

ENVIRONMENTAL ASSESSMENT**Walker Lane Minerals Corp.****Isabella Pearl Project**

Case file number NVN 086663

DOI-BLM-NV-C010-2018-0007-EA

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US Department of the Interior
Bureau of Land Management
Carson City District
Stillwater Field Office
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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.

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ACRONYMS AND ABBREVIATIONS

Full Phrase

ABA	acid-base accounting
ADR	adsorption-desorption-recovery
AGP	acid-generating potential
amsl	above mean sea level
ANP	acid-neutralizing potential
AOI	area of interest
APE	area of potential effect
Aqua	Aqua Hydrogeologic Consulting
ARD	acid rock drainage
BCC	Birds of Conservation Concern
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CESA	cumulative effects study area
CFR	Code of Federal Regulations
COPC	chemicals of potential concern
DO	dissolved oxygen
DOI	Department of the Interior
DR	Decision Record
EA	environmental assessment
EC	electrical conductivity
ESA	Endangered Species Act
FLPMA	Federal Land Policy Management Act of 1976, as amended
FONSI	Finding of No Significant Impact
GBE	Great Basin Ecology, Inc.
GIS	geographic information system
gpm	gallons per minute
(H)	horizontal
HDPE	high-density polyethylene
HLP	heap leach pad
MBTA	Migratory Bird Treaty Act of 1918
mg/L	milligram per liter
MWMP	meteoric water mobility procedure
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NDEP	Nevada Department of Environmental Protection
NDEP-NMSM	Nevada Department of Environmental Protection-Nevada Modified Sobek Method
NDOM	Nevada Division of Minerals
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife

NEPA	National Environmental Policy Act
NNHP	Nevada Natural Heritage Program
NNP	net neutralization potential
P.L.	Public Law
PM ₁₀	particulate matter less than 10 microns in diameter
PM _{2.5}	particulate matter less than 2.5 microns in diameter
RFFA	reasonably foreseeable future action
RMP	Resource Management Plan
ROW	right-of-way
SEM	Sierra Environmental Monitoring, Inc.
SFO	Stillwater Field Office
SVL	SVL Analytical, Inc.
USC	United States Code
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
(V)	vertical
VRI	visual resource inventory
VRM	visual resource management
WLMC	Walker Lane Minerals Corp.
WRDF	waste rock disposal facility
°C	degrees Celsius
°F	degrees Fahrenheit
µg/m ³	microgram(s) per cubic meter(s)

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CHAPTER I

INTRODUCTION

Walker Lane Minerals Corp. (WLMC), a wholly owned subsidiary of Gold Resource Corporation, is proposing to develop and operate an open-pit mine, a waste rock dump, and a heap leach facility at its Isabella Pearl project, near Luning, Nevada (Proposed Action). This environmental assessment (EA) is a site-specific analysis of potential impacts that may result by implementing the Proposed Action.

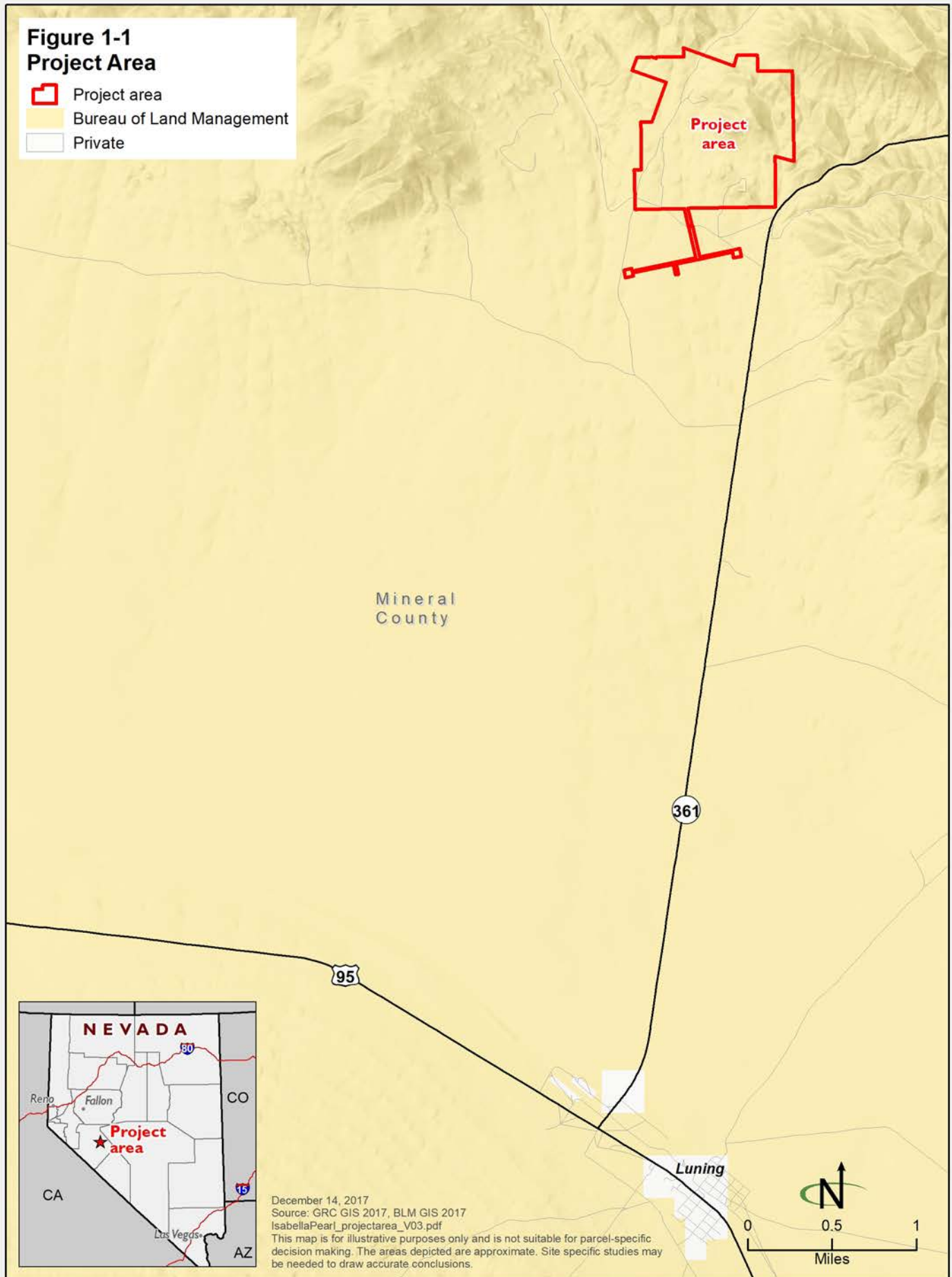
This EA will allow the Bureau of Land Management (BLM), Carson City District, Stillwater Field Office (SFO) Authorizing Officer to determine whether implementing the Proposed Action may cause significant impacts on the human environment. If the BLM Authorizing Officer determines no significant impacts would occur, a Finding of No Significant Impact (FONSI) would be prepared, and a Decision Record (DR) would be issued.

This EA has been prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), following the guidance provided in BLM Handbook H-1790-1 (National Environmental Policy Act, Rel. 1-1710, January 2008), hereafter referred to as H-1790-1.

I.1 LOCATION OF PROPOSED ACTION

The Isabella Pearl Project is in Mineral County, Nevada, on public land administered by the BLM. The proposed project is approximately 108 miles southeast of Reno and 233 miles northwest of Las Vegas at approximately 38° 36' North Latitude and 118° 11' West Longitude. It occupies portions of Township 9 North, Range 34 East, Sections 27, 34, and 35, and Township 8 North, Range 34 East, Section 3, Mount Diablo Baseline and Meridian.

The project is near the town of Luning, on a maintained dirt road off State Route 361 and approximately 1-mile northwest. **Figure I-1**, below, shows the proposed project location.



I.2 BACKGROUND INFORMATION

The proposed project is to develop and operate an open-pit mine, a waste rock dump, and a heap leach facility. In February 2017, WLMC, submitted the Plan of Operations and Reclamation Plan, Isabella Pearl Project, Luning, NV (Welsh Hagen 2017) to the BLM. The BLM notified WLMC that the plan of operations must meet minimum standards required for the BLM to begin processing the mining operation application.

Mining claims in the project area are owned by WLMC. Modern exploration conducted in the project area before WLMC acquired it was completed by a Combined Metals-Homestake joint venture, which leased the Isabela claims in 1987. Combined Metals-Homestake drilled at least 175 rotary and core holes from 1988 to 1990.

In 2006 TXAU Investments Ltd., operating under its subsidiary Isabella Pearl, LLC (IPLLC), acquired the property and drilled 19 core holes under a Notice of Intent for Exploration Activities to provide material for metallurgical testing. IPLLC completed 7 additional confirmation core holes in 2008. It completed eight geotechnical borings and 16 shallow test pits in the vicinity of the proposed processing facility and waste rock dump in 2008.

In 2009, IPLLC drilled two monitoring wells and in 2010 drilled three hydrogeological holes to test for groundwater elevations in the area of the proposed open pit. In 2012, IPLLC drilled five holes to provide additional samples for rock characterization testing and three monitoring wells in the area of the proposed open pit. In 2013, IPLLC drilled two water test holes and a production water well, upgradient of the open pit.

WLMC acquired the property in 2016 and drilled 10 holes for mineral grade confirmation and metallurgical analyses. It also drilled a production water well downgradient of the project area in the historic Santa Fe corridor. Exploration drilling information is summarized in **Table I-1**, below.

Table I-1
Drilling Summary

Company	Year	Reverse Circulation, Sonic, and Conventional		Core		Total Drill Holes	Total Feet
		No.	Feet	No.	Feet		
Combined Metals-Homestake	1988–1990	169	59,094	6	1,686	175	60,780
IPLLC Confirmation/Metallurgical	2007–2008	—	—	26	7,598	26	7,598
IPLLC—Geotechnical	2008	8	850	—	—	8	850
IPLLC—Monitor Wells	2009	2	1,100	—	—	2	1,100
IPLLC—Hydrogeological	2010	3	1,420	—	—	3	1,420
IPLLC—Environmental	2012	—	—	5	559	5	559
IPLLC—Monitor Wells	2012	3	1,221	—	—	3	1,221
IPLLC - Production/Test Wells	2013	3	1,220	—	—	3	1,220

**Table I-1
Drilling Summary**

Company	Year	Reverse Circulation, Sonic, and Conventional		Core		Total Drill Holes	Total Feet
		No.	Feet	No.	Feet		
WLMC - Confirmation/Metallurgical	2016	10	269	4	2,411	14	2,680
WLMC - Production Water Well	2016	1	1,313	—	—	1	1,313
TOTALS		199	66,487	41	12,254	240	78,741

WLMC proposes to conduct additional mineral exploration, which would include access road maintenance, road building, drill pad construction, and exploration drilling.

I.3 PURPOSE AND NEED

The BLM's purpose is to respond to a request to remove and process locatable minerals from and on the Isabella Pearl claims in the Gabbs Valley Range north of Luning, Nevada, as described in the Plan of Operations and Reclamation Plan Isabella Pearl Project, Luning, NV, and summarized in this EA.

The BLM's need for the action is established by the agency's responsibility under Sections 302 and 501 of the Federal Land Policy and Management Act of 1976 (FLPMA) and the BLM Surface Management Regulations at Code of Federal Regulations (CFR), Part 3809. It is to respond to an exploration or mining plan of operations. Another need is to take any action necessary to prevent unnecessary or undue degradation of public lands from prospecting, exploring, assessing, developing, and processing locatable mineral resources on public lands.

I.4 LAND USE PLAN CONFORMANCE STATEMENT

Resource management planning regulations mandate that all actions approved or authorized by the BLM be reviewed for conformance with existing land use plans (43 CFR, Subpart 1610.5-3; 516 Departmental Manual 11.5 [BLM 2009b]). A proposed action and alternatives must be consistent with applicable land use plans and in agreement with the terms, conditions, and decisions of the approved plan; alternatively, a plan amendment must be completed for the proposal to be approved (BLM 2008).

Carson City District Consolidated Resource Management Plan, May 2001

The Proposed Action and alternatives described below are in conformance with the Carson City District Consolidated Resource Management Plan (RMP) (BLM 2001). Section 10, entitled Minerals and Energy, outlines the RMP-level decisions specific to mining in the district, as follows:

- RMP-level decisions, Desired Outcomes, page MIN-1, number 1: "Encourage development of energy and mineral resources in a

timely manner to meet national, regional and local needs consistent with the objectives for other public land uses.”

- Standard operating procedures, Locatable Minerals, page MIN-5, number 8: “Pursuant to the mining laws, BLM lands are available for mineral entry, location, exploration, and operations that will not cause undue or unnecessary degradation of the public lands.”

I.5 RELATIONSHIPS TO STATUTES, REGULATIONS, OTHER PLANS, AND ENVIRONMENTAL ANALYSIS DOCUMENTS

The Proposed Action is consistent with federal laws and regulations, plans, programs, and policies of affiliated tribes, other federal agencies, and state and local governments, including the following:

- General Mining Law of 1872
- Mining and Mineral Policy Act of 1970 (MMPA)
- Federal Land Policy Management Act of 1976 (43 United States Code [USC], Sections 1701–1782, October 21, 1976, as amended 1978, 1984, 1986, 1988, 1990–1992, 1994, and 1996)
- Title 43 CFR, Subpart 3809.0-6, Surface Management—Policy
- State of Nevada mining regulations the Nevada Administrative Code (NAC) 445A.350 through 445A.447, Mining Facilities
- Nevada Revised Statute 519A, Reclamation of Land Subject to Mining Operations or Exploration Projects
- NAC 519A, Regulation of Mining Operations and Exploration Projects
- The Endangered Species Act of 1973 (16 USC, Sections 1531–1544, December 28, 1973, as amended 1976–1982, 1984, and 1988)
- Migratory Bird Treaty Act (16 USC, Sections 703–712)
- Native American Graves Protection and Repatriation Act, 1990
- American Indian Religious Freedom Act of 1979
- National Historic Preservation Act (Public Law [P.L.] 89-665; 54 USC, Section 300101 et seq., as amended January 2015)
- Archaeological Resources Protection Act of 1979, as amended (P.L. 96-95; 16 USC, Sections 470aa-mm)
- Wild Free-Roaming Horse and Burro Act of 1971, as amended
- Clean Water Act of 1972
- Materials Act of 1947, as amended (30 USC, Section 601 et seq.)
- NEPA

The Mineral County zoning classification for the area encompassing the proposed project is M-3. It allows for uses characterized as mining, renewable energy resource, recreation, and public use.

I.6 DECISION TO BE MADE

The decision the BLM would make, based on the NEPA analysis, is one of the following:

- Approve the plan of operations and reclamation plan for the Isabella Pearl project with no modifications
- Approve the plan of operations and reclamation plan for the Isabella Pearl project with modifications or additional mitigation measures that are needed to prevent unnecessary or undue degradation of public lands
- Deny the approval of the plan of operations and reclamation plan for the Isabella Pearl project as currently written and do not authorize the project if the Proposed Action does not comply with the 3809 regulations and the FLPMA mandate to prevent unnecessary or undue degradation

CHAPTER 2

THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The BLM is responsible for administering access to mineral rights on certain federal lands, as authorized by the General Mining Law of 1872. Qualified prospectors are entitled to reasonable access to mineral deposits on public domain lands that have not been withdrawn from mineral entry. The CCDO administers the surface and subsurface resources and has designated lands in the project area as open for mineral exploration and development.

WLMC is proposing to develop an open-pit mine and cyanide heap leach facility. The proposed mine site and processing facilities are to be located in the Santa Fe Mining District, which has seen historic mining operations dating back to the late nineteenth century. The first recorded operation on the project site was a 400-foot deep adit driven in the late 1930s.

The project area encompasses approximately 490 acres. All intended areas of disturbance have been inventoried for cultural and biological resources. **Table 2-1**, Areas of Existing and Proposed New Disturbance, shows the breakdown of components and acreage of disturbance. This is further articulated in the plan of operations, Part II (Welsh Hagen 2017).

Components of the Proposed Action are as follows:

- Open-pit area encompassing three ore bodies
- Oxide ore stockpile
- Crushing and screening facility
- Leach pad divided into two cells

Table 2-1
Areas of Existing and Proposed New Disturbance

Mine Component¹	Acres Existing Disturbance	Acres Proposed New Disturbance	Total Acres Disturbance
Roads			
Exploration roads, pads and sumps outside of proposed mine pit	26.6 ²	15.0 ³	41.6
Main project entrance, R-1	0	0.6	0.6
Main ore haulage, ⁴ R-3	0	3.3	3.3
Haulage road south terminus, ⁴ R-4	0	2.0	2.0
Contractors' yard road, R-5	0	0.2	0.2
Operating area access, R-6	0	1.3	1.3
Crusher to pad road, R-7	0	0.3	0.3
Well access, R-8	0	0.1	0.1
Raw water storage tank, R-9	0	0.2	0.2
Existing access north, R-10 ⁵	0.8	0.9	1.7
Leach Pad perimeter road, R-11	0	6.6	6.6
DG stockpile off-haul road, ⁴ R-12	0	3.9	3.9
Subtotals	27.4	24.4	61.8
Leach Pad, Mine Pits, Waste Rock Dump, Borrows, and Stockpiles			
Pearl dump, D-1	0	94.8	94.8
Heap leach pad	0	28.1	28.1
Disturbance in mine pit area ⁶	24.1	24.2	48.3
Pit perimeter berm	0	2.8	2.8
Growth medium borrow, B-1 ⁷	0	8.8	8.8
DG*/granite stockpile, BQ-1	0	4.9	4.9
DG/granite borrow/quarry, Q-1	0	9.3	9.3
Subtotals	24.1	172.9	197.0
Yards			
Ore preparation area, Y-1	0	5.6	5.6
Contractors' yard, Y-2	0	1.6	1.6
ADR plant area, Y-3	0	10.8	10.8
Employee/visitor parking, Y4	0	0.3	0.3
Blasting media storage, Y-5	0	0.3	0.3
Raw water storage tank, Y-6	0	0.5	0.5
Utility corridor from production well IPPW-1 to IPPW-2, Y-7	0.4	3.7	4.1
Water lines to crusher and dust suppression loading, Y-8	0	0.8	0.8
Contingent water lines, Y-9	2.2	0	2.2
Power line and water line to crusher, Y10	0	0.2	0.2
Subtotals	2.6	23.8	26.4
Sediment & Drainage Control			
Permanent principal drainage, D-1 ⁸	0	3.4	3.4
Haul road drainage diversion, D-2	0	1.2	1.2
East pad diversion, D-3	0	1.7	1.7
Ore prep area diversions, D-4 ⁹	0	0.6	0.6

Table 2-1
Areas of Existing and Proposed New Disturbance

Mine Component¹	Acres Existing Disturbance	Acres Proposed New Disturbance	Total Acres Disturbance
Southeast ADR pad diversion, D-5	0	0.2	0.2
Growth media borrow post-reclamation drainage, D-6	0	0.6	0.6
Subtotals	0	7.7	7.7
Grand Total	54.1	238.8	292.9

Source: Welsh Hagen 2017

¹R-1, R-3, A-1, A-2 etc. are SRCE ID codes.

²Includes 24.11 acres of preexisting exploration disturbance and 2.5 acres of recent extra-pit exploration disturbance by WLMC under BLM NOI Case Number NVN 094961.

³For contingent future exploration outside of proposed mine pit.

⁴Haulage road disturbance areas include safety berms.

⁵Existing public access road northward would be reclaimed. A permanent public bypass would be constructed to avoid long-term drainage channel crossing maintenance.

⁶Includes 21.61 acres of preexisting disturbance and 2.5 acres of IPLLC exploration disturbance in pit footprint.

⁷8.84-acre expansion of 5.60-acre ore preparation area to 14.44-acre growth media borrow excavation.

⁸This feature to remain permanently after reclamation.

⁹Drainage diversions would be removed during excavation of reclamation stage borrow

*Decomposed granite

- Pregnant pond¹ to be converted to evapotranspiration cell
- Barren/stormwater pond to be converted to evapotranspiration cell
- Three diesel-powered electric generators
- Two fuel yards
- Adsorption-desorption-recovery (ADR) plant
- Office and lab facilities
- Two completed production water wells
- Two contingent production water wells
- Monitoring wells
- Raw water storage tank
- Equipment maintenance shop
- Waste rock dump
- Two sanitary leach fields
- Haulage and access roads
- Growth medium stockpile (heap perimeter berm)

¹ A catchment basin at a mine that holds a gold and silver bearing cyanide solution

- Growth medium (colluvium) borrow site
- Decomposed and weathered granitic rock borrow pile and stockpile
- Fencing and gates
- Sulfide ore storage area and leachate sump
- Contingent exploration roads and drill pads

Current plans call for WLMC to mine and process an approximate average of 93,200 tons of ore per month, over a period of 36 months. There would be approximately 3 months of preproduction development and construction and 3 months of residual leaching. The mine would be in operation 24 hours per day, 7 days per week.

The expected life of the mine is 3 years from the start of preproduction development to the initiation of final reclamation. Additional mineralized zones may exist within an economic haulage distance of the proposed processing facilities. Mine life could be extended if exploration identifies additional resources.

The Proposed Action includes one mine pit, no part of which would be visible from public roadways. The mine waste rock dump and heap would be visible from public access roads and would be constructed with 3 horizontal (H) to 1 vertical (V) slopes. Reclamation of portions of the waste rock dump would progress during mine production. All existing and proposed surface disturbance areas, except for the mine pit, would be contoured and covered with growth medium. They would be revegetated using a BLM-approved seed mix on the completion of operations. The total anticipated new surface disturbance, including the mine pits, would be 292.9 acres in the project area and on BLM-administered land (**Figure I-1**).

Since the mine would be in development and production for only approximately 36 months, mining would be completed by a contract mining company. **Table 2-2**, below, shows the proposed development schedule. The contractor would provide its own offices and shop facilities in an area graded and prepared by the applicant. Owing to the brevity of the mine life and the clemency of weather at the site, a pole-barn shop² is anticipated.

Ore would be conventionally drilled and blasted in 20-foot benches. The ore would be loaded with a front-end loader into dump trucks and hauled to the ore processing area.

² Workshop building with poles which minimize the internal clear span or your open space under roof.

Table 2-2
Development and Production Schedule

Year I	Tons Oxide Waste Rock	Tons Mine Run Oxide Ore	Tons Crushed Oxide Ore	Tons Sulfide Waste	Tons Sulfide Ore
First quarter preproduction	1,304,128	400,362	109,670	0	0
Second quarter	1,443,881	200,983	209,298	0	0
Third quarter	1,400,932	314,580	128,649	0	0
Fourth quarter	1,461,299	321,450	151,148	0	0
Year II					
First quarter	1,611,667	21,309	90,183	0	0
Second quarter	1,690,463	95,355	93,343	0	0
Third quarter	1,870,266	26,371	85,698	0	0
Fourth quarter	1,850,266	42,364	87,723	0	2,756
Year III					
First quarter	1,843,065	39,907	100,000	43,210	9,700
Second quarter	970,931	104,739	165,164	165,565	51,367
Third quarter	160,904	44,516	180,084	0	0
Residual/leach fourth quarter	0	0	0	0	0
Total	15,607,802	1,611,936	1,400,960	208,775	63,823

Source: Plan of Operations and Reclamation Plan, Walker Lane Minerals Corp., Isabella/Pearl Project. 2017

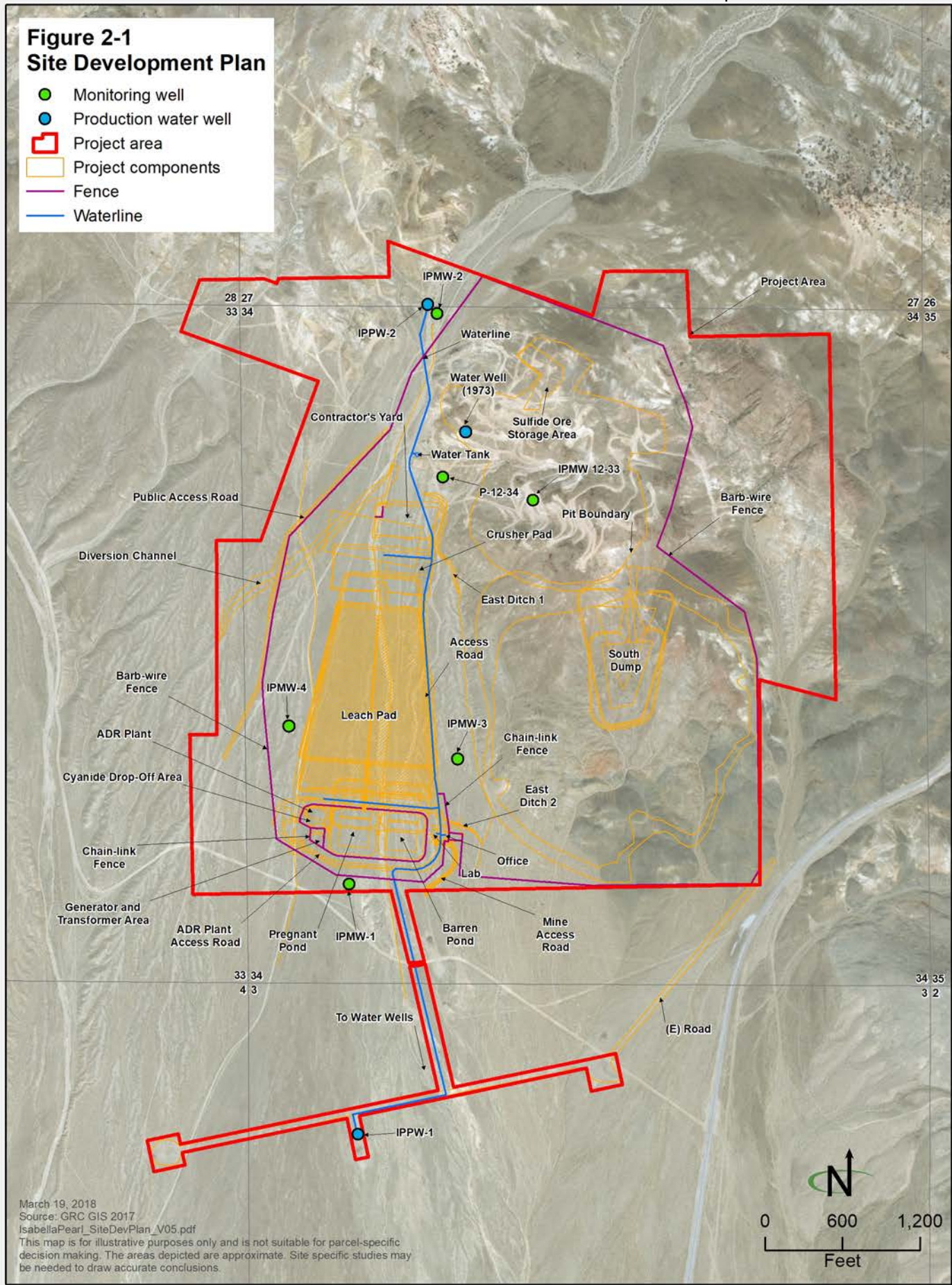
Waste Rock Dump

The mine pits would generate an estimated total 15.8 million tons of waste rock; approximately 15.6 million tons of the waste would be oxidized material. Waste would be deposited at the location south of the Pearl sub-pit, as shown on **Figure 2-1**, Site Development Plan.

Preproduction and first year waste rock from the Pearl pit (see **Figure 2-1**) would be dumped on natural ground near the crest elevation of the Pearl pit, falling southward toward a natural swale, as shown on **Figure 2-1**. During year 2 of production, the Pearl dump³ would be built from the south toe upward, with the outer slopes concurrently graded to 3(H):1(V). The outer faces of the graded waste would be contoured, compacted, overlain with growth medium, and revegetated as soon as is practical. In the final quarter of production, sulfide waste would be deposited inside the horse-shoe shaped Pearl dump. As the end of operations approaches, the east, south, and west crest of the waste dump⁴ (94.8 acres) would be dozer-graded inward to cover sulfide waste and to produce finished slopes of 3(H):1(V). The top of the dump would be contoured and revegetated during postproduction reclamation.

³ A pile of broken rock or ore on surface.

⁴ A pile or heap of waste rock material or other non-ore earthen materials.



2.1.1 Heap Leach Facility

The dimensions and capacities of components of the proposed heap leach facility are described in the following sections; their positions are shown in **Figure 2-1** and Figures 7A through 7F from the plan of operations (Welsh Hagen 2017). Figure 8 from the plan of operations (Welsh Hagen 2017) is a process flow diagram for the project, from the ore stockpile to gold doré⁵ production.

Ore Preparation

The Proposed Action includes mining and heap leaching of low-grade (run-of-mine) oxide ore without pretreatment and more intensive conditioning. This includes crushing and screening higher-grade oxide ore. The design capacity of the heap leach pad proposed herein is 3.3 to 3.4 million approximately equal tons of crushed ore and run-of-mine ore. The present designed mine pit is expected to yield 3 million tons of leach ore. The excess leach pad capacity is provided additional heap leach ore, which may be available at higher gold prices.

Run-of-Mine Ore

An estimated 1.6 million tons of mine production would be low-grade run-of-mine ore that would not be crushed. This material would be placed on the leach pad without preparation and only on pad areas protected by a minimum of 4 feet of cover over the leach pad liner and collector piping system. Most such material would be placed in interior portions of the leach heap to minimize the difficulty of regrading for reclamation.

Crushed Ore

The processing circuit described in this section is conceptual. Actual components would depend on equipment held by WLMC and selected for processing; WLMC would crush the ore. Higher-grade oxidized gold ore would be crushed before placement on the heap for leaching. The crushing plant would consist of a dump bin, a 42-inch by 17-foot vibrating grizzly feeder, and a 22-inch by 48-inch jaw crusher as a trailer-mounted unit. Secondary crushing would be done with a 6-foot by 20-foot vibrating screen and an MVP 450 cone crusher as a trailer-mounted unit. Tertiary crushing would be done with a 6-foot by 20-foot vibrating screen and an MVP 450 cone crusher as a trailer-mounted unit.

Four short conveyor belts would be required to connect the units. Freshwater would be added to the ore stream to promote agglomeration. A lime/cement silo would add lime or cement to final crushed ore. The crushing unit and transfer points along the conveyor system would be equipped with wet dust-suppression systems. Cyanide solutions would not be added to the ore processing stream in the crushing area.

⁵ A doré bar is a semi-pure alloy of gold and silver created at the site of the mine. It is then transported to a refinery for further purification. The proportions of silver and gold can vary widely.

Heap Leach

The active leaching area of the heap leach pad would cover approximately 28.1 acres. A growth medium stockpile berm, ranging from 3 feet to 16 feet high and constructed from grubbed surface soil, would be built along the sides and downstream edge of the heap leach pad. The lined set-back zone between the active leach area and a leach pad perimeter berm encompasses an additional acre. The surface of the perimeter berm and its access road would drain into the leach pad containment area, bringing the total leach pad facility catchment to 34.7 acres.

Adsorption-Desorption-Recovery Plant

The ADR plant layout is illustrated on plan of operations Figure 7C and Figure 7D (Welsh Hagen 2017). The plant would consist of five 7-foot-diameter vertical adsorption towers in series, with a carbon screen on the barren discharge; a 3-ton carbon-stripping plant, with a carbon conditioning and sizing screen; and barren and pregnant solution tanks. Electro-winning⁶ would be done in a 150-foot electrolytic cell; smelting would be done in a T-200 melt furnace. The strip heater and the furnace would be propane fired.

The ADR processing plant would be housed in a concrete-lined area with an 8- to 12-inch stem wall. It would have a containment capacity of 110 percent of the volume of the largest tank/vessel in each of the four separate containment areas in the plant. Draining solution, if any, would drain into the sumps and would be pumped back into the circuit.

The plant site area would be underlain by a 60-millimeter, smooth, high-density polyethylene (HDPE) geomembrane to provide a solution barrier 3 feet below the plant site and slab foundation. The geomembrane would be graded to drain any solution in the plant site area to the east end of the pregnant solution pond.

Assay Laboratory

A complete sample preparation and atomic absorption assay facility would be housed in a 12-foot by 40-foot trailer east of the barren/stormwater pond.

Offices and Infrastructure

A 12-foot by 60-foot office trailer would house administrative offices, as well as the engineering, geology, and surveying staff. Contractors would be provided with a site north of the ore preparation area on which to place their own shop. A parking area would be provided for employees and visitors on the south side of the fenced ADR plant area.

⁶ Also called electroextraction, the electrodeposition of metals from their ores that have been put in solution via a process commonly referred to as leaching. Electrowinning uses a similar process to remove impurities from a metal.

A septic system with leach field would service the ADR plant, laboratory, and offices. A second septic system would service the ore preparation area, mine, and contractor's shop.

A pipeline with industrial water from a non-potable water storage tank would service the ADR plant, laboratory, office, and contractor's shop.

Water Management Plan

Potable water would be delivered in bottles. The industrial water system layout for the project is illustrated in the plan of operations (Welsh Hagen 2017).

Industrial water would be supplied from two production water wells. Production Well #2 (IPPW-2) was completed in September 2013 to a depth of 420 feet and is upgradient of both the proposed heap leach and open pit. Production Well #1 was installed in October 2016 to a depth of 1,300 feet; it is 50 feet north of the plugged and abandoned Santa Fe Well #5 in the Santa Fe corridor.

Two contingent production water wells may also be installed in the Santa Fe corridor. The locations are illustrated in the plan of operations Appendix II.A, Figure 1 (Welsh Hagen 2017). Permits for the production water wells and a maximum of 484 acre-feet of water annually (300 gallons per minute) have been issued by the Nevada State Engineer (see plan of operations Appendix II.A.).

2.1.2 Power Supply

Power would be supplied by three diesel-powered electric generators. One 1500-kilowatt (kW) generator would be online and one 1500-kW generator would be on standby. One 200-kW generator would be on standby for the production wells to generate power for the well pumps if the need arises. The total connected force in the plant, including the crushers, would be approximately 1,567 horsepower.

WLMC would install 4,160 buried power lines from the generator yard throughout the site and to the production wells, IPPW-1 and IPPW-2. Fuel for the generators would be stored in two aboveground tanks, on graded areas with HDPE-lined floors and berms for secondary containment. They would provide emergency capture of 110 percent of the largest fuel tank/vessel volume. The sizes of the tanks and their associated containment areas would depend on contracted supplier delivery schedules and equipment, which are currently unknown.

Sulfide Ore Storage

An estimated 135,000 tons of high-grade ore, containing on average about 10 percent by weight sulfide minerals, occur in deeper portions of the Pearl ore body. About half of this resource would be mined in conjunction with associated oxide ore. The remaining half lies below the level of oxide resources and would not be mined.

The Proposed Action would construct a sulfide ore storage area for mining and temporarily stockpiling the approximately 64,000 tons of sulfide ore that must be extracted to access commingled oxide ore. The storage area would be approximately 1.9 acres of the lower floor of the depleted Civit Cat sub-pit. The area would be underlain by a minimum 6 inches of prepared native subgrade and 60-mil HDPE geomembrane, protected by a minimum 18 inches of coarse aggregate to prevent rupture by haulage trucks. The floor would be graded to drain to an external sump.

Any acid leachate generated by stockpiled sulfide ore would drain to the sump, where it would be chemically neutralized by sodium hydroxide to achieve a pH compatible with process fluids in the leach heap. This treatment is expected to cause most metal ion species in the solution to precipitate in the sump.

The sump has been designed to contain acid leachate that may be generated by a 24-hour, 100-year storm. Neutralizing sodium hydroxide would be manually added to leachate in the sump and mixed by a recirculation pump. A pH meter would be used to measure acidity. The sump would operate as a batch-processing facility.

Neutralized leachate would be transported to the leach heap, after the pH of each batch has been increased to the specified level and allowed to rest to allow precipitates to settle. The locations of the sulfide ore stockpile and drainage sump are shown on **Figure 2-1**, Site Development Plan.

Installing the sulfide ore stockpile pad and sump would be deferred until mining progresses to a point where the storage capacity is required, giving sufficient lead time for construction.

2.1.3 Roads, Pads, and Sumps

To the extent possible, WLMC would use cross-country travel to explore access to the project, in order to minimize road construction and associated ground disturbance. Road disturbance along currently unknown access routes would reduce the repetitive use of cross-country roads for exploration equipment, which would require reclamation. Planning and bonding estimates provide for reclaiming 4,525 feet of cross-country exploration access roads, 648 feet of blade-smoothed roads, 98 feet of trenches, and 54 drill pads and sumps with the following dimensions:

- Exploration access road widths—12 feet
- Drill pad lengths and widths—60 feet by 20 feet
- Drilling sump dimensions—2 yards by 5 yards by 2 yards, or 20 cubic yards

Existing disturbance is estimated at 4.83 acres, under BLM exploration permit number NVN94961. WLMC would reclaim this disturbance, as well as 42,797 linear feet of preexisting roads and 70 drill pads within the project boundaries.

2.1.4 Permits and Approvals

The Proposed Action would also require authorizing actions from other federal, state, and local agencies with jurisdiction over certain aspects of the proposed project. WLMC is responsible for amending existing permits, applying for, and acquiring additional permits, as needed.

The following federal, state, and local permits have been acquired or need to be acquired for the proposed mine project:

- Acquired:
 - Explosives permit, 9-NV-009-20-8K-00321 (Ledcor CMI, Inc.)
 - Class II air quality operating permit, #API041-3853 Nevada Department of Environmental Protection (NDEP)
 - Mercury operating permit to construct, #API041-3895 (NDEP)
 - Class I air quality operating permit to construct, #AP 1041-3897 (NDEP)
 - Stormwater general permit, NVR300000 MSW-43292 (NDEP)
 - Industrial artificial pond permit, #467428 (NDOW)
 - Permit to appropriate water, #82498, 83484, 83485, 79096 (Nevada Division of Water Resources)
 - Water pollution control permit, NEV2009102 (NDEP)
- Need to be acquired:
 - Permit to operate (Nevada Division of Minerals (NDOM))
 - Hazardous materials storage permit (NFMD)
 - Special use permit, building permits (Mineral County)

2.1.5 Prevention of Unnecessary or Undue Degradation

Design, construction, project maintenance, and concurrent reclamation for the project are all planned. This is to prevent unnecessary or undue degradation of lands affected by the project throughout its life and when it is closed. The goal of the reclamation plan is to reestablish productive post-mining land use and to provide for long-term public safety and site stabilization.

The following is an overview of the reclamation methods to be employed both during and after mining, processing, and exploration. The plan of operations

(II.3, Reclamation Plan) provides a more through overview of reclamation methods to reestablish productive post-mining land use and to provide for long-term public safety and site stabilization.

Measures taken to prevent unnecessary and undue degradation are based on general requirements established by the BLM under 43 CFR, Part 3809, surface management regulations, NDEP mining and reclamation regulations, NDEP water quality regulations and NDEP air quality regulations.

The following measures to be taken to prevent unnecessary and undue degradation by the project would be implemented during operations and when the project is decommissioned:

- All regulated components of the facility would be designed and constructed to meet or exceed BLM and NDEP design criteria. Stockpiles that do not require engineered containment would be evaluated for their potential to release pollutants and would be monitored routinely.
- All regulated waste would be managed according to relevant regulations.
- Surface disturbance would be minimized while optimizing the recovery of mineral resources. Grading plans are based on careful cut-and-fill balances to reduce surface disturbances to the extent practicable.
- Fugitive dust emissions from disturbed and exposed surfaces would be controlled.
- Surface water drainage would be controlled by diverting stormwater, isolating facility runoff, and minimizing erosion.
- Where they are suitable as a growth medium, surficial soils and alluvial material would be managed as a topsoil resource and removed, stockpiled, and replaced during reclamation.
- The reclamation plan would specify earthwork and contouring, revegetation and stabilization, and detoxification and disposal, and it would include monitoring activities to satisfactorily reclaim the proposed disturbance areas.

2.1.6 Environmental Protection Measures

In addition to the measures listed in **Section 2.1.5** and in compliance with 43 CFR, Subpart 3809.420, the Proposed Action would include protection measures for the specific resources outlined below. WLMC has also committed to measures outlined in the plan of operations to minimize potential impacts on resources and to prevent unnecessary or undue degradation.

Cultural Resources

During the course of activities on federal land, any cultural or paleontological resources or Native American human remains, funerary items, sacred objects, or objects of cultural patrimony discovered by WLMC, or any person working on its behalf, would be immediately reported to the BLM Authorized Officer by telephone, followed by written confirmation. All operations in the immediate area, generally within 100 feet of such discovery, would be suspended and the discovery would be protected until an evaluation can be made by the BLM Authorized Officer.

For cultural resources other than Native American human remains, funerary items, sacred objects, or objects of cultural patrimony, this evaluation would determine the significance of the discovery and what measures would be necessary to allow the activities to proceed. WLMC would be responsible for the cost of evaluation and mitigation. Any decision on treatment or mitigation would be made by the BLM Authorized Officer after consulting with WLMC. Operations may resume only on written authorization to proceed from the BLM Authorized Officer.

WLMC would inform all persons working in the project area that federal and state laws prohibit knowingly disturbing cultural resources or collecting artifacts.

Hazardous and Solid Wastes

Hazardous wastes are not anticipated to be generated; however, if generated, they would be disposed of at an approved facility, in accordance with state and federal regulations. Although petroleum products would be used on-site, they are excluded as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act Section 101(14). Diesel, oil, and lubricants would be transported to the site in portable containers (e.g., tanks in the pickup trucks for diesel fuel) but would not be stored on-site. If regulated materials (petroleum products) are spilled, measures would be taken, under Barrick's spill response guidelines, to control the extent of the spill, and the appropriate agencies would be notified, in accordance with the applicable federal and state regulations.

Solid waste would be collected at each drill pad and transported off-site periodically for disposal at an approved solid waste facility.

In the event of oil, fuel, or hydraulic fluid leaks, they would be cleaned up as soon as possible. In the event of a major spill, the following actions would be taken, in addition to any federal, state, and local health and safety requirements:

- Contain the spread or migration of the spill using the on-hand supply of erosion control structures or by creating dirt berms, as feasible and necessary

- In accordance with 43 CFR, Subpart 8365.1-1(b)(3), no sewage, petroleum products, or refuse would be dumped from any trailer or vehicle
- Regulated wastes would be removed from the project area and would be disposed of in a state, federal, or local designated area

The BLM and NDEP (phone 775-687-4670) would be notified within 24 hours, and the appropriate remedial actions and confirmation sampling would be conducted under the direction of NDEP if one of the following circumstances were to occur:

- If a petroleum spill were to meet the reportable quantity, in accordance with the NDEP's guidelines (greater than 25 gallons or greater than 3 cubic yards of impacted material)
- If a reportable quantity for hazardous waste were released, based on the EPA's guidelines established under Title III List of Lists (40 CFR, Part 302)

Spill notification would also be required for any spills into a waterway.

Portable toilets would be available in the project area.

Biological Resources

Vegetation

As facilities are constructed, reclamation would begin at the same time, as practicable. At the close of mining operations, growth media would be distributed over disturbed areas, followed by seeding with an approved mix. Plant species used in the seed mix may result in a slightly different vegetation community until natural volunteer seeding of the area by species from surrounding, undisturbed areas becomes established.

At the close of operations, all non-pit disturbed surfaces not classified as preexisting, rock outcrop, or ground with natural slopes exceeding 2(H):1(V) would be revegetated. This would be done to control runoff, reduce erosion, provide forage for wildlife, and reduce visual impacts. Seeding would be timed to take advantage of optimal climate and would be coordinated with other reclamation activities.

During construction, cactus and yucca plants would be avoided if possible. With BLM and State of Nevada approval, cactus and yucca plants that cannot be avoided would be transplanted to nearby suitable habitat.

Annual monitoring for noxious weeds would be conducted in the project area. New infestations of invasive, nonnative weeds would be treated promptly and according to approved BLM regulations to prevent them from spreading off-site.

Herbicide may be applied to reduce the size of noxious weed populations, with BLM approval. Vehicles being used in areas with noxious weeds off-site would be washed before entering the site. Only certified weed-free gravel and straw or hay bales would be used on-site.

General Wildlife

In accordance with IM No. 2016-023, to prevent wildlife mortalities in open, uncapped hollow pipes, the BLM would implement management actions. These apply to fence posts, sign posts, survey markers, outbuilding vents, and other structures in the project area. It is to ensure that designs for new construction or the modification of facilities do not include open-top vertical pipes that are less than 12 inches in diameter.

To prevent wildlife mortalities in open, uncapped hollow pipes or other openings, they would be capped or screened or otherwise covered to prevent unintentional trapping. Wildlife escape ramps would be installed in sumps and other areas, where applicable. In addition, other openings where wildlife escape ramps are not practicable, such as cellar well openings, would be capped or covered so they are not a trap hazard. The BLM wildlife biologist and NDOW would be notified within 24 hours of any wildlife injuries or mortalities in the project area during construction and operation.

All trenches, sumps, and other excavations that pose a hazard or nuisance to the public, wildlife, or livestock would be adequately fenced to preclude access; alternatively, they would be constructed with a sloped end for easy egress.

WLMC would remove all polyvinyl chloride mine markers within the project boundary, in accordance with the state statute or guidance.

Speed limits would be posted and enforced in order to reduce the likelihood of direct wildlife mortality from vehicle collision.

The ponds containing cyanide would be protected from avian encroachment by bird netting. The pond process area would be surrounded by chain-link fencing in order to prevent wildlife and livestock from approaching the ponds.

Employees would be provided with appropriate environmental training before project work begins.

Migratory Birds

Surface-disturbing activities would not occur during the migratory bird nesting season, from March 1 to August 31, annually. If surface-disturbing activities must occur during this period, preconstruction avian surveys would be conducted in appropriate habitats by qualified, BLM-approved biologists not more than 7 days before such activities begin.

The specific area to be surveyed would be based on the scope of the surface-disturbing activities, as determined by the qualified biologist, in coordination with the BLM Authorized Officer's representative. If surface-disturbing activities do not take place within 7 days of surveys, the areas would be resurveyed.

If nesting migratory birds are detected during surveys, appropriate buffers determined by the BLM, in coordination with other state and federal wildlife agencies, would be applied. Buffers would remain in effect until the qualified biologist determines the young have fledged or the nest has failed; this determination would be communicated to the BLM Authorized Officer's representative for review and approval.

BLM Sensitive Species

Before any construction work near bat roosting habitat begins, an experienced biologist would survey the area for potential bat habitat (including maternity and hibernacula⁷), with protocols approved by the BLM and NDOW. WLMC would work with NDOW to survey for bat use at the adits and shafts in advance to any disturbance to these areas. They would follow mitigation measures proposed to protect BLM sensitive bat species. Active roosts and hibernacula would not be disturbed until bats have left the sites. Other suitable nearby adits and shafts would be protected to offset impacts.

To reduce impacts on birds and bats and to minimize light pollution, lighting would follow dark sky lighting practices. This would come about by keeping lighting to the absolute minimum, with the lowest level of lumens possible; by strategically planning fixture location to pertinent sites only; and by fitting light fixtures with hoods or shields, faced downward.

Under the Proposed Action, WLMC would not disturb the surface within a 0.5-mile radius of any active raptor nests, which is the buffer distance that the US Fish and Wildlife Service (USFWS) recommends for golden eagles. All golden eagle nests within 2.5 miles of the project area would be monitored annually for the life of the project, following the Pagel et al. protocol.

Water Resources

WLMC would monitor on a quarterly basis all springs within 3 miles of the project for Profile II constituents (NDEP 2014).

Visual Resources

Light shields would be used on lighting units to deflect light away from the town of Luning, Highway 95, and Highway 361. Safety and general security lighting would be limited to the minimum illumination needed to achieve safety and security objectives and to avoid unnecessary light pollution of night skies.

⁷ A place in which a creature seeks refuge

To reduce impacts on the viewshed and where feasible, WLMC would use visual screening to reduce reflectivity and glare, such as installing brown slats in chain-link fences or using weathering chemicals on galvanized surfaces.

2.2 ALTERNATIVES OTHER THAN THE PROPOSED ACTION

2.2.1 No Action Alternative

In accordance with Chapter VI, Section 6.6.2 of H-1790-I, this EA evaluates the No Action Alternative, which is a reasonable alternative to the Proposed Action. The objective of the No Action Alternative is to describe the environmental consequences that may result if the Proposed Action were not implemented. The No Action Alternative forms the baseline against which the impacts of the Proposed Action can be measured.

Under the No Action Alternative, the proposed mining and processing facilities would not be approved. No additional disturbance would occur beyond the currently disturbed area and mineral resources would not be extracted.

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CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter identifies and describes the current condition and trend of elements or resources in the human environment that may be affected by the Proposed Action and the anticipated environmental consequences. In accordance with the Council on Environmental Quality (CEQ) regulations found at 40 CFR, Subpart 1508.8, “effects” and “impacts” are synonymous in this EA. They are the direct, indirect, or cumulative aesthetic, historic, cultural, economic, social, and health impacts. They also are ecological effects, such as those on natural resources and on the components, structures, and functions of affected ecosystems.

3.1 SCOPING AND ISSUE IDENTIFICATION

In accordance with the H-1790-1, the SFO ID (Interdisciplinary) team conducted internal scoping to identify potential resources that may be affected by implementing the Proposed Action and alternatives. Resources identified by the SFO ID team as not being present or as present but not affected are outlined in **Table 3-1**, Supplemental Authorities, and **Table 3-2**, Other Resources.

Following submission by IPLLC of the plan of operations in 2010, public scoping was conducted from March 15 through April 15, 2011. In five letters and four telephone calls received by the BLM, the following issues and concerns were identified:

- Wildlife—Potential disturbance of habitat for mule deer, pronghorn antelope, and desert bighorn sheep
- Special status species—Proximity of disturbance to a known prairie falcon nest
- Springs—The impact of mining on springs and associated wildlife

- Public access and vested rights-of-way—The status of public access to surrounding areas for recreation
- Level of NEPA analysis—What criteria were used to determine that the preparation of an EA would be appropriate, as opposed to a full environmental impact statement
- Transportation of ore—Plans to evaluate the impacts of the transportation of ore on off-site facilities
- Water resources—Waste and ore rock characterization and potential impacts on Waters of the United States
- Cultural resources—Request for complete examination of the site for archaeological and cultural resources
- Water rights—Two claims of vested water rights for stockwater use in the area
- Recreation—Requests by various off-road race organizers to control cross traffic during race day

Comments on the Proposed Action were requested by WLMC and BLM using the State of Nevada Department of Administration Clearing House. Issues originally identified from the agency comments were concern for water quality, wildlife (including special status species), habitat, recreation, nearby spring monitoring, and quantity and quality reporting.

3.1.1 Supplemental Authorities

Appendix I of the BLM's NEPA Handbook (H-1790-1) identifies supplemental authorities which identify resources that are subject to requirements specified by statute or executive order and must be considered in all BLM environmental documents. The BLM Nevada IM NV-2009-030 (Supplemental Authorities to Consider in National Environmental Policy Act [NEPA] Documents) provided statewide guidance to BLM district and field offices in Nevada on how these supplemental authorities should be considered in NEPA documents. Attachment I to IM NV-2009-030 provides the supplemental authorities list as a screening tool for review and documentation of relevant laws, regulations, executive orders, and directives in NEPA documents. This list expands on Appendix I of H-1790-1 to include other legal authorities, with requirements specified by statute or executive order, which must be considered in all Nevada BLM EA documents.

Table 3-1, below, lists the supplemental authorities, their status in relation to the Proposed Action, and the rationale for whether the topic would be carried forward for detailed analysis. (Supplemental authorities determined to not be present or to be present but not affected by the Proposed Action need not be carried forward or discussed.) Supplemental authorities that could be affected may be carried forward in the document if there are issues that necessitate a detailed analysis.

**Table 3-1
Supplemental Authorities***

Resource	Present?	May Be Affected?	Rationale
Air quality	Yes	Yes	Carried forward for analysis.
Areas of Critical Environmental Concern	No	No	Resource not present.
Cultural resources	Yes	No	See Section 3.2.1 for background information and rationale.
Environmental justice	No	No	No communities or residences within a 5-mile radius of the mine; there would be no disproportionate effects on minority or low-income populations.
Farmlands (prime or unique)	No	No	There are no prime or unique farmlands in or surrounding the project area.
Floodplains	No	No	There are no floodplains in or surrounding the project area.
Invasive, nonnative species	Yes	Yes	See Section 3.8 , Vegetation, for analysis.
Migratory birds	Yes	Yes	Carried forward for analysis.
Native American religious concerns	Yes	No	See Section 3.2.1 for background information and rationale.
Threatened or endangered species; proposed and candidate species (plants and animals)	No	No	No species listed under the Endangered Species Act are known to occur in the project area. Suitable habitat for the listed species does not occur in the project area (GBE 2017).
Wastes, hazardous or solid	Yes	No	The operator would handle and store all hazardous materials according to state and federal regulations and standard operating procedures. Any spills of petroleum products would be remediated and reported according to state regulations. Solid waste would be disposed of in an approved facility.
Water quality (surface/ground)	Yes	Yes	Carried forward for analysis. See Section 3.3 , water quality. Surface water and groundwater quantity would be carried forward for analysis under the heading of <i>Water Resources</i> .
Wetlands/riparian zones	No	No	There are no wetlands in or next to the project area.
Wild and Scenic Rivers	No	No	There are no Wild and Scenic Rivers in or near the project area.
Wilderness/ Wilderness Study Areas	No	No	None present. The Gabbs Valley Range Wilderness Study Area is approximately 0.3 miles north of the project area.

*See H-1790-I (January 2008), Appendix I, Supplemental Authorities to be Considered.

Supplemental authorities determined to be not present or present/not affected need not be carried forward or discussed further in the document. Supplemental authorities determined to be present/may be affected can be carried forward in the document.

3.2 RESOURCES OR USES OTHER THAN SUPPLEMENTAL AUTHORITIES

Resources or uses identified in **Table 3-2**, below, that are not supplemental authorities, as defined by the BLM's Handbook H-1790-1, were evaluated by the SFO ID team in all NEPA documents. Resources or uses that are not present or that are present, but not affected by, the Proposed Action need not be carried forward or discussed further. Resources or uses that are present and may be affected could be carried forward in the document if there are issues that warrant a detailed analysis.

Table 3-2
Other Resources*

Resource or Issue	Present?	May be Affected?	Rationale
Access	Yes	Yes	Carried forward for analysis. See Section 3.12 .
BLM sensitive species (plants and animals)	Yes	Yes	Carried forward for analysis.
Fire management	No	No	Fuels for big fires are not present in or surrounding the project area.
Forestry resources	No	No	Forest resources are not present in or surrounding the project area.
General wildlife	Yes	Yes	Carried forward for analysis.
Land uses and authorizations	Yes	Yes	Carried forward analysis.
Lands with wilderness characteristics	No	No	Lands with wilderness characteristics are not present in or surrounding the project area.
Livestock grazing	Yes	No	The project area is in the Pilot/Table Mountain Grazing Allotment, which is 551,530 acres. Approximately 315 acres of the project area would be fenced. This would account for approximately 0.06 percent of the allotment. At the close of reclamation, the fence would be removed, thus returning most of the project area to active range, with forage opportunities for livestock grazing; therefore, this resource use is not discussed further.
Minerals and geology	Yes	Yes	Carried forward for analysis.
Noise	Yes	No	There are no occupied dwellings or residential areas or other sensitive receptors within 5 miles of the project area.
Paleontological resources	No	No	Resource not present.

**Table 3-2
Other Resources***

Resource or Issue	Present?	May be Affected?	Rationale
Public health and safety	Yes	Yes	Potential public health and safety issues would pertain to access, water quality, and chemical spills. Access is addressed in Section 3.12 and includes such protection measures as fences around the project, signs, and speed limits. Water quality is addressed in Section 3.7, and any chemical spills would be contained according to the emergency response plan and reported in accordance with federal and state laws; therefore, public health and safety is not discussed as a separate issue topic in this EA.
Recreation	Yes	No	No current SRPs (Special Recreation Permits) are in this area, but they may be issued later. As long as signs are used to inform public knowledge of where they can and cannot be in the project area, there should not be any issues around recreation.
Socioeconomics	Yes	Yes	Carried forward for analysis.
Soils	Yes	Yes	Carried forward for analysis.
Vegetation	Yes	Yes	Carried forward for analysis.
Visual resources	Yes	Yes	Carried forward for analysis.
Wild horses and burros	Yes	No	The Pilot Mountain Herd Management Area bisects the Proposed Action area to the north. It consists of 255,040 acres of important habitat for wild horse management. There are 140 acres of the herd management area in the project area (BLM GIS 2017). The range site there produces very little vegetation usable by wild horses. Horses have not been observed in the project area. Based on aerial imagery, this area has been disturbed by previous mining. The project area would be fenced, so it would not pose a danger to horses. At the close of reclamation, the fence would be removed, thus returning most of the project area to active range, with forage opportunities for wild horses; therefore, this resource use is not discussed further.

*Resources or uses not present or present but not affected need not be carried forward or discussed further in the document. Resources or uses that are present/may be affected can be carried forward in the document.

3.2.1 Rationale for Resources Declared Not Affected

Cultural Resources

Cultural resources inventories (CRI) were conducted in both the existing plan of operations permit boundary and in the area of potential effect (APE). Their purpose was to provide baseline cultural resource data for the general study area. Two inventories were conducted, in compliance with the National Historic Preservation Act: the BLM cultural resources report CRR3-2483 (titled A Class III Cultural Resources Inventory of 545 Acres for the Isabella Mine Project, Mineral County, Nevada) and CRR3-2764 (titled A Class III Cultural Resource Inventory of 13 Acres for the Isabella Mine Project, Mineral County, Nevada). No historic properties that have been recommended as eligible for inclusion on the National Register of Historic Places were identified. WLMC would avoid any other areas containing cultural resources.

As part of the environmental protection measures of the Proposed Action (see **Section 2.1.6**, Environmental Protection Measures), WLMC has committed to avoiding discovered cultural resources of significance, or it would mitigate impacts in a manner acceptable to the BLM; therefore, cultural resources were not carried forward for further analysis.

Native American Religious Concerns

Consultation with the Walker River Paiute Tribe was initiated on September 4, 2009 with a letter sent to the tribal chairman. Information concerning the results of the CRI was provided to The Walker River Paiute Tribe at that time. Subsequent discussion resulted in no concerns.

Native American consultation with the Walker River Paiute Tribe is ongoing, and to date no traditional cultural properties or sacred sites have been identified in the project area. Ