment 1.

5.4 CONSULTATION AND COORDINATION WITH AGENCIES AND TRIBAL GOVERNMENTS

Various federal laws require the BLM to consult with Native American tribes, the SHPO, the USFWS, NDEP, and the EPA during the NEPA decision-making process. In addition to formal scoping, the BLM implemented collaborative outreach and a public involvement process that included inviting agencies to be cooperating partners for the EIS planning process. A cooperating agency is any federal, state, or local government agency or Native American tribe that enters into a formal agreement with the lead federal agency to help develop an environmental analysis.

5.4.1 Government-to-Government Consultation with Native American Tribes

The federal government works on a government-to-government basis with Native American tribes. The President formally recognized this on November 6, 2000, with Executive Order 13175 (*Federal Register*, Volume 65, page 67249). As a matter of practice, the BLM coordinates with all tribal governments, associated native communities and organizations, and tribal individuals whose interests might be directly and substantially affected by activities on public lands.

In addition, Section 106 of the NHPA requires federal agencies to consult with Indian tribes for undertakings on tribal lands and for historic properties of significance to the tribes that would be affected by an undertaking (36 CFR 800.2(c)(2)). BLM Manual 1780 (BLM 2016b) and BLM Handbook H-1780-1 (BLM 2016c) provide guidance for Native American consultations.

Executive Order 13175 stipulates that, during the NEPA process, federal agencies consult tribes identified as being directly and substantially affected. The BLM has been in contact with tribal governments throughout the development and expansion of the CRI Mine, including the current Proposed Action.

The following tribes would be consulted for the project: Lovelock, Pyramid Lake, and Summit Lake Paiute tribes and Winnemucca Indian Colony. On May 22, 2019, the BLM sent letters to the tribes initiating formal consultation, in accordance with the NHPA and other legal authorities. The tribes are also on the EIS mailing list to receive updates, and the BLM notified them of the availability of the Draft EIS. The BLM will keep the tribal governments informed of the EIS's progress.

5.4.2 Nevada State Historic Preservation Officer Consultation

In accordance with the requirements of Section 106 of the NHPA, the BLM is coordinating with and soliciting input from the SHPO. The BLM received a letter dated Monday, May 13, 2019, providing the SHPO's concurrence on the cultural resource report and findings. A treatment plan is being prepared, and the BLM will continue to consult with the SHPO on the project and treatment plan.

5.4.3 US Fish and Wildlife Service Consultation

Consultation with the USFWS is required under Section 7(c) of the ESA before the BLM begins any project that would affect federally listed or endangered species or their habitat. Current surveys have indicated that ESA-listed species are not found in the project area. This indicates that a draft biological assessment would not be needed to evaluate the potential impact of the mine expansion on federally listed threatened and endangered species.

5.4.4 US Environmental Protection Agency

NEPA regulations require that EISs be filed with the EPA (40 CFR 1506.9); the BLM and representatives of CRI met with the EPA and, in 2018, the BLM prepared an MOU for mining EISs in Nevada between the BLM and EPA. The purposes of the MOU are as follows:

- Establish and maintain coordination and cooperation between the EPA and the BLM for their respective individual participation in the administration of the NEPA for EIS-level mining operations for locatable minerals on federal lands administered by the BLM within the state of Nevada. This coordination allows the BLM to evaluate and address EPA comments and resolve issues early in the EIS process.
- Establish that, by default under this MOU, the EPA will be a cooperating agency under NEPA, for all such EISs
- Maintain and improve common guidelines and procedures for expediting the NEPA process for Plan of Operations approval for mining operations in Nevada
- Facilitate the administration, review, and approval of EISs for mining operations in Nevada

5.4.5 State of Nevada Sagebrush Ecosystem Program

The BLM and CRI will continue to consult with the SETT, which provides guidance to other agencies and project proponents on the Nevada Conservation Credit System, in conjunction with implementation of the

Greater Sage-Grouse plan amendments. The credit system ensures that Greater Sage-Grouse habitat impacts are offset by long-term enhancement and protection of habitat. As stated in **Chapter 3**, CRI used the Nevada HQT to quantify habitat function for Greater Sage-Grouse in the proposed POA 11 Project Area. CRI will continue to coordinate with the SETT to develop appropriate mitigation.

5.4.6 Nevada Department of Conservation and Natural Resources, Division of Environmental Protection

A standing MOU provides procedures and guidance for coordination and cooperation between the BLM, the NDEP, and the Forest Service on mining-related NEPA issues. The MOU is based on the General Mining Law of 1872, as amended (30 USC 22, et seq.) as well as other authorities. The purpose of the MOU is to achieve the following:

- Establish and maintain coordination among the NDEP, the USFS, and the BLM for their respective joint responsibilities pertaining to the administration and reclamation of lands disturbed by exploration and mining for locatable minerals on private, state, and federal lands administered by the USFS and BLM in Nevada
- Expedite administration and enforcement of their respective authorities pertaining to exploration and mining
- Prevent unnecessary or undue degradation of public and private lands and minimize adverse environmental impacts on surface resources
- Develop and maintain common guidance to regulate facilities and activities on consisting of both public and private lands

5.5 Cooperating Agencies

A cooperating agency is any federal, state, or local government agency or Native American tribe that enters into a formal agreement with the lead federal agency to help develop an environmental analysis. Cooperating agencies and tribes work with the BLM, sharing knowledge and resources, to achieve desired outcomes for public lands and communities within statutory and regulatory frameworks.

The benefits of enhanced collaboration between agencies in preparing NEPA analyses are as follows:

- Disclosing relevant information early in the analytical process
- Applying available technical expertise and staff support
- Avoiding duplication with other federal, state, tribal, and local procedures
- Establishing a mechanism for addressing intergovernmental issues

The cooperating agencies that have been engaged in the EIS process for this project are the EPA, NDOW, and NDEP.

5.6 List of Preparers

This EIS was prepared by an interdisciplinary team of staff from the BLM and Environmental Management and Planning Solutions, Inc. (EMPSi), with their supporting subcontractors. The following table lists the people who prepared or contributed to the development of the EIS.

Bureau of Land Management	
Name	**Role/Responsibility**
Winnemucca District Office Interdisciplinary Team Members	
Jeanette Black	Hydrology, water quality/quantity
Debbie Dunham	Land use authorizations
Clay Edmondson	Special status species, threatened and endangered species, and general wildlife

BUREAU OF LAND MANAGEMENT	
Name	**Role/Responsibility**
Lena Hite	Rangeland management
Michael Kizorek	Visual resources
Kathleen Rehberg	Project lead; geology, minerals, energy, transportation, and noise
Lynn Ricci	Planning and environmental coordinator
Tanner Whetstone	Cultural resources, paleontological resources, and Native American religious concerns
Utah State Office	
Julie Suhr Pierce, PhD	Environmental justice, social values, and economics

CONSULTANTS		
Name	**Role/Responsibility**	**Education**
Environmental Management and Planning Solutions, Inc. ***www.empsi.com***		
David Batts	Principal-in-charge	MS, Natural Resource Planning BS, International Development
Jennifer Thies	Project manager	MS, Resource Management BS, Conservation and Resource Studies
Matthew Smith	Deputy project manager; soils, transportation, lands and realty	MS, Biology BS, Environmental Biology
Theresa Ancell	Vegetation, special status species (plants)	BA, Environmental, Population, Organismic Biology
Amy Cordle	Air quality and climate change	BS, Civil Engineering
Alex Dierker	GIS	BS, Animal Ecology
Derek Holmgren	Visual resources	MS, Environmental Science BS, Environmental Science BA, International Studies
Jenna Jonker	GIS	BA, Geography
Josh Schnabel	Air quality, social values and economic considerations	MA Natural Resource Management/Environmental Planning BA Sociology
Morgan Trieger	Special status species, migratory birds, fish, and wildlife	BS, Conservation and Resource Studies
McCurry Hydrology		
Gordon McCurry	Hydrology, water quantity	BS, Geosciences MS, Geology (Hydrology)
FarWestern		
D. Craig Young, PhD	Cultural/historic resources	MA, Anthropology PhD, Anthropology
Tucker Orvald	Cultural/historic resources	BA, Anthropology MS, Cultural Resource Management
Albert Garner	Cultural/historic resources	BS, Anthropology
Verax Environmental Consulting		
Greg Kipp	Geochemistry, minerals, geology, hydrology, and hydrogeology	BS, Geological Engineering MS, Geological Engineering

Chapter 6. Glossary

Acid mine drainage. Water from pits, underground workings, and waste rock, containing free sulfuric acid. The formation of acid drainage is primarily due to the weathering of iron pyrite and other sulfur-containing minerals. Acid drainage can mobilize and transport heavy metals, which are often characteristic of metal deposits.

Acid rock drainage (ARD). Drainage that occurs as a result of natural oxidation of sulfide minerals contained in rock exposed to air and water. It is not confined to mining but can occur wherever sulfide-bearing rock is exposed to air and water.

Alluvium. Unconsolidated sediments consisting of clay, silt, sand, and gravel that are deposited in valleys by flowing water. When saturated, alluvium can form alluvial aquifers.

Animal unit month (AUM). The amount of forage required by one cow and calf, or their equivalent, for one month.

Aquifer. A zone, stratum, or group of strata acting as a hydraulic unit that stores or transmits water in sufficient quantities for beneficial use.

Bedrock. Solid rock exposed at the surface of the earth or overlain by unconsolidated material, weathered rock, or soil.

Black Ridge Fault (BRF). A major structural feature in the area that forms a 200- to 500-foot-wide higher-permeability shear zone just east of the Rochester pit. It is a range front structure that trends north-south, extending from the Moonlight Mine area north of Spring Valley on the north, to approximately 0.5 miles south of the Relief Canyon Mine to the Relief Canyon Fault on the south. The BRF serves as the main drainage conduit for bedrock groundwater in the area and is where high-capacity water supply wells are located.

Dewatering. The removal or extraction of water from a pit, tunnel, other conduit, or aquifer containing volumes of water.

Drawdown. Vertical distance that a water elevation is lowered or the pressure head is reduced due to the removal of water from the same system.

Evaporation Cell (e-cell). Evaporation cells remove or minimize the volume of source solution through passive evaporation or evapotranspiration from heap leach pads or rock disposal sites. Cells are generally constructed in existing double-lined ponds or in another suitable location.

Evapotranspiration. The process by which water is transferred from the land to the atmosphere by evaporation from the soil, open water, and other surfaces and by transpiration from plants.

Forage. All browse and non-woody plants that are available to livestock or game animals for grazing or harvestable for feed.

Forb. An herbaceous flowering plant other than a grass.

Fugitive dust. Dust particles suspended randomly in the air from road travel, excavation, and rock loading operations.

Geochemistry. The study of the distribution and amounts of the chemical elements in minerals, ores, rocks, soils, water, and the atmosphere and their circulation in nature, on the basis of the properties of their atoms and ions. Geochemistry is concerned with the chemical composition of, and chemical reactions taking place within, the earth's crust.

Groundwater. Water found beneath the land surface in the zone of saturation below the water table.

Growth media. All materials, including topsoil, specified soil horizons, vegetation debris, and organic matter, that are classified as suitable for stockpiling or reclamation.

Haul road. A road used by large (less than 50-ton capacity) trucks to haul ore and waste rock from an open pit mine to other locations.

Heap leaching. An ore extraction method used for low to moderate grade ores that involves placing the ore in a mound and then leaching a solution by percolation, which dissolves target metals from the rock.

Heap leach pad (HLP). Staged layers of ore and conduits for distribution of heap leaching solution positioned on a pad to collect metal-laden leach fluid after it percolates through the ore.

Hydrographic basin. An extent or an area of land where surface water from rain and melting snow or ice converges to a single point, in the basin, where the waters join another water body, such as a river, lake, reservoir, estuary, wetland, sea, or ocean.

Hydraulic conductivity. A measure of the ability of material to permit the flow of water under a gradient; permeability.

Key observation point (KOP). A specific place on a travel route or in an existing or potential use area where the view of a management activity or project would be most revealing; used for purposes of the contrast rating.

Leaching. The process of applying a chemical agent that bonds preferentially and dissolves into solution the target metals in an ore. The metal complexes or binds to the solution, which is then called a pregnant solution. The pregnant solution is collected for processing to recover the metals.

Milling. The general process of treating or separating and concentrating the valuable metals or minerals from the rest of the ore material.

Mine pit. Surface area from which ore and waste rock are removed.

Open pit Mining. A type of mining that involves excavating ore by digging downward from the ground surface, removing the overburden, and extracting the ore beneath. The result of the mining operation is an open pit.

Ore. An earth material containing target metals or minerals in sufficient concentration and quantity that can be mined and processed at an economic profit.

pH. Symbol for the negative common logarithm of the hydrogen ion concentration (acidity) of a solution. The pH value of 7 is considered neutral. A pH value below 7 indicates acidity, and a pH value above 7 indicates alkalinity or a base.

Pit shell. The outer limit or the extremities of the mining area.

Potentially acid-generating (PAG) material. Geologic material that has the potential to produce acid when placed in contact with air or water. This typically involves the oxidation of sulfide minerals but can include simple dissolution of acidic residues from past sulfide oxidation.

Pure live seed. The percentage of good viable seed that has the potential to germinate within a measured 1 pound weight of any seed lot (USDA 2009).

Reclamation. Returning disturbed land to a form and productivity in conformity with a predetermined land management plan or a government-approved plan or permit.

Rock disposal site (RDS). An accumulation of blasted rock that is waste rock, often dumped at the angle of repose but occasionally graded to designed slopes to enhance stability. Synonymous with waste rock facility.

Riparian. Pertaining to or situated on the bank of a body of water, especially of a watercourse, such as a river.

Stockpile. An accumulation of ore, stone, or other mined or quarried material.

Sulfides or sulfidic material. Minerals and rocks that contain a significant fraction of sulfur in a reduced oxidation state. Sulfides are often combined with metals, releasing metals and acid when exposed to water and oxygen.

Surface water. Water found in ponds, lakes, inland seas, streams, and rivers or above the ground surface.

Tailings. Crushed ore that has been washed or treated and is regarded as too poor to be treated further.

Waste rock. A non-ore rock that is removed to access the ore zone. It contains target metals or minerals below the economic cutoff level and must be removed to gain access to the ore zone.

Watershed. The entire land area that contributes water to a particular drainage system or stream.

This page intentionally left blank.

Chapter 7. References

Adams, K., and T. Sawyer. 1999. Unnamed faults near Packard Flat, in Quaternary fault and fold database of the United States. Internet website: http://earthquakes.usgs.gov/hazards/qfaults.

Algermissen, S., D. Perkins, P. Thenhaus, S. Hanson, and B. Bender. 1982. Probabilistic Estimates of Maximum Acceleration and Velocity in Rock in the Contiguous United States. United States Department of the Interior, Geological Survey Open File Report 82-1033. Internet website: https://pubs.usgs.gov/of/1982/1033/report.pdf

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practice for Avian Protection on Power Lines. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC, and Sacramento, California.

Babal, M., C. I. Busby, D. M. Garaventa, S. A. Guedon, and M. E. Tannam. 1993. An Historic Context for the Rochester Cultural District, Vicinity of the Coeur Rochester Mine, Pershing County, Nevada. BLM Report No. Cr2-2474(P). Report on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

Bengston, G. 2003. Northern Paiute and Western Shoshone Land Use in Northern Nevada: A Class I Ethnographic and Ethnohistoric Overview. Bureau of Land Management, Nevada, Cultural Resources Series 12. Nevada State Office, Reno, Nevada.

BLM (Bureau of Land Management). 1984. Manual 8400—Visual Resource Management. Rel. 8-24, April 5, 1984. BLM, Washington, DC.

______. 1986. Handbook H-8410-1—Visual Resource Inventory. Rel. 8-28, January 17, 1986. BLM, Washington, DC.

______. 1991. Nevada cyanide management plan. Nevada State Office, Reno, Nevada.

______. 2008. Groundwater Modeling Guidance for Mining Activities. Nevada State Office, Reno. April 21, 2008.

______. 2009. Manual 7300—Air Resources Management Program. January 16, 2009. Internet website: https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual7300.pdf.

______. 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. Bureau of Land Management. Cheyenne, Wyoming. April 2013.

______. 2014. State Protocol Agreement between the Bureau of Land Management, Nevada, and the Nevada State Historic Preservation Officer for Implementing the National Historic Preservation Act. Revised December 22, 2014. BLM Nevada State Office, Reno. Internet website: http://www.blm.gov/style/medialib/blm/nv/cultural.Par.65188.File.dat/State%20Protocol%20Agreement%20Dec%202014.pdf.

______. 2015a. Record of Decision and Resource Management Plan for the Winnemucca District Planning Area. EIS. BLM/NV/WN/ES/13-11+1793. Winnemucca District Office, Winnemucca, Nevada.

______. 2015b. Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. BLM Nevada State Office, Reno, Nevada.

______. 2016a. Coeur Rochester Mine Plan of Operations Amendment 10 and Closure Plan Final EIS DOI-BLM-NV-W010-2014-0022-EIS. February 2016. Winnemucca District Office, Winnemucca, Nevada.

______. 2016b. Manual 1780 Tribal Relations. Rel 1-1780. December 15, 2016. BLM, Washington, DC.

______. 2016c. Handbook 1780-1 Improving and Sustaining BLM-Tribal Relations. Rel 1-1781. December 15, 2016. BLM, Washington, DC.

______. 2018a. Gold Rock Mine Project Final Environmental Impact Statement. Internet website: https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=49330.

______. 2018b. Guidelines and Standard for Archaeological Inventory (sixth edition), October 2018. United States Department of the Interior Bureau of Land Management Nevada State Office. Nevada State Office, Reno, Nevada.

______. 2019. Nevada and Northeastern California Greater Sage-Grouse Record of Decision and Approved Resource Management Plan Amendment. March 2019. Nevada State Office, Reno Nevada BLM GIS. 2019. GIS data available on the BLM server or BLM GIS website: https://navigator.blm.gov/home.

BLM GIS. 2015. GIS data from the 2015 GRSG ARMPA. Internet website: https://navigator.blm.gov/data?id=e45c4ef6fe526091.

______. 2019. GIS data available on the BLM server or BLM GIS website. Internet website: https://navigator.blm.gov/home.

Bradley, P. V., M. J. O'Farrell, J. A. Williams, and J. E. Newmark (editors). 2006. The Revised Nevada Bat Conservation Plan. Nevada Bat Working Group. Reno, Nevada.

Bureau of Labor Statistics (BLS). 2019. Local Area Unemployment Statistics. Labor Force Data by County, Annual Averages. Internet website: https://www.bls.gov/lau/#cntyaa.

Bureau of Land Management, Winnemucca District, Nevada Division of Historic Preservation and Archaeology, and the Advisory Council on Historic Preservation. 1992. Programmatic Agreement among the Bureau of Land Management, Winnemucca District, Nevada Division of Historic Preservation and Archaeology, and the Advisory Council on Historic Preservation Regarding the Treatment of Historic Properties During Mineral Development Associated with the Rochester Mine by Coeur Rochester, Inc. and Coeur Exploration, Inc. Nevada State Office, Reno, Nevada.

Busby, C. I., D. M. Garaventa, M. Babal, S. A. Guedon, and M. E. Tannam. 1993. Proposed Boundaries, Property Types and Contributing Elements for the Rochester Cultural District, Vicinity of the Coeur Rochester Mine, Pershing County, Nevada. Submitted to USDI Bureau of Land Management, Winnemucca District Office, Nevada, Report No. CR2-2490(P).

Clark, D. R. , and R. L. Hothem. 1991. "Mammal mortality at Arizona, California, and Nevada gold mines using cyanide extraction." *Cal. Fish and Game* 77(2): 61–69.

CRI (Coeur Rochester, Inc). 2015a. Plan of Operations Amendment 10 and Reclamation Plan Update for the Rochester and Packard Mines. BLM Case Number N-64629/Reclamation Permit No. 0087 (POA 10). Coeur Rochester Mine, Pershing County, Nevada. Lovelock, Nevada. January 2015.

______. 2015b. Coeur Rochester Project Draft Final Permanent Closure Plan (FPCP) for Plan of Operations Amendment 10 (POA 10). Lovelock, Nevada. January 2015.

______. 2016. Plan of Operations Amendment 11 Stormwater Pollution Prevention Plan. Lovelock, Nevada. November 2016.

______. 2017a. Plan of Operations Amendment 11 and Reclamation Plan Update for the Coeur Rochester and Packard Mines, Pershing County, Nevada, BLM Case Number N-64629 / Reclamation Permit No. 0087 (POA 11). Lovelock, Nevada. August 2017.

______. 2017b. Weed Management Plan (Revision 1.3). Lovelock, Nevada. September 2017.

______. 2017c. Coeur Rochester and Packard Mines, Pershing County, Nevada, Lighting Management Plan. Lovelock, Nevada. October 2017.

Cronquist, A., A. H. Holmgren, N. H. Holmgren, and J. L. Reveal. 1972. *Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A.*, Volume 1. New York Botanical Garden, Bronx, New York.

EMPSi (Environmental Management and Planning Solutions Inc.). 2019. Coeur Rochester and Packard Mines Plan of Operations Amendment 11 Environmental Impact Statement: Public Scoping Report. May 2019. Report on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

EPA (US Environmental Protection Agency). 1998. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), 3rd edition. US Environmental Protection Agency, Office of Solid Waste, Washington, DC.

______. 2015. 2014 National Emissions Inventory. Version 2. Internet website: https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data.

______. 2018a. National Ambient Air Quality Standards (NAAQS) Table. Internet website: https://www.epa.gov/criteria-air-pollutants/naaqs-table.

______. 2018b. The Green Book Nonattainment Areas for Criteria Pollutants. Internet website: https://www.epa.gov/green-book.

______. 2018c. TRI Data and Tools. Reporting for Coeur Rochester Mines. Form R-Mercury. Internet website: https://ofmpub.epa.gov/enviro/tri_formr_partone_v2.get_thisone?rpt_year=2017&dcn_num=1317216311199&ban_flag=Y.

______. 2019. Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2017. Internet website: https://www.epa.gov/sites/production/files/2019-04/documents/us-ghg-inventory-2019-main-text.pdf. EPA 430-R-19-001.

FarWestern GIS. 2018. GIS data of the direct and indirect cultural areas of potential effect. Data on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

Francis, C. D., and J. R. Barber. 2013. "A framework for understanding noise impacts on wildlife: An urgent conservation priority." *Frontiers in Ecology and the Environment* doi:10.1890/120183.

Giambastiani, D. 2019. A Class III Cultural Resources Inventory of 3,595 Acres in Pershing County, Nevada for the Coeur Rochester Mine POA 11 Project. On file at the BLM Winnemucca District Office, Winnemucca, Nevada. BLM Report CR2-3385.

Greater Sage-Grouse Advisory Committee. 2012. Strategic Plan for Conservation of Greater Sage-Grouse in Nevada. Presented to Governor Brian Sandoval. July 2012. State of Nevada.

HydroGeo. 2010. Hydrogeologic and Geochemical Technical Report Rochester Mine. Crested Butte, Colorado. February 1, 2010.

International Code Council, Inc. 2006. International Building Code. Internet website: http://bechtel.colorado.edu/~willam/4830%202006%20IBC.pdf.

IPCC (Intergovernmental Panel on Climate Change). 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (T. F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, et al., editors). Cambridge University Press, Cambridge, United Kingdom, and New York, New York, USA.

______. 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (R. K. Pachauri and L. A. Meyer, editors). IPCC, Geneva, Switzerland.

JBR (JBR Environmental Consultants). 2014. Coeur Rochester Mine Baseline Technical Report, Plan of Operations Amendment 10, Heap Leach Pad Expansion and Reclamation Plan Update for the Rochester and Packard Mines. BLM Casefile No. NVN-064629 and State of Nevada Reclamation Permit No. 0087. May 9, 2014, revised July 11, 2014. Prepared for Coeur Rochester, Inc.

Knight Piésold. 2010. Rochester Mine Stage III Heap Leach Pads Design Report, Project #TU101.0322.03. May 28, 2010. Elko, Nevada.

______. 2015. Coeur Rochester, Inc. Rochester Mine Stage V Heap Leach Facilities Design Report. Knight Piésold and Co., Elko, Nevada. January 9, 2015.

NAC (Nevada Administrative Code). 2018. Chapter 445B—Air Controls, Section 445B.22097—State Standards of Quality for Ambient Air. Internet website: https://www.leg.state.nv.us/NAC/NAC-445B.html.

NBMG GIS. 2013. GIS data of the geologic map of the Unionville and Buffalo Quadrangle. Nevada Bureau of Mines and Geology. Internet website: http://www.nbmg.unr.edu/Maps&Data/.

NDEP (Nevada Division of Environmental Protection). 2016a. Calendar Year 2016 Actual Production/Emission Reporting Spreadsheet for Mercury Emissions from the Precious Metals Mining Industry. Internet website: https://ndep.nv.gov/uploads/air-nmcp-docs/2016-hg-emissions.pdf.

______. 2016b. Nevada Statewide Greenhouse Gas Emissions Inventory and Projections, 1990–2030. Internet website: https://ndep.nv.gov/uploads/air-pollutants-docs/GHG_Report_2016.pdf.

NDEP BAPC (Nevada Division of Environmental Protection, Bureau of Air Quality Planning). 2018. Class II Air Quality Operating Permit AP1044-0063.04. June 22, 2018.

NDWR (Nevada Division of Water Resources). 2019. Nevada Water Rights Mapping Application. Internet website: http://webgis.water.nv.gov/Html5Viewer/Index.html?configBase=http://webgis.water.nv.gov/Geocortex/Essentials/REST/sites/NDWR_Water_Rights/viewers/NDWR_Water_Rights1/virtualdirectory/Resources/Config/Default.

Nevada State Historic Preservation Office (SHPO). 2019. May 13, 2019 SHPO Letter to BLM Re: A Class III Cultural Resources Inventory of 3,595 Acres in Pershing County for the Coeur Rochester Mine POA II Project, Nevada BLM: 3809/8100 (NVW010.43); Undertaking #2010-0577. Letter on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

NRCS GIS. 2018. GIS data of soil map units. Internet website: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

NVDWR (Nevada Department of Water Resources) GIS. 2019. GIS data of State Engineers Groundwater Basin Boundaries. Internet website: http://water.nv.gov/gisdata.aspx.

O'Shea, T. J., D. R. Clark, Jr., and T. P. Boyle. 2000. "Impacts of mine-related contaminants on bats." In: *Proceedings of Bat Conservation and Mining: A Technical Interactive Forum* (K. C. Voories and D. Throgmorton, editors). November 14–16, 2000, St. Louis, Missouri. US Department of Interior, Office of Surface Mining and Coal Research Center, Southern Illinois University, Carbondale. Pp. 276-292.

Patricelli, G. L., J. L. Blickley, and S. L. Hooper. 2013. "Recommended management strategies to limit anthropogenic noise impacts on greater sage-grouse in Wyoming." *Human-Wildlife Interactions* 7(2): 230–249.

Perry, R., and M. Visher. 2017. Major Mines of Nevada 2017—Mineral Industries in Nevada's Economy: Nevada Bureau of Mines and Geology Special Publication P-29.

Pershing County. 2012. Pershing County Master Plan. December 2012. Lovelock, Nevada.

Piteau Associates. 2019a. POA 11 Water Quantity and Quality Impacts Assessment Report. Prepared for Coeur Rochester, Inc. Project No. 3767. March 2019. Report on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

______. 2019b. Technical Memorandum: BLM Data Adequacy Addendum. April 2019. Report on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

Piteau GIS. 2018. GIS data published in the POA 11 Water Quantity and Quality Impacts Assessment Report.

Ross-Hauer, JoEllen. 2018 Architecture Report for the Coeur Rochester Mine POA 11 Project. BLM Report No. CR2-3385-1 Report on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

Sammons/Dutton LLC. 2017. Plan of Operations Amendment 11 and Reclamation Plan Update for the Coeur Rochester and Packard Mines Socioeconomic and Environmental Justice Baseline Report. Pershing County, Nevada. October 2017. Report on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

Saxelby Acoustics. 2018. Coeur Rochester POA 11 Noise Survey, Construction Noise Analysis, and Mining Noise Analysis. May 2018. Report on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

Shamberger, H. H. 1973. *The Story of Rochester, Pershing County, Nevada*. Nevada Historical Press, Carson City, Nevada.

SWS (Schlumberger Water Services). 2010. Updated Backfill Management Plan. Schlumberger Water Services, Reno, Nevada. October 1, 2010. P. 63, Appendix B.

______. 2012a. Coeur Rochester, Inc., Rochester and Packard Mines Baseline Hydrologic and Geochemical Characterization Report and Groundwater Model Work Plan in Support of POA #9. Reno, Nevada. February 2012.

______. 2012b. Coeur Rochester, Inc. Rochester and Packard Mines Hydrogeologic Summary. Schlumberger Water Services, Reno, Nevada. May 2012.

______. 2014. Coeur Rochester, Inc. Updated Baseline Hydrologic and Geochemical Characterization Report POA 10 and Reclamation Plan Update. Schlumberger Water Services: Reno, Nevada. June 3, 2014.

______. 2015. Coeur Rochester, Inc. Water Quantity and Quality Impacts Analysis, POA 10 and Reclamation Plan Update. Reno, Nevada. January 2015.

Solaegui Engineers, LTD. 2018. Plan of Operations Amendment 11 and Reclamation Plan Update for Coeur Rochester and Packard Mines Traffic Impact Analysis. Sparks, Nevada. February 2018.

SRK (SRK Consulting). 2017a. Coeur Rochester Mine Request for Approved Jurisdictional Determination. Reno, Nevada. March 2017.

______. 2017b. 2016 Coeur Rochester POA 11 Botanical Baseline. Prepared for Coeur Rochester, Inc. April 2017.

______. 2017c. 2017 Coeur Rochester POA 11 Botanical Baseline Report—Utility Corridor Alternatives and Relief Canyon Road. Reno, Nevada. October 2017.

______. 2018a. POA 11 Ecological Risk Assessment. Reno, Nevada. December 2018.

______. 2018b. Coeur Rochester POA 11 Geochemical Characterization Report. Reno, Nevada. February 2018.

______. 2018c. Coeur Rochester POA 11 Waste Rock Management Plan. Reno, Nevada. August 2018.

______. 2018d. 2018 Coeur Rochester POA 11 – Supplemental Botanical Baseline Report – Rochester Canyon Utility Corridor Alternative. September 2018.

State of Nevada. 2016. Department of Conservation and Natural Resources. Sagebrush Ecosystem Program. Nevada Habitat Quantification Tool Scientific Methods Document v1.1. Prepared by Environmental Incentives, LLC and EcoMetrix Solutions Group, LLC. Internet website: http://sagebrusheco.nv.gov/uploadedFiles/sagebrusheconvgov/content/CCS/NV%20CCS%20HQT%20Methods%20Document%20-%20version%201.1.pdf.

Stewart, O. C. 1939. "The Northern Paiute bands." University of California Anthropological Records 2(3):127-149. Berkeley, California.

SWReGAP GIS. 2004. Published GIS data of vegetation communities. Internet website: https://swregap.org/data/landcover/.

Tiley, S., and P. (M.) Rucks. 2011. Ethnographic Syntheses of the Eagle Lake Field Office, Bureau of Land Management, Susanville, California. On file, BLM, Susanville, California.

Tiley, S., and T. McBride. 2013. Ethnographic Synthesis and Context for the Carson City District Office, Bureau of Land Management, Nevada. Prepared for Bureau of Land Management, Carson City District, Carson City, Nevada.

Trinity Consultants. 2018. Technical Support Document for AERMOD Modeling of Ambient Air Quality Impacts, Coeur Rochester Mine POA 11. Boise, Idaho.

USACE (US Army Corps of Engineers). 1983. Earthquake Design and Analysis for Corps of Engineers Projects, ER 1110-2-1806. Department of the Army. Washington, DC.

______. 2018. Letter from Jason Gipson, USACE, to Dana Sue Kimbal, Coeur Rochester, Inc. No subject. Referencing Regulatory Division (SPK-2000-25123). October 16, 2018. Letter on file with the BLM, Winnemucca District Office, Winnemucca, Nevada.

US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates. Internet Website: https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

US Department of the Interior and United States Department of Agriculture. 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+3071/REV 07. Bureau of Land Management. Denver, Colorado.

WRC (Wildlife Resource Consultants, LLC). 2017a. Coeur Rochester Mine Pershing County, Nevada, 2016 Baseline Wildlife Survey Report for POA 11. Cedarville, California. April 2017.

______. 2017b. Coeur Rochester Mine Pershing County, Nevada 2017 Baseline Wildlife Survey Report for POA 11 Utility Corridor Alternatives and Relief Canyon Road. Cedarville, California. October 31, 2017.

______. 2018a. Coeur Rochester Mine Pershing County, Nevada 2018 Supplemental Wildlife Baseline Report: Rochester Canyon Utility Corridor Alternative. Cedarville, California. October 2018.

______. 2018b. Coeur Rochester Mine POA 11 Project Pershing County, Nevada Final Seeps and Springs Survey Report. Cedarville, California. February 14, 2018.

WRC GIS. 2016. GIS data of springs and seeps surveyed in 2016 by Western Resource Consultants. Cedarville, California.

WSP (WSP USA). 2017. Coeur Rochester, Inc. Baseline Hydrologic Data Collection, Water Quantity and Quality Impacts Assessment Workplan. May 2017.

______. 2018. Coeur Rochester Inc. Baseline Hydrologic Report. Reno, Nevada. May 18, 2018.

This page intentionally left blank.

Appendix A
Figures

This page intentionally left blank.

Appendix A. Figures

Figures List

This page intentionally left blank.

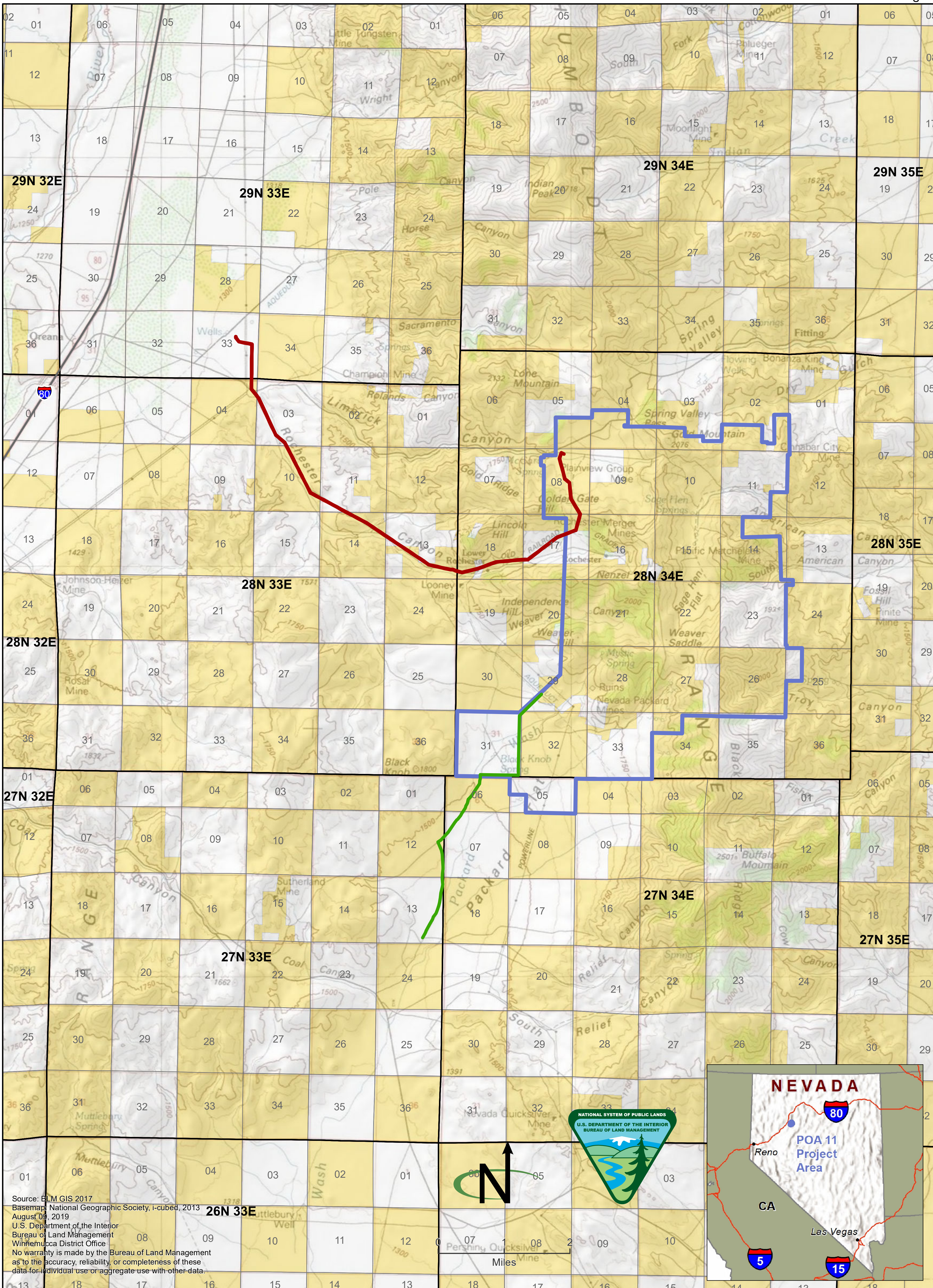

Figure 1-1

Project Area

- POA 11 plan boundary
- NV Energy 120 kV Power Line
- Packard Flat Road
- Bureau of Land Management
- Private
- Township/Range
- Section

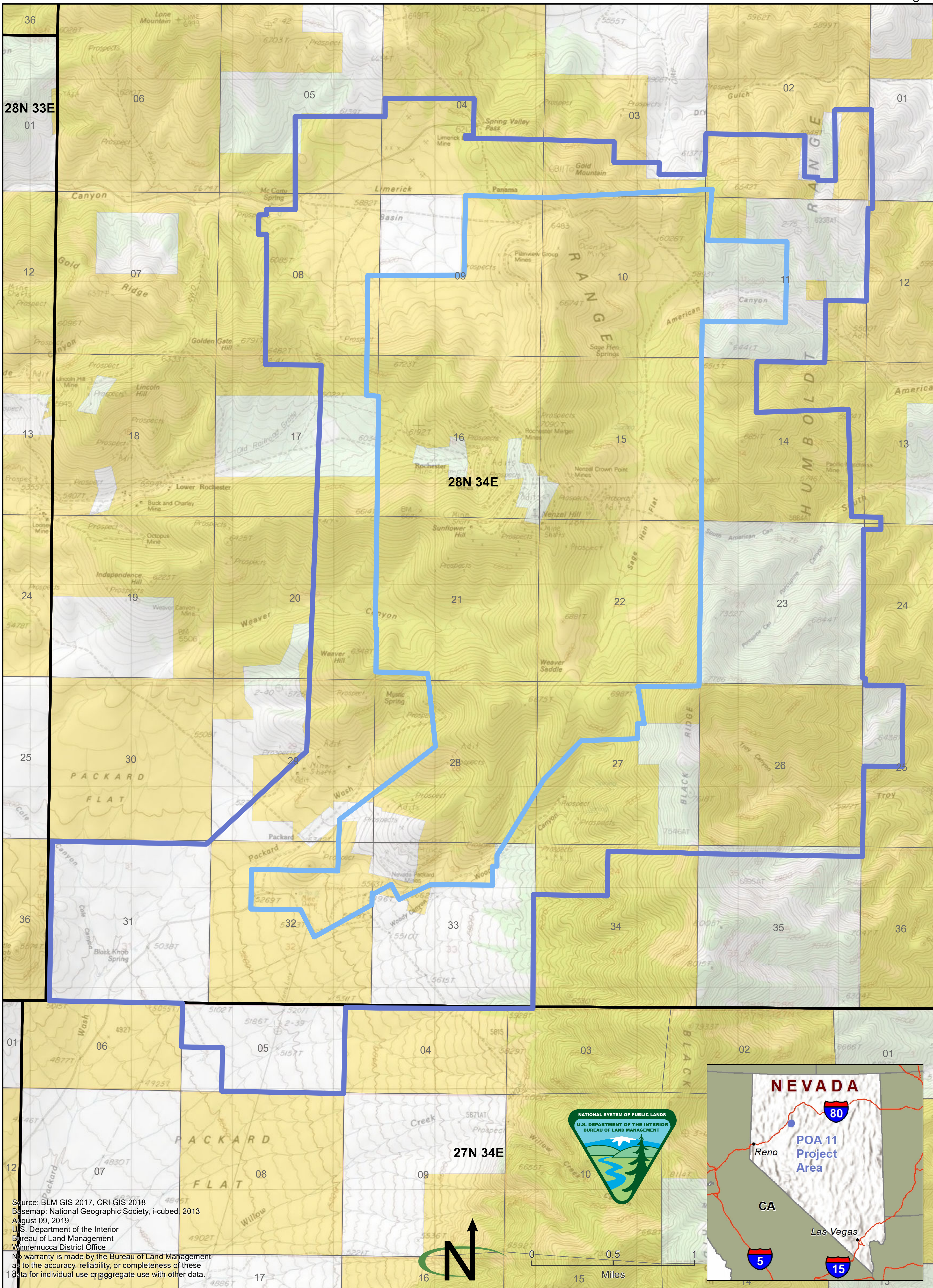

Figure 1-2

Existing and Proposed Plan Boundaries

- POA 11 plan boundary
- POA 10 plan boundary
- Bureau of Land Management
- Private

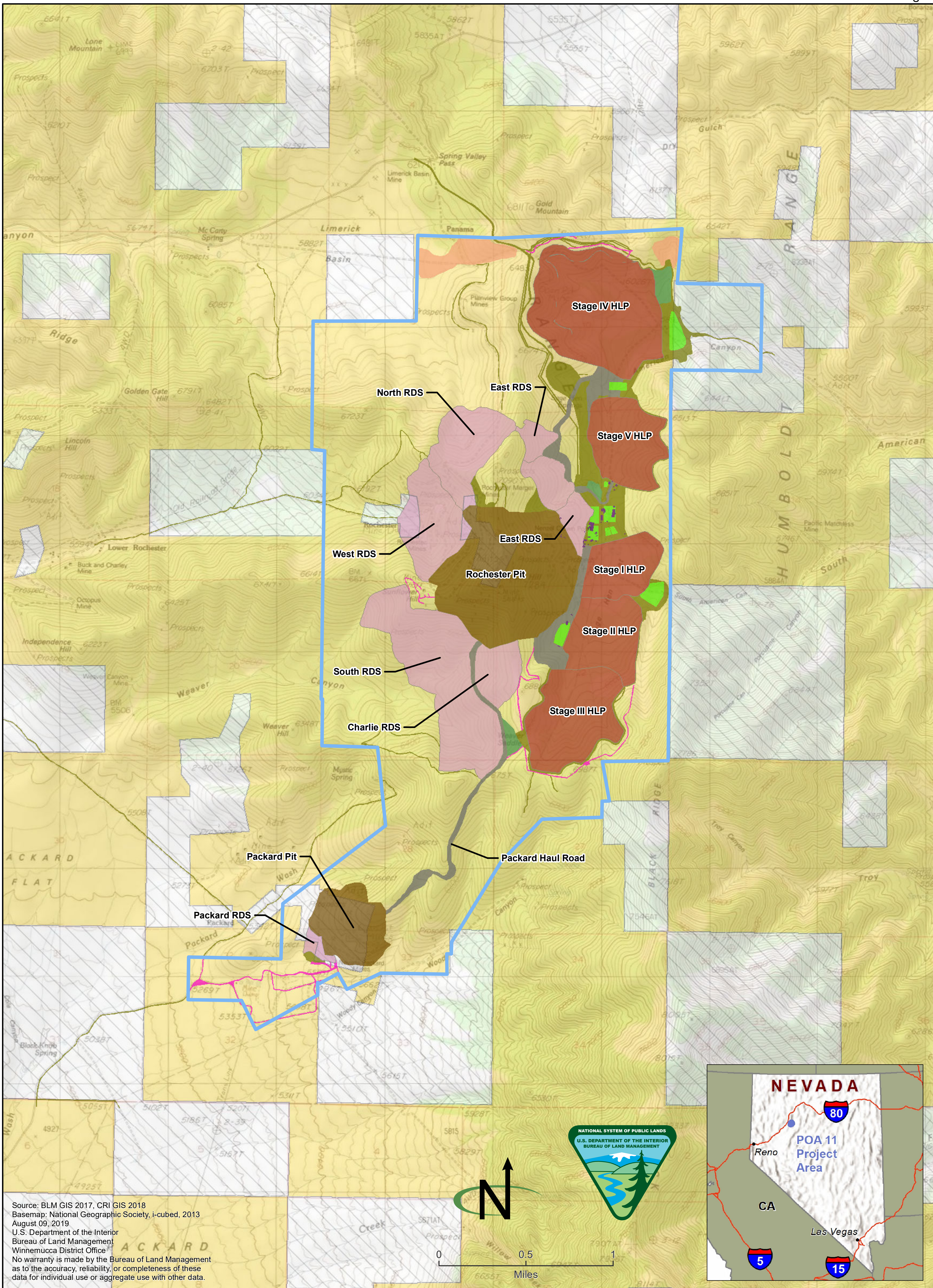

Figure 1-3
Existing and Authorized Facilities

- POA 10 plan boundary
- Bureau of Land Management
- Private

Existing and Authorized Disturbance

- Pit
- Heap Leach Pad (HLP)
- Rock Disposal Site (RDS)
- E-Cells/Process Ponds
- Growth Media Stockpiles
- Foundations and Buildings
- Yards-Storage Borrow Areas
- Exploration Roads/Drill Pads
- Roads
- Additional disturbance area

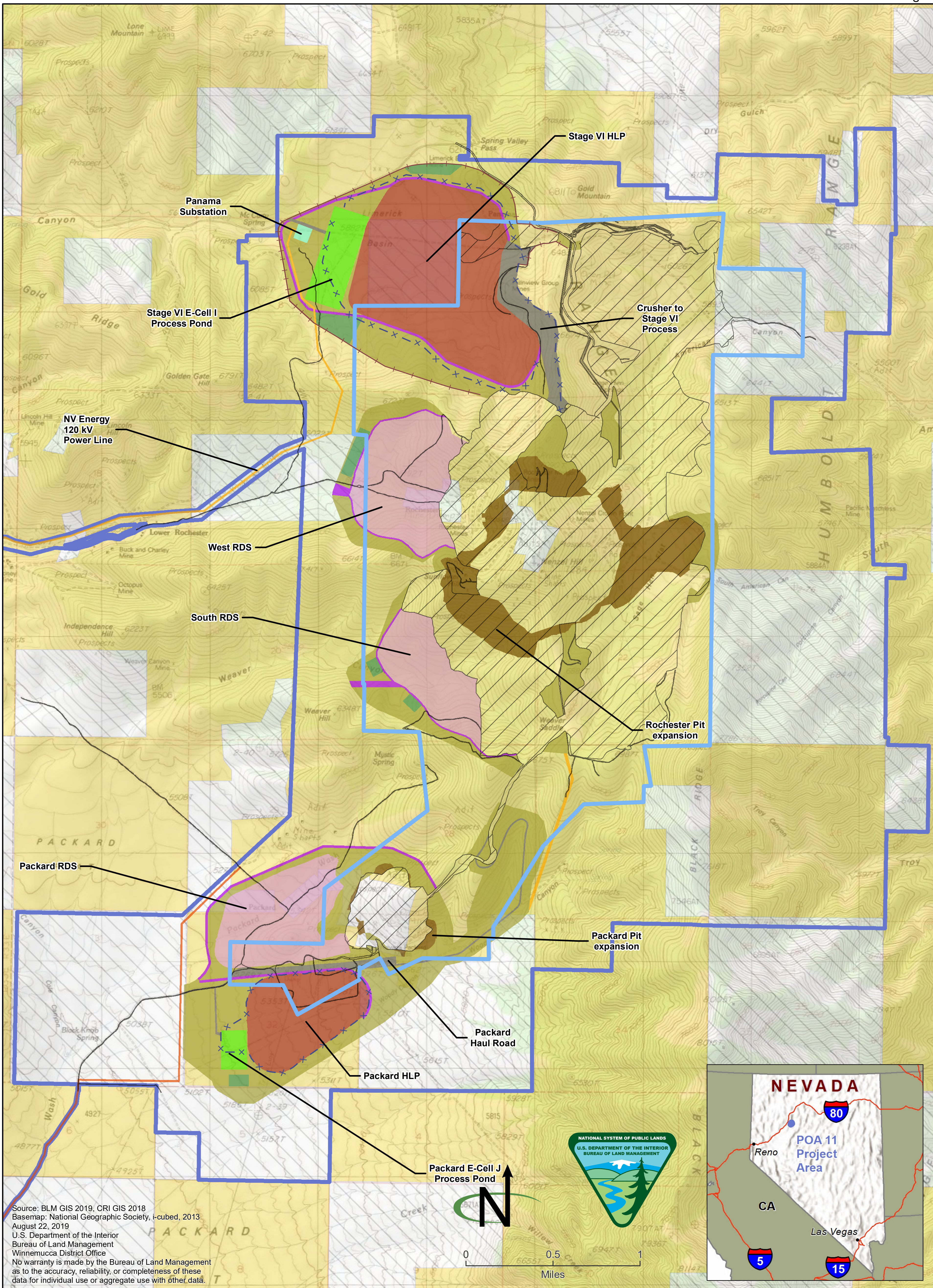

Figure 2-1
Proposed Facilities

POA 11 EIS project area
POA 10 plan boundary
Bureau of Land Management
Authorized disturbance
Private

Proposed Disturbance

Pit expansion
Heap Leach Pad (HLP)
Rock Disposal Site (RDS)
E-Cell
Growth Media Stockpiles
Sediment and drainage control
Roads
Additional disturbance area
Panama substation
NV Energy 120 kV Power Line
Packard Flat (road improvement)
8' chain link fence
Barbed wire fence

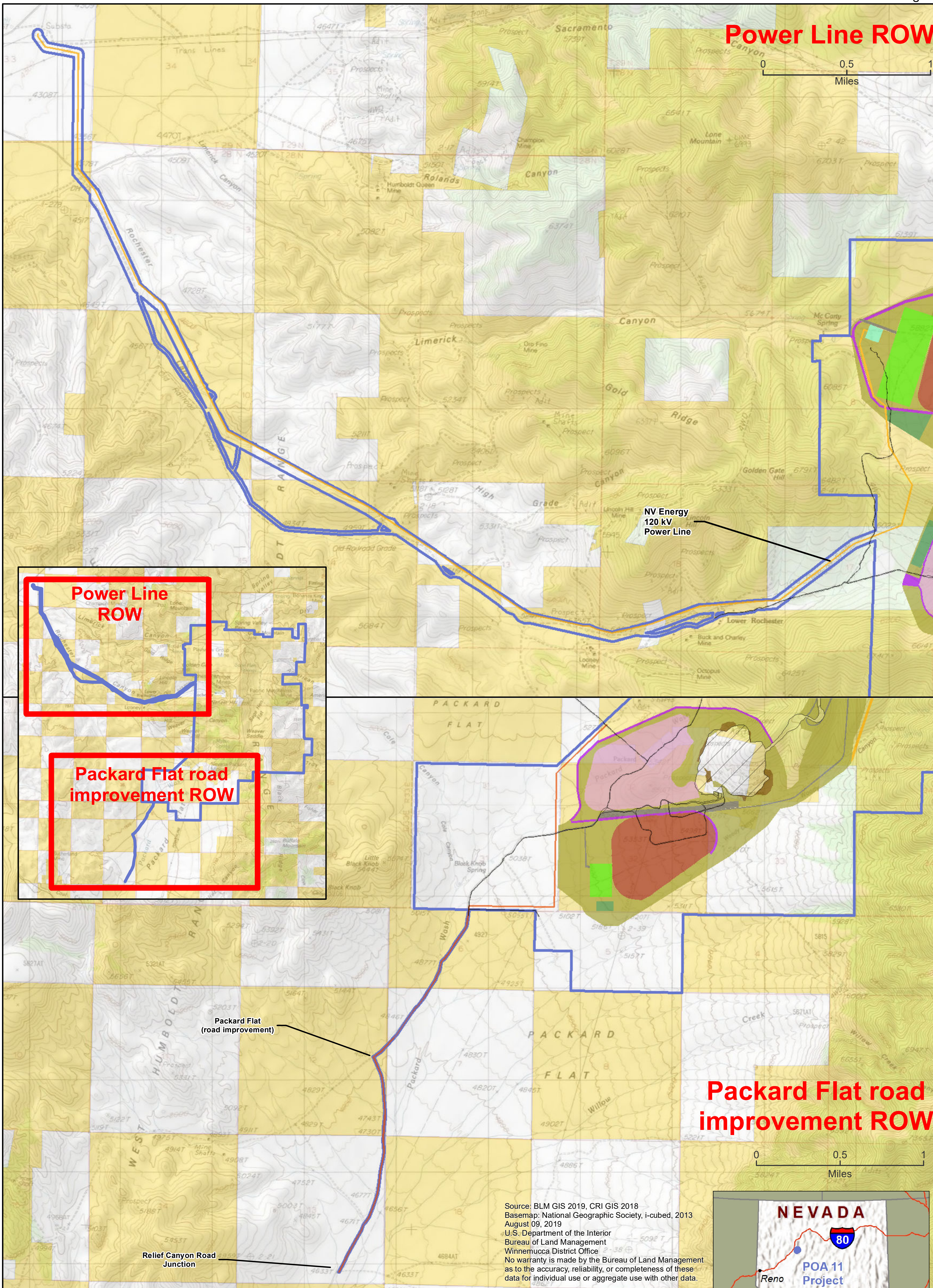

Figure 2-2
Proposed Facilities- ROWs

- POA 11 EIS project area
- Authorized disturbance
- Bureau of Land Management
- Private

Proposed Disturbance

- NV Energy 120 kV Power Line
- Packard Flat (road improvement)
- Panama substation
- Pit expansion
- Heap Leach Pad (HLP)
- Rock Disposal Site (RDS)
- E-Cell
- Growth Media Stockpiles
- Sediment and drainage control
- Roads
- Additional disturbance area

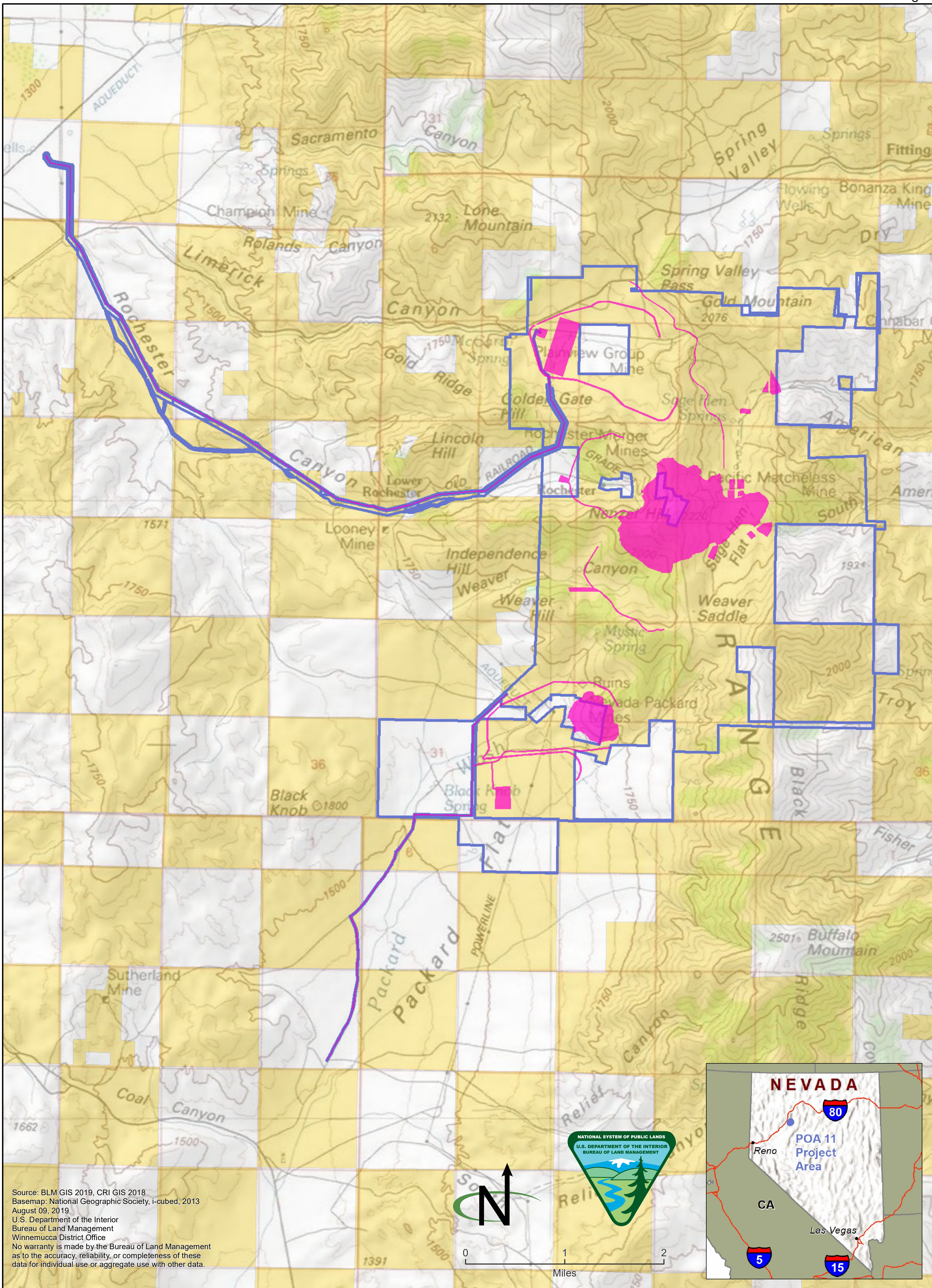

Figure 2-3
Permanent Disturbance

- Permanent disturbance
- POA 11 EIS project area
- Bureau of Land Management
- Private

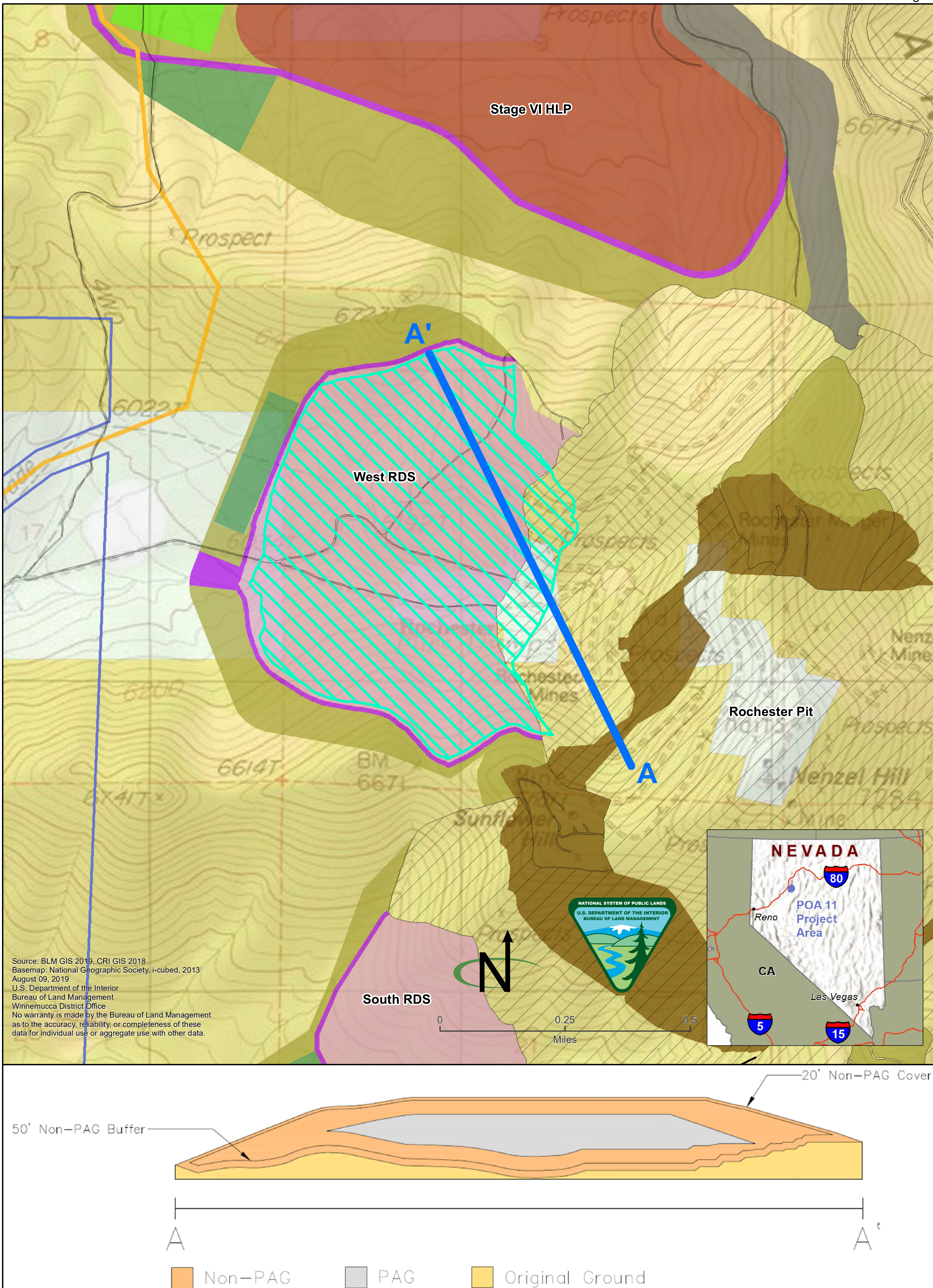

Figure 2-4
Alternative 1 - Management of PAG in the West RDS

- POA 11 EIS project area
- Authorized disturbance
- Bureau of Land Management
- Private
- Cross-section
- PAG management fill area

Proposed Disturbance

- Pit expansion
- Heap Leach Pad (HLP)
- Rock Disposal Site (RDS)
- E-Cell
- Growth Media Stockpiles
- Sediment and drainage control
- Roads
- Additional disturbance area
- NV Energy 120 kV Power Line

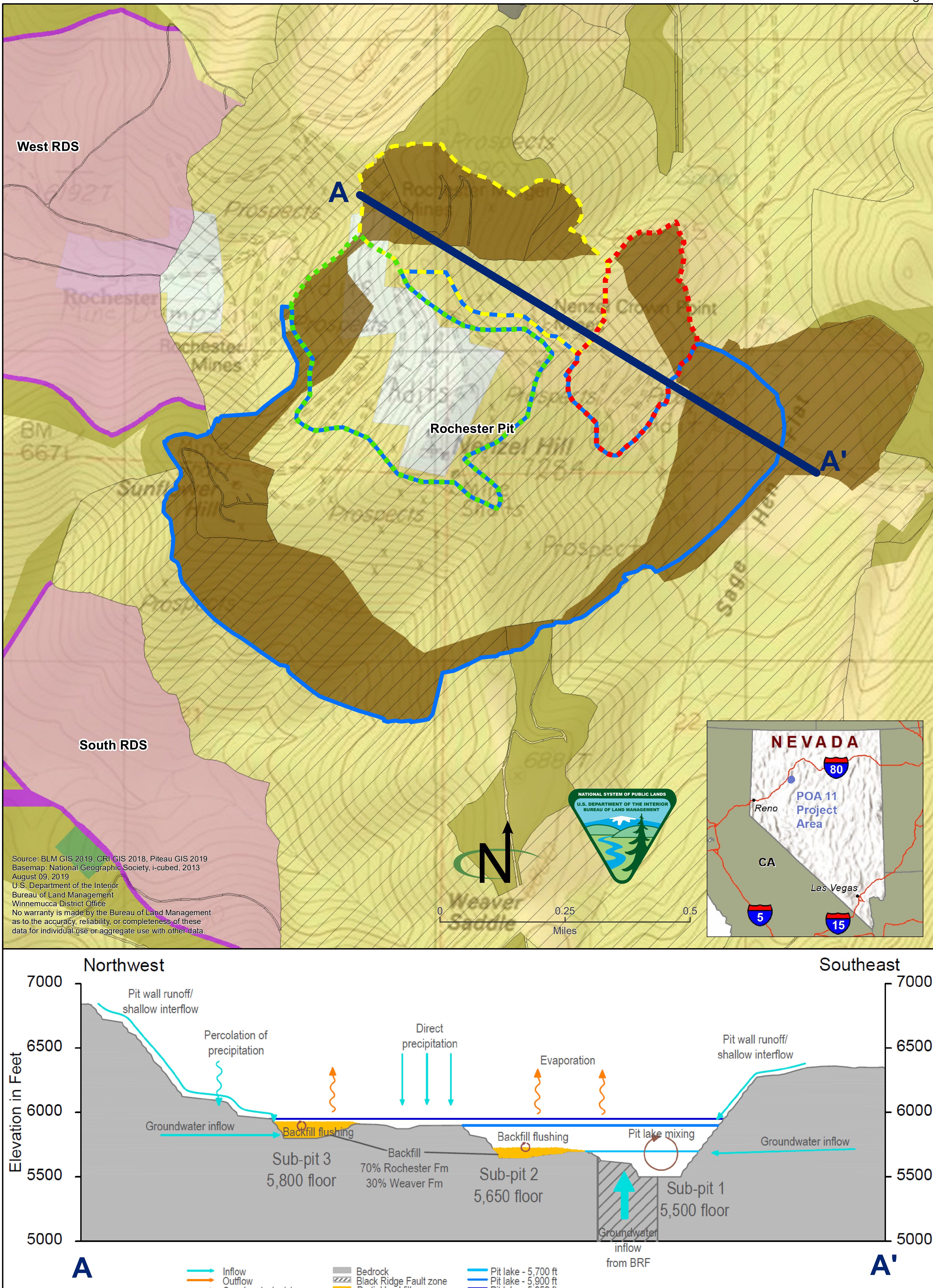

Figure 2-5
Alternative 2 - Partial Backfill of Pit Lake

Authorized disturbance
Bureau of Land Management
Private
Sub-pit 1 catchment
Sub-pit 2 catchment
Sub-pit 3 catchment
Sub-pit 4 catchment
Cross-section

Proposed Disturbance
Pit expansion
Rock Disposal Site (RDS)
Growth Media Stockpiles
Sediment and drainage control
Roads
Additional disturbance area

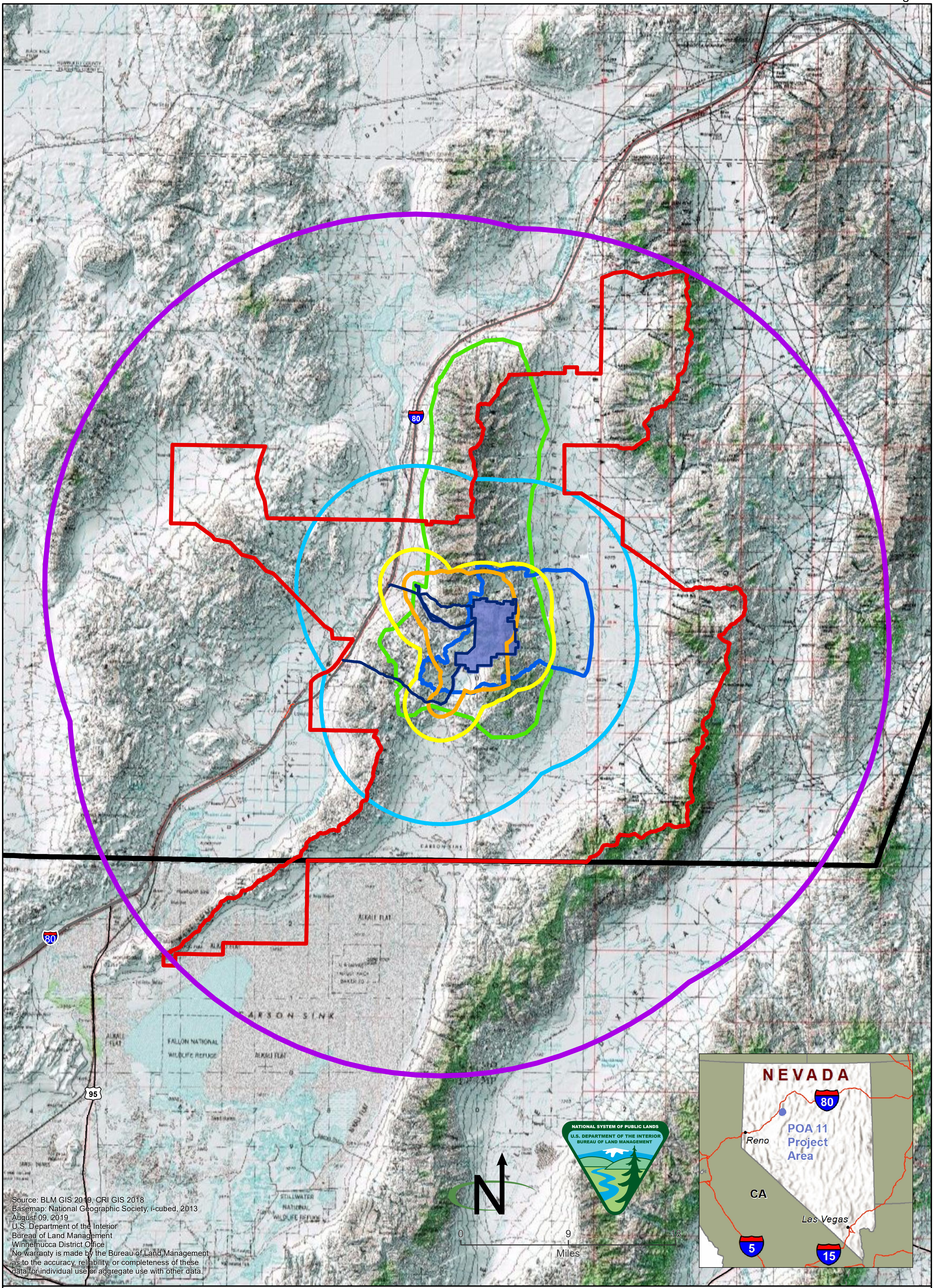

Figure 3-1
Cumulative Effect Study Areas

POA 11 EIS project area

Air CESA
Cultural CESA
Rangeland CESA
Raptor CESA
Visual CESA
Hydrologic CESA
General Wildlife and soils CESA
Transportation CESA
Socioeconomic CESA (Pershing and Humboldt counties)

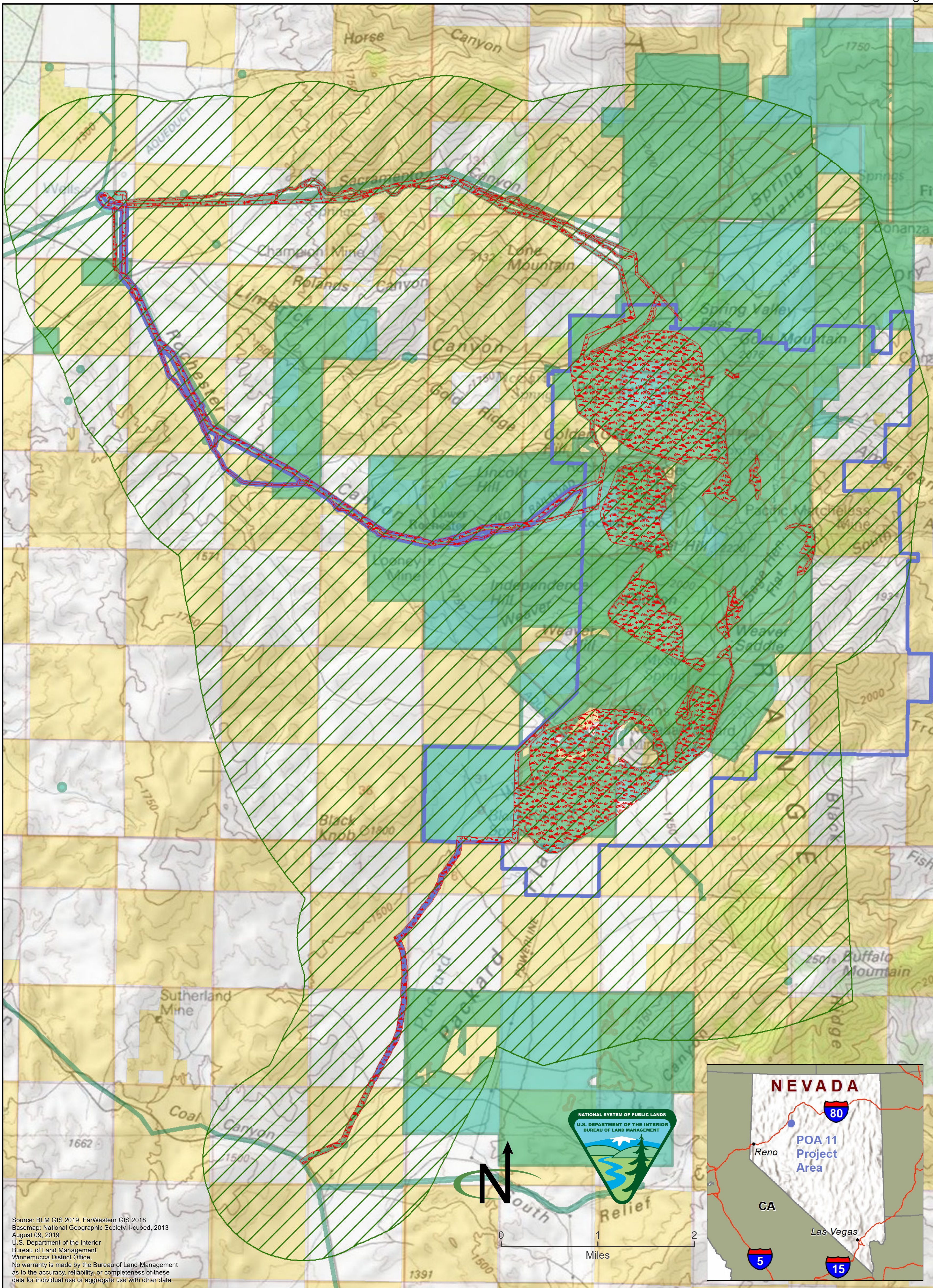

Figure 3-2

Cultural Area of Potential Effect

- Direct
- Indirect
- Previous cultural studies
- POA 11 project area
- Bureau of Land Management
- Private

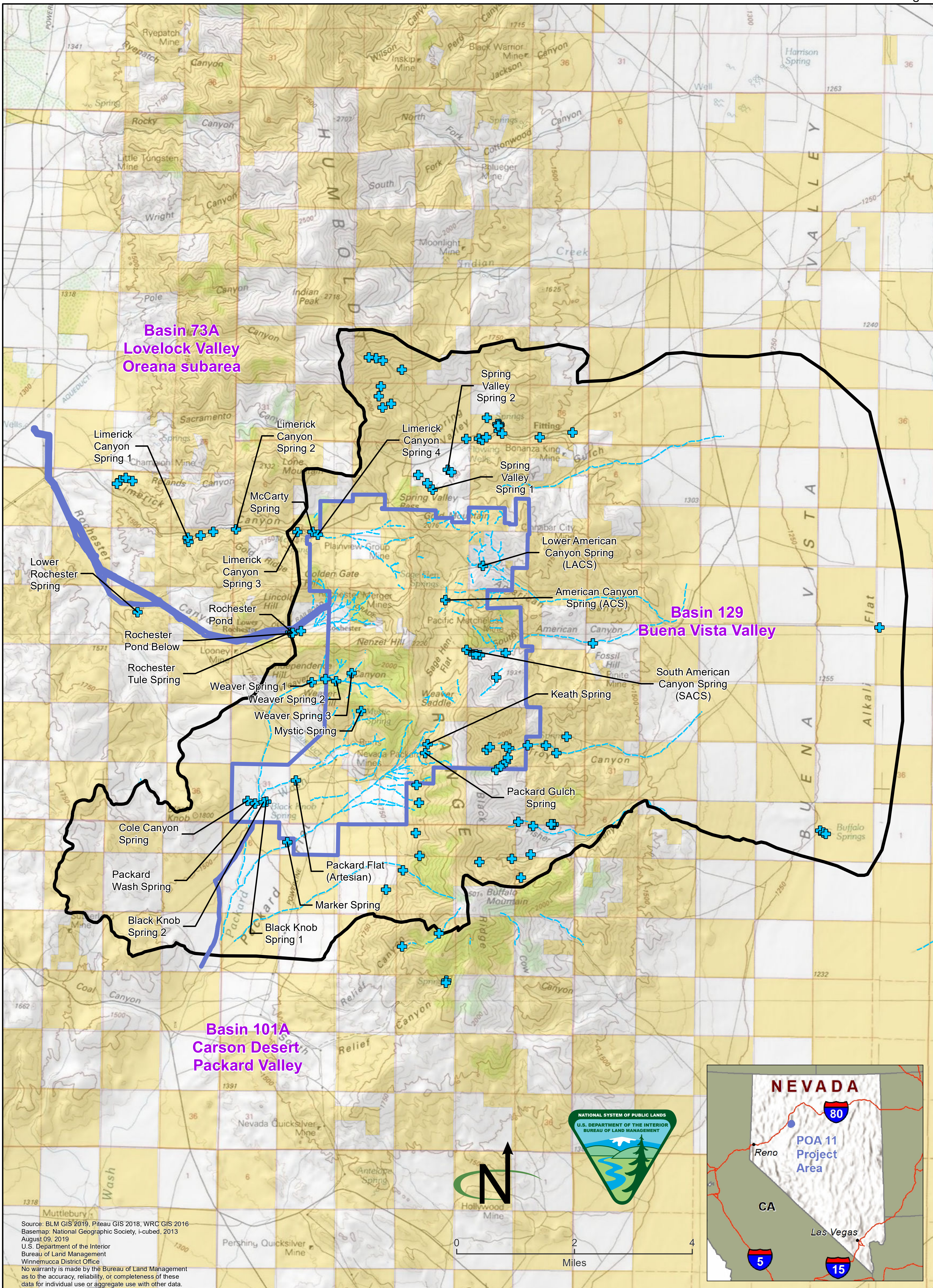

Figure 3-3

Seeps and Springs

- Hydrologic Model Area
- Seeps and springs surveyed for POA 11
- Ephemeral drainage
- POA 11 project area
- Bureau of Land Management
- Private

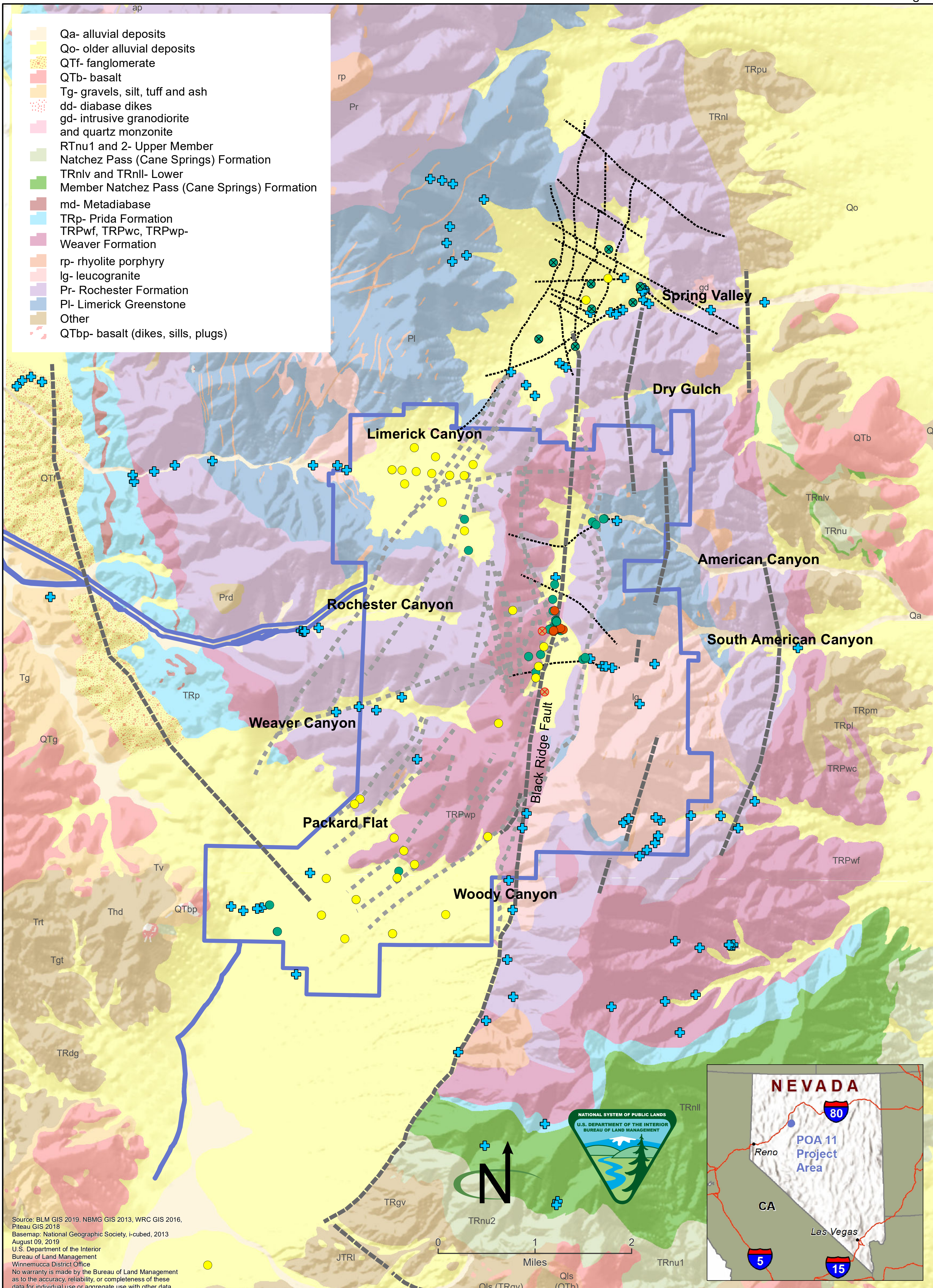

Figure 3-4

Geology

- Monitoring well
- Pumpback well
- Piezometer
- Production well
- Spring or seep
- Rochester district faults
- Regional faults
- Lineament
- POA 11 project area

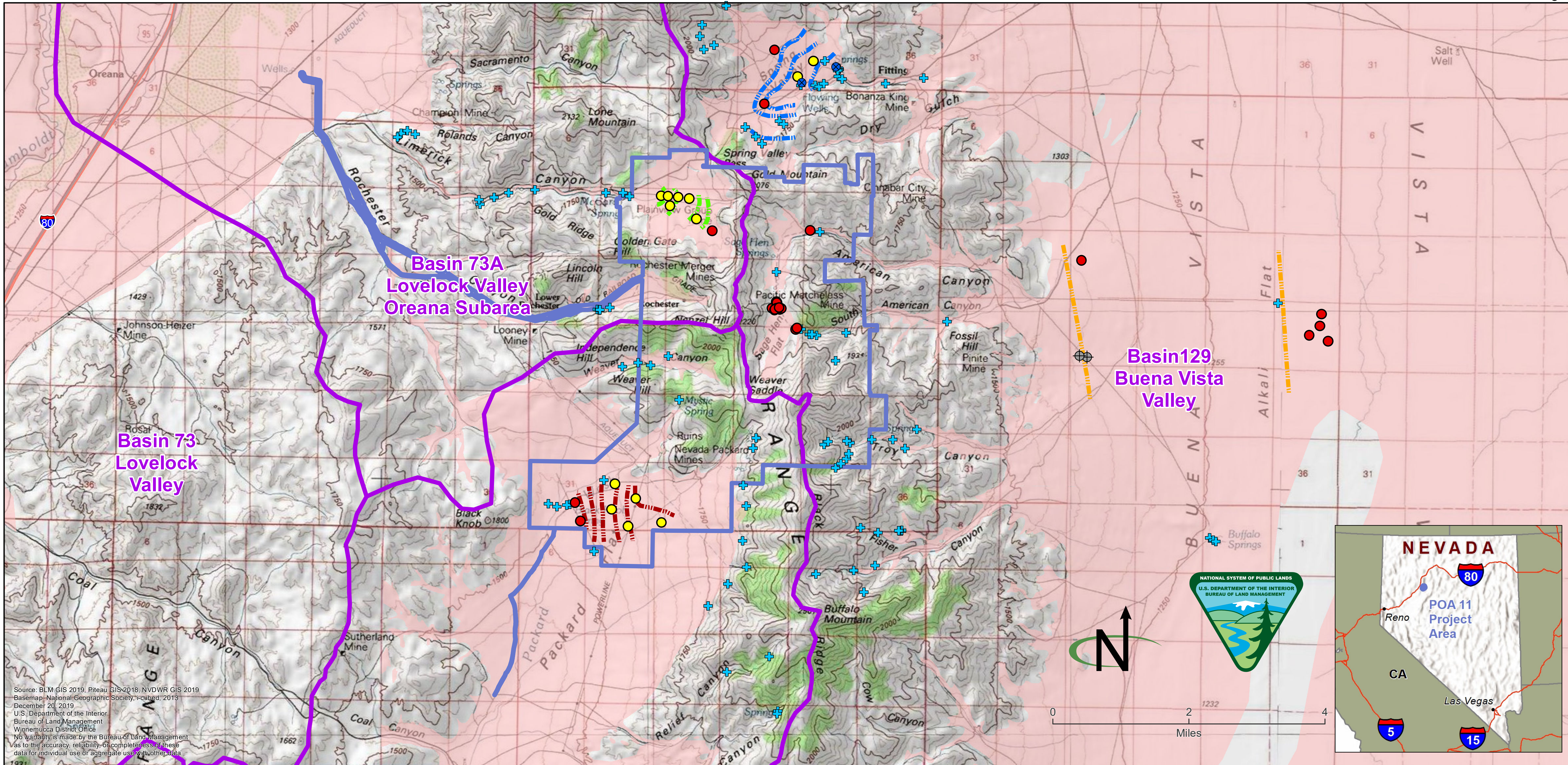

Figure 3-5

Alluvial Potentiometric Surface

- Alluvial monitoring well
- Alluvial production well
- Alluvial piezometer
- Domestic well
- Spring or seep
- Extent of alluvium
- Spring Valley alluvial contours, 50 ft, Second Quarter 2013
- Limerick Canyon alluvial contours, 50ft, October 2017
- Buena Vista Valley contours, 50 ft
- Packard Flat alluvial contours, 50ft, Second Quarter 2017
- Hydrographic basin divides
- POA 11 project area

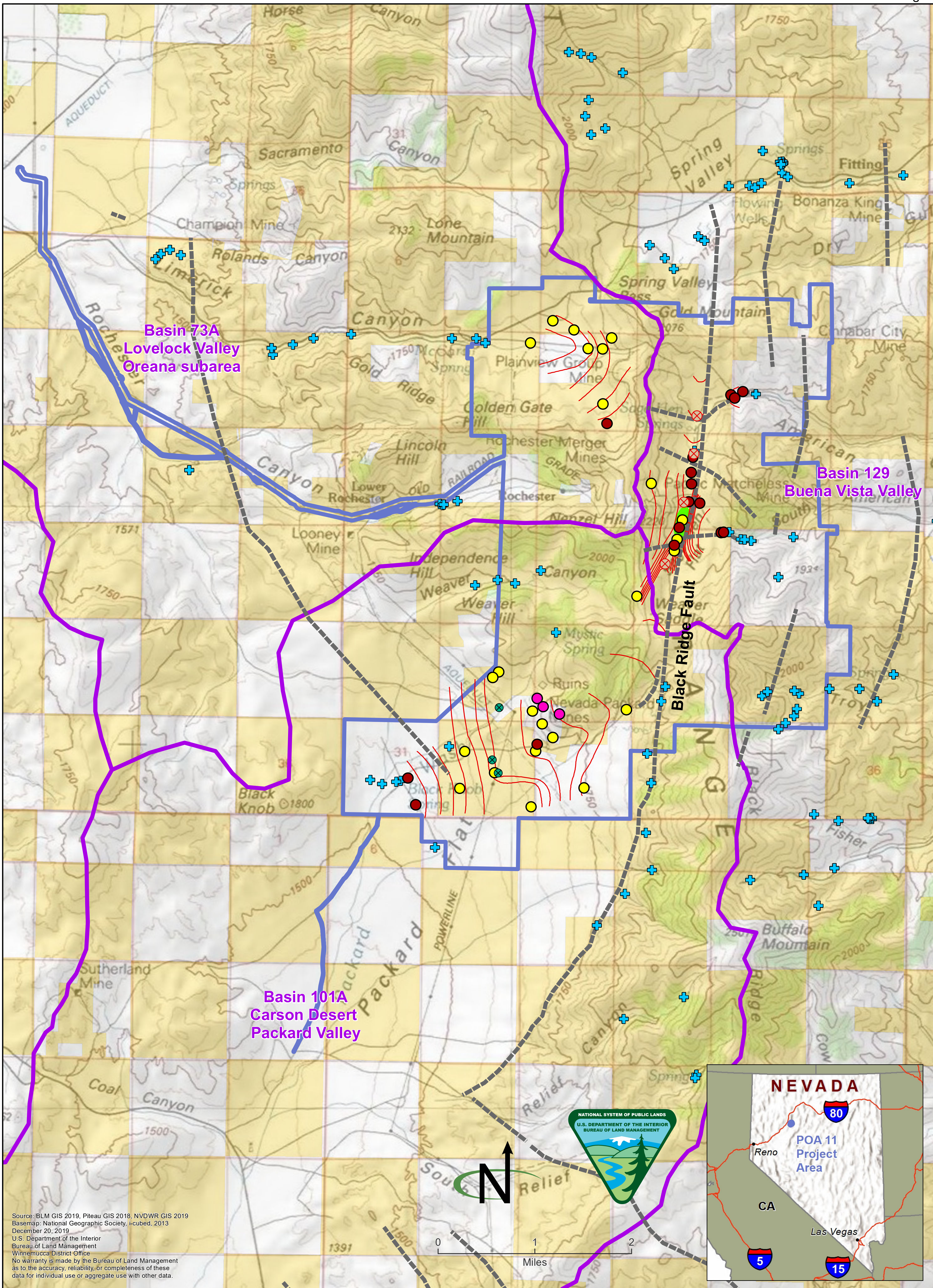

Figure 3-6

Bedrock Potentiometric Surface, Second Quarter 2017

- Bedrock monitoring well
- Bedrock piezometer
- Existing well
- Production well
- Abandoned monitoring well
- Spring or seep
- Area of ground water divide- Rochester
- Fault
- Bedrock Groundwater Contours, 50 ft, Second Quarter 2017
- Hydrographic basin divide
- POA 11 project area
- Bureau of Land Management
- Private

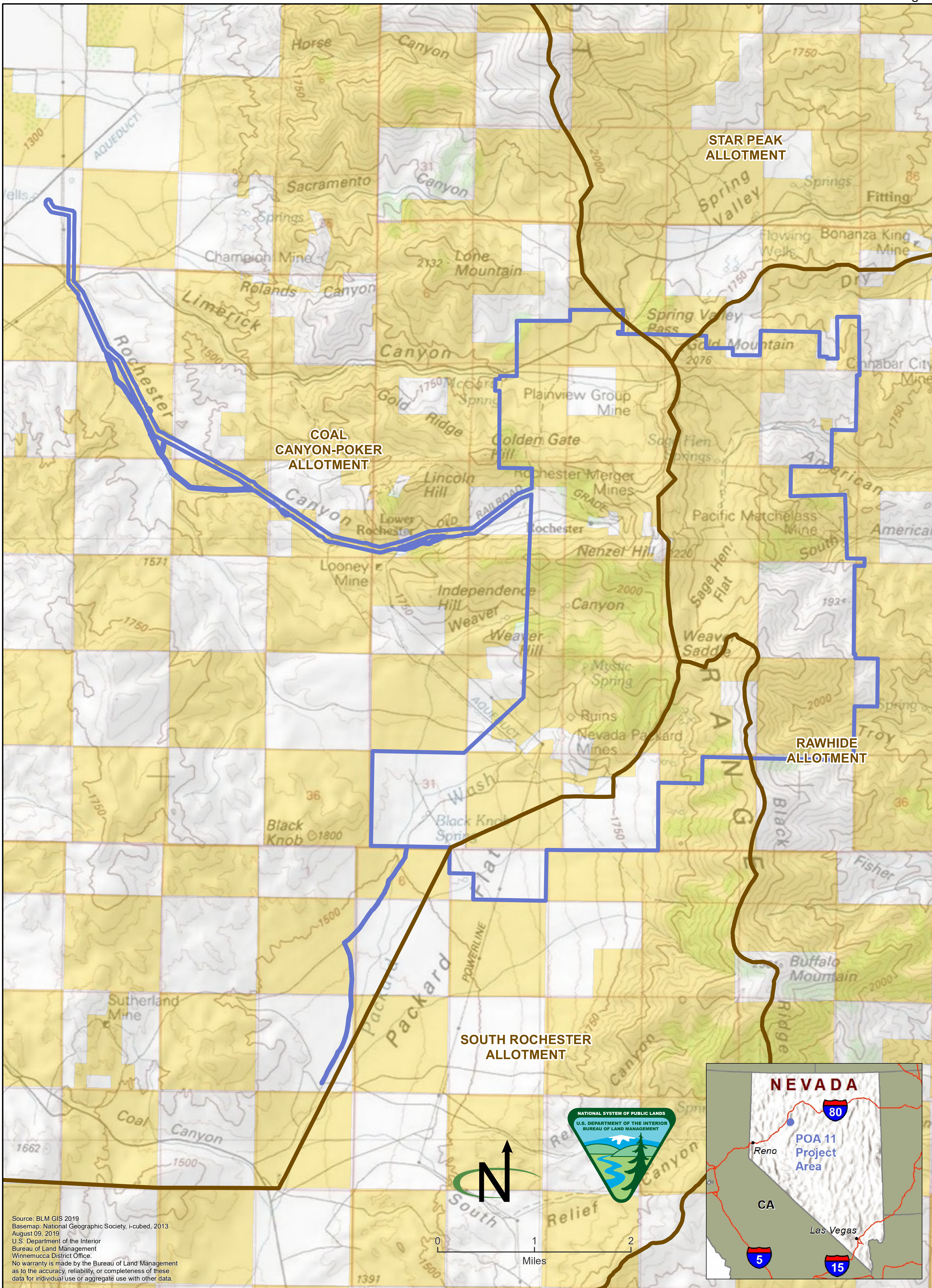

Figure 3-7

Grazing Allotments

- BLM grazing allotment
- POA 11 project area
- Bureau of Land Management
- Private

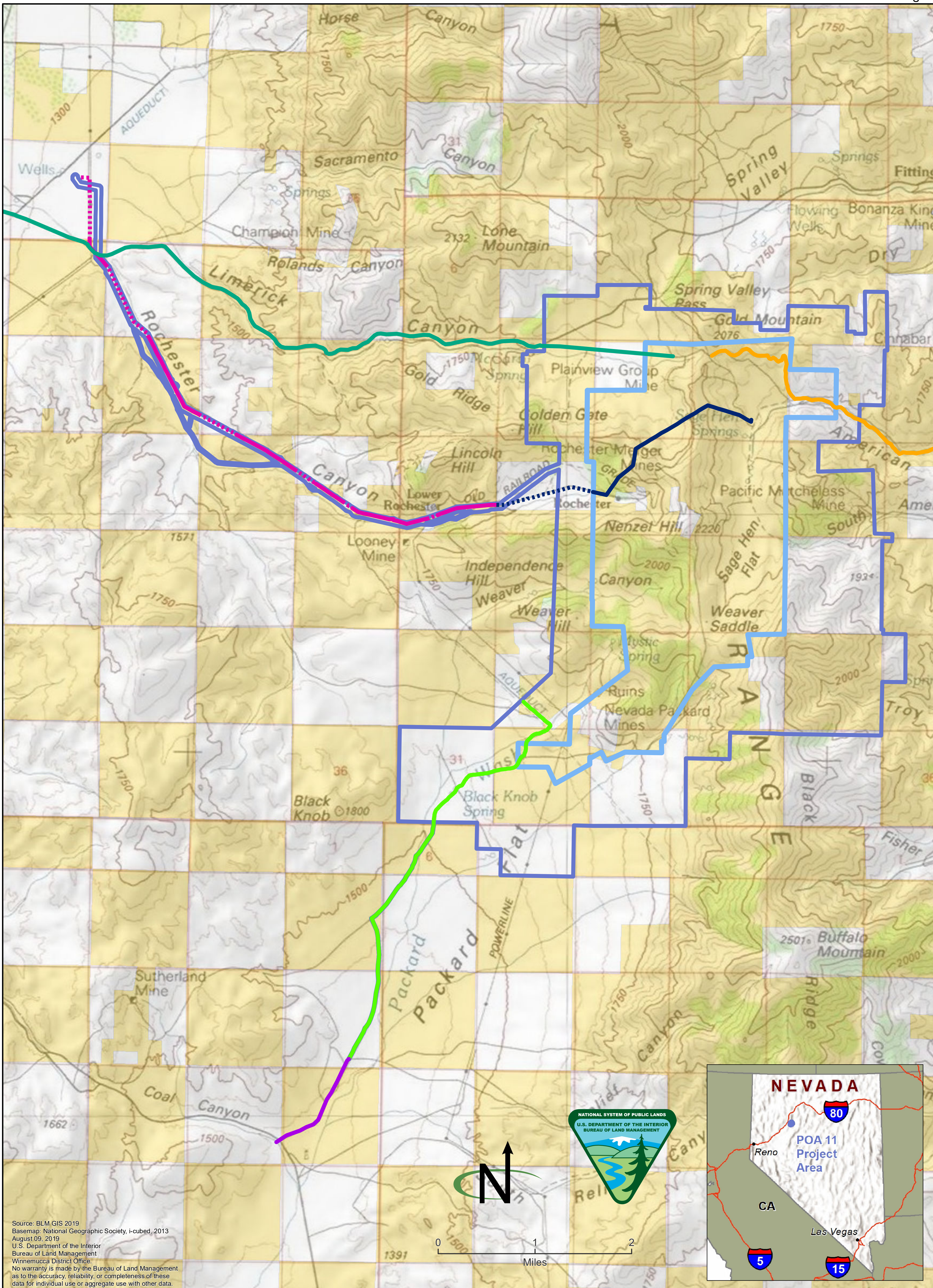

Figure 3-8

Rights-of-way

- Limerick Canyon Road
- Packard Flat Road
- Relief Canyon Road
- American Canyon Road

Existing 60kV Segments

- NVN-043389 (Private Land)
- NVN-043389 (Public Land)
- NVN-093923 (Private Land)
- NVN-093923 (Public Land)

- POA 11 project area
- POA 10 plan boundary
- Bureau of Land Management
- Private

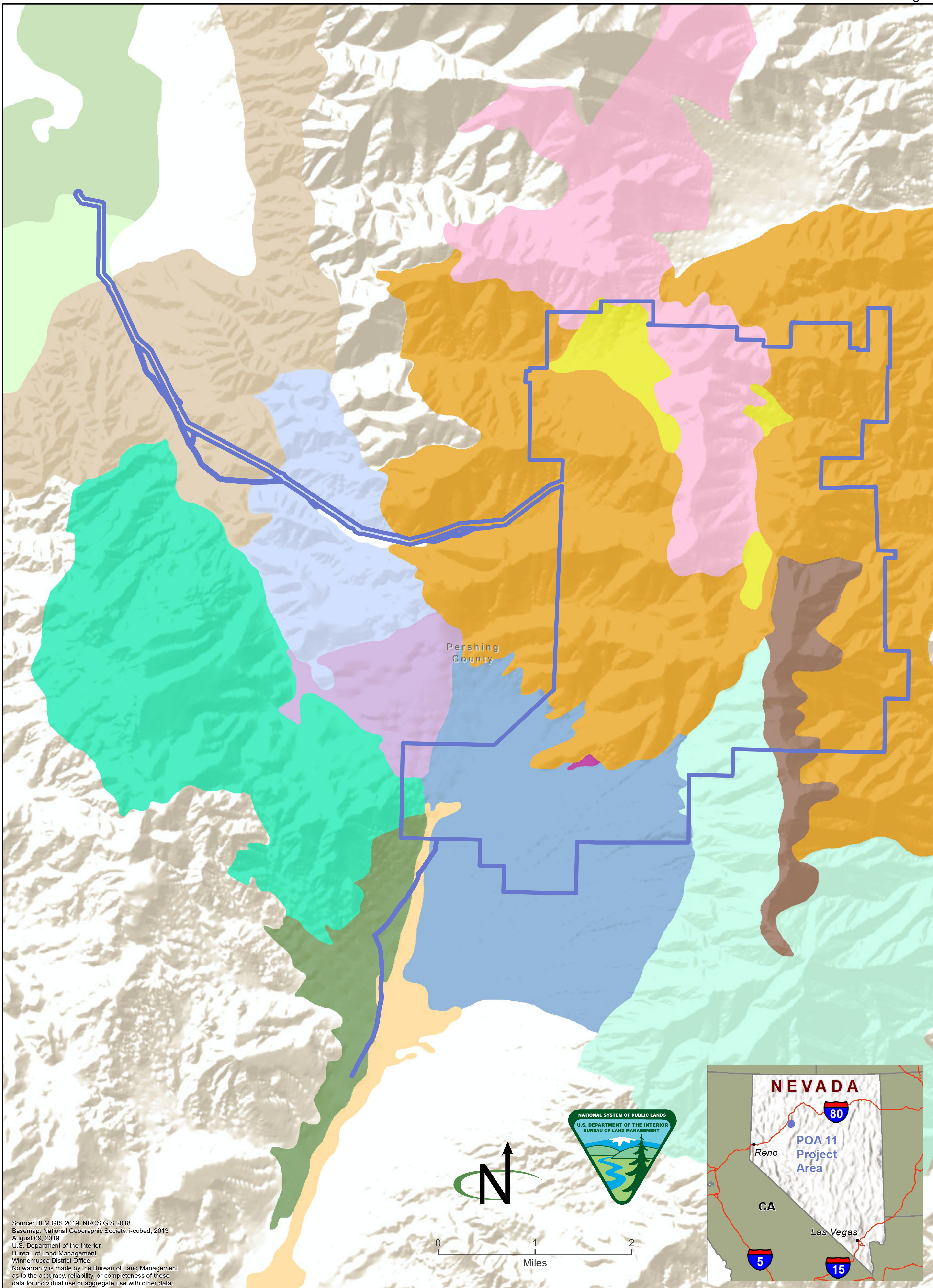

Figure 3-9

Soil Map Unit Names

- Weso very fine sandy loam, 0 to 2 percent slopes
- Mazuma very fine sandy loam, 2 to 8 percent slopes
- Laped-Colbar association
- Hoot, steep-Bojo-Hoot association
- Roca-Reluctan association
- Snapp-Oxcorel association
- Slaven-Iver-Cleavage association
- Puffer-Xine-Rock outcrop association
- Cortez very fine sandy loam, 2 to 8 percent slopes
- Bliss-Chiara association, sloping
- Bubus very fine sandy loam, 0 to 2 percent slopes
- Oxcorel-Beoska association
- Puffer-Mulhop-Rock outcrop association
- Slickens
- Trunk-Burrita associaiton
- POA 11 project area

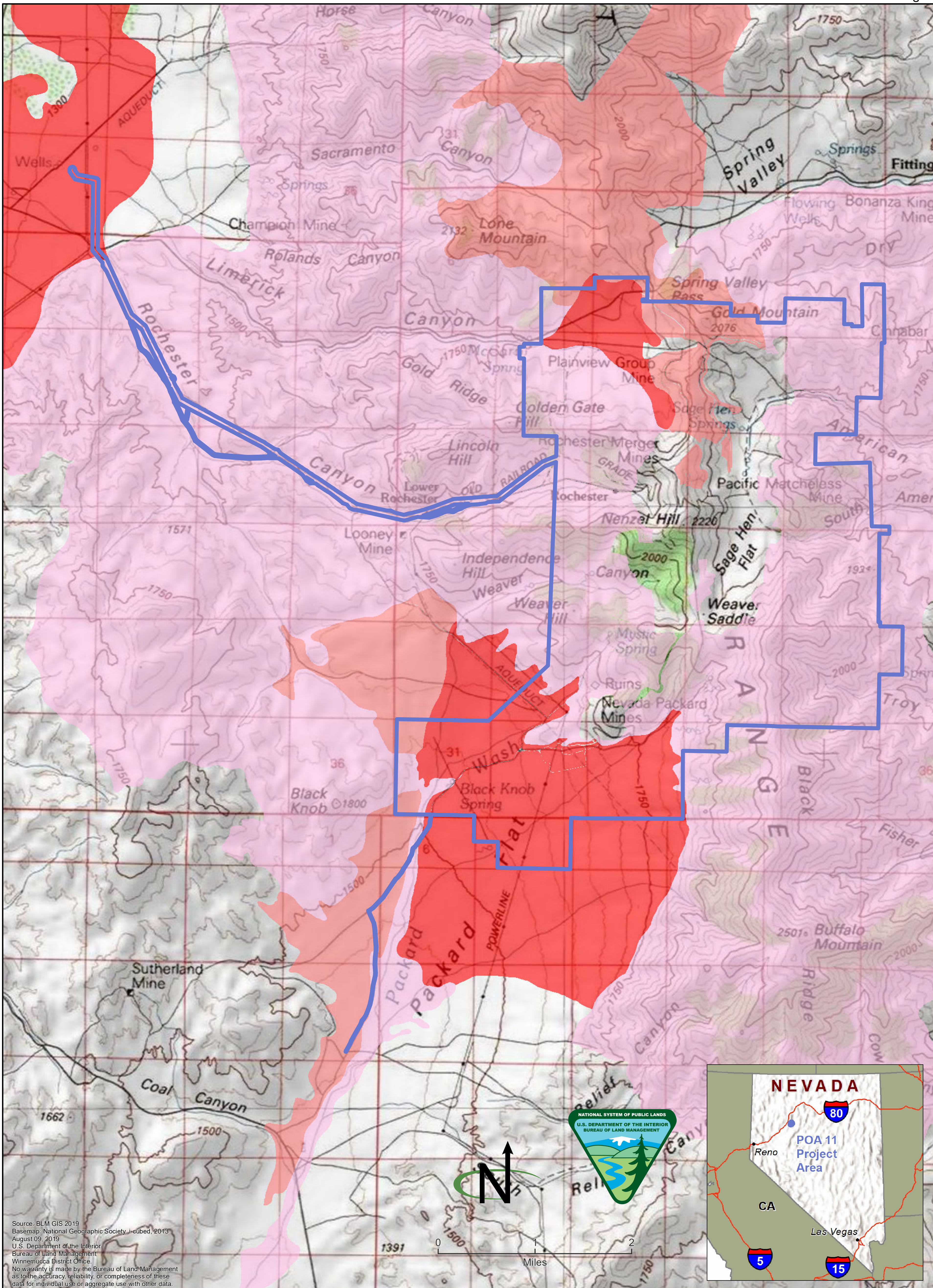

Figure 3-10

Potential Biological Soil Crust

- High potential
- Moderate potential
- Low potential
- POA 11 project area

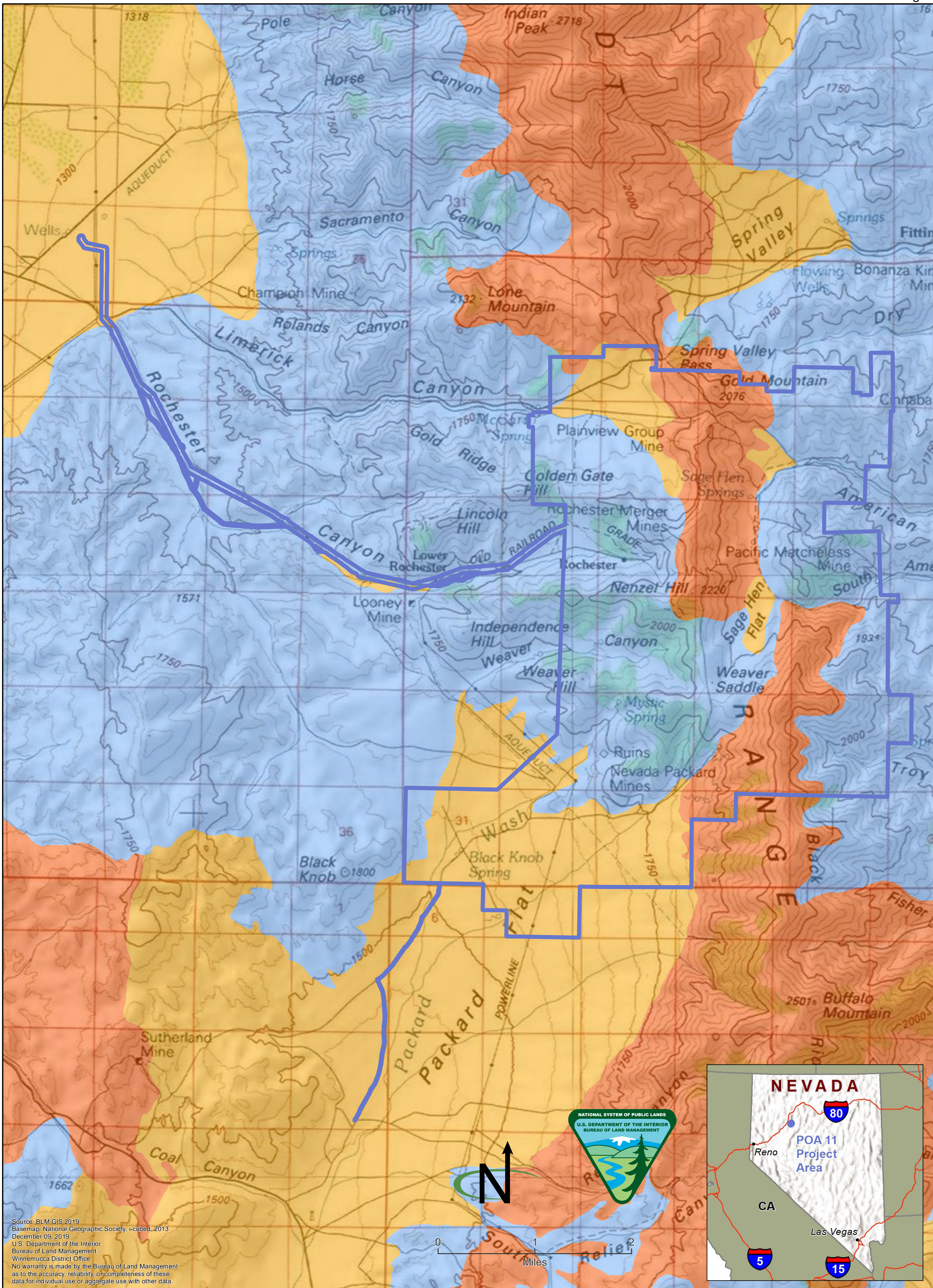

Figure 3-11

Areas of Potential Water Erosion

High
Med
Low
POA 11 project area

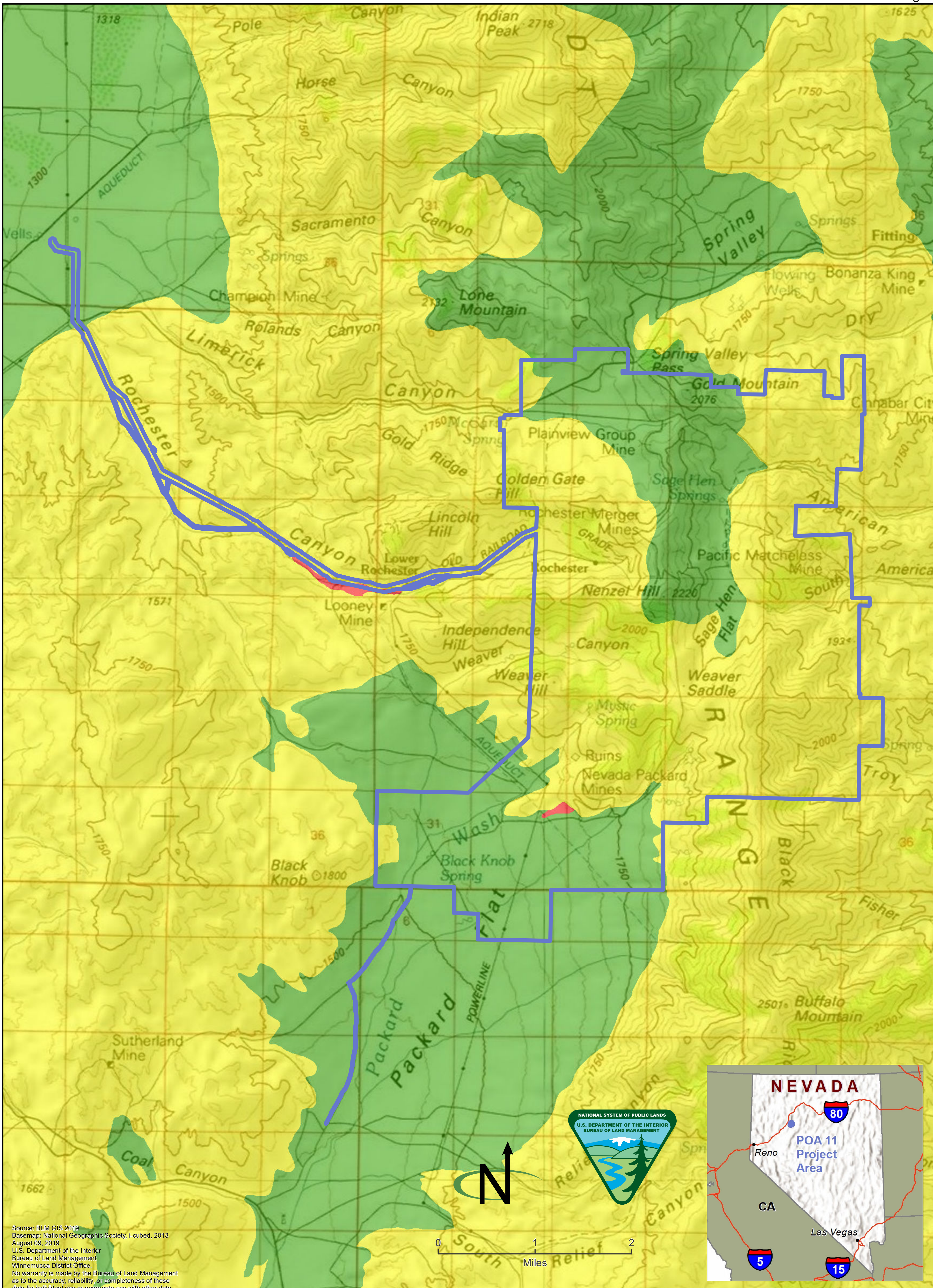

Figure 3-12

Areas of Potential Wind Erosion

- High potential
- Medium potential
- Low potential
- POA 11 project area

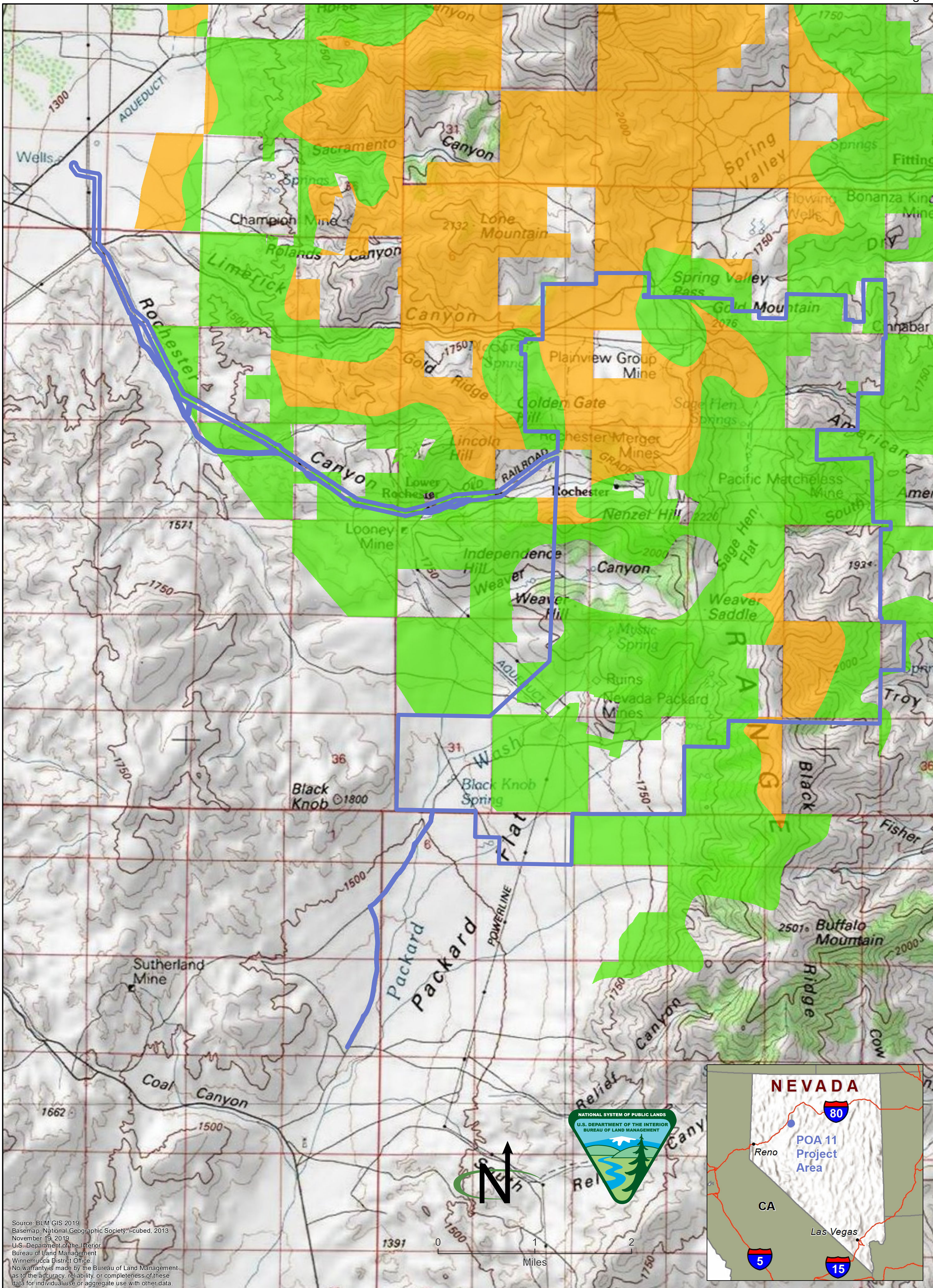

Figure 3-13

Greater Sage-Grouse Habitat, 2019

POA 11 project area

General Habitat Management Area (GHMA)

Other Habitat Management Area (OHMA)

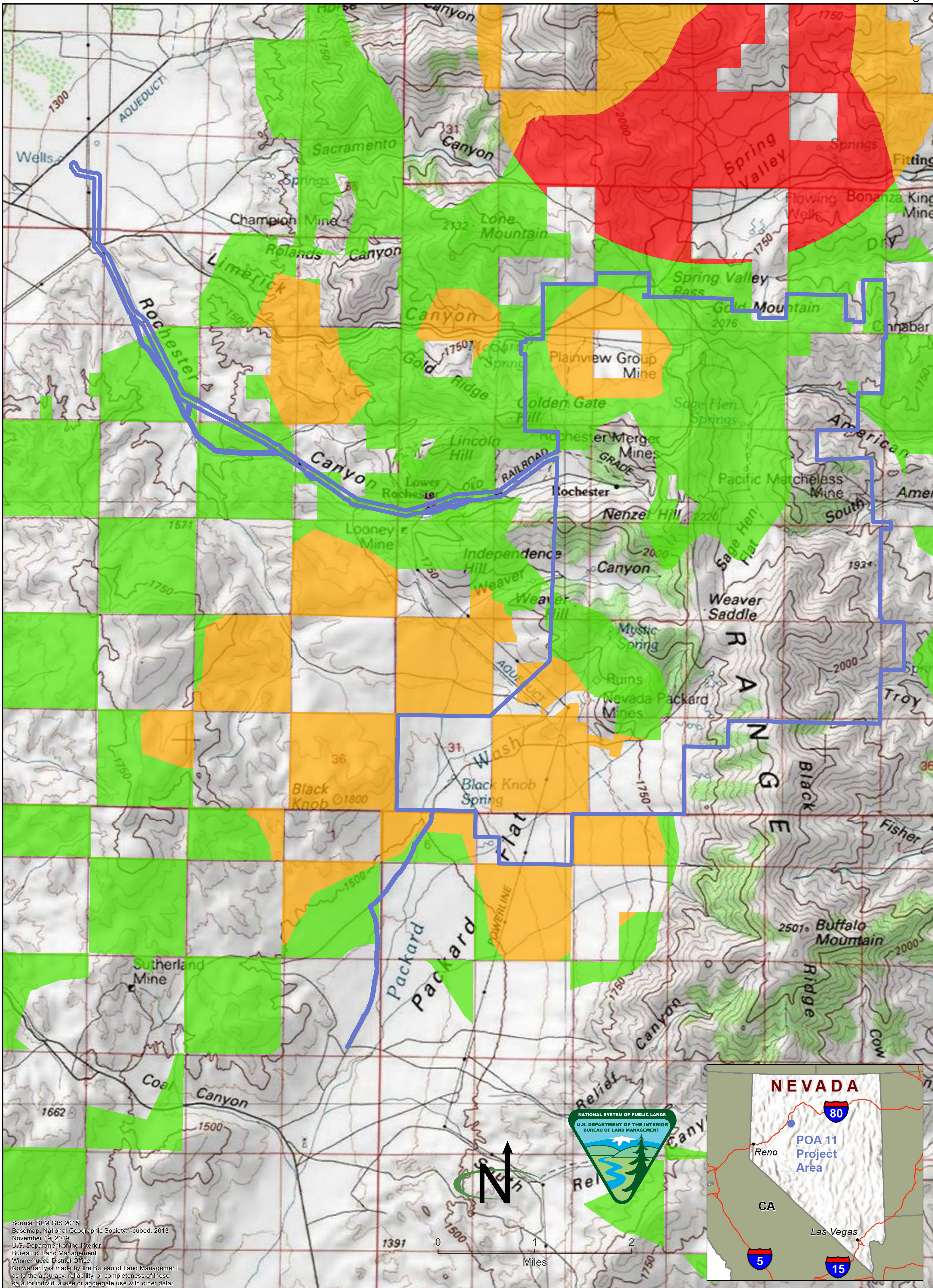

Figure 3-14

Greater Sage-Grouse Habitat, 2015

- POA 11 project area
- Priority Habitat Management Area (PHMA)
- General Habitat Management Area (GHMA)
- Other Habitat Management Area (OHMA)

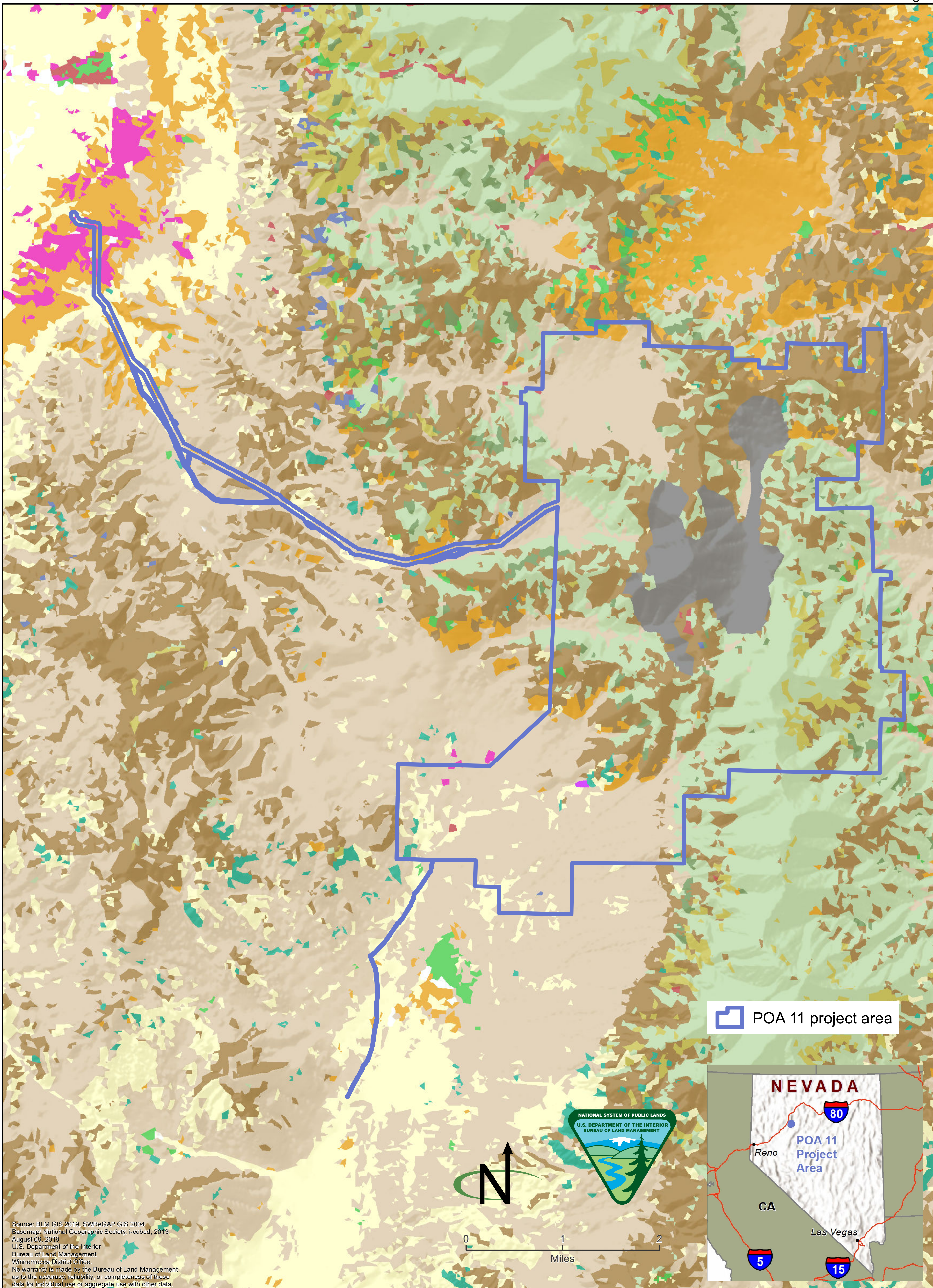

Figure 3-15

Vegetation Communtities

- Great Basin Pinyon-Juniper Woodland
- Inter-Mountain Basins Big Sagebrush Shrubland
- Great Basin Xeric Mixed Sagebrush Shrubland
- Recently Mined or Quarried
- Inter-Mountain Basins Mixed Salt Desert Scrub
- Inter-Mountain Basins Cliff and Canyon
- Invasive Annual Grassland
- Inter-Mountain Basins Montane Sagebrush Steppe
- Inter-Mountain Basins Semi-Desert Shrub Steppe
- Inter-Mountain Basins Semi-Desert Grassland
- Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland
- Invasive Annual and Biennial Forbland
- Inter-Mountain Basins Playa
- Inter-Mountain Basins Big Sagebrush Steppe

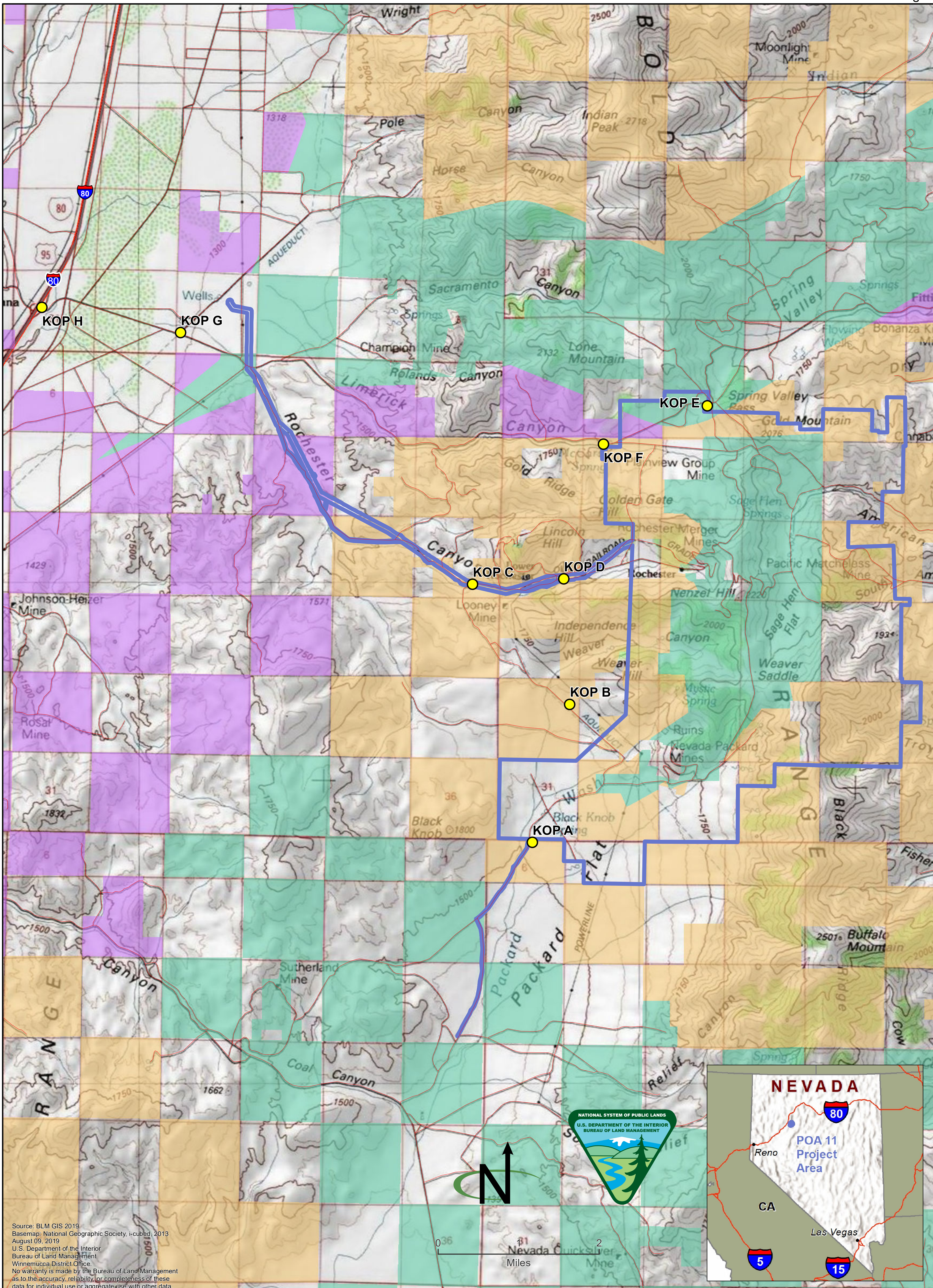

Figure 3-16

Visual Resource Management

- VRM Class II
- VRM Class III
- VRM Class IV
- KOP Location
- Existing roads
- POA 11 project area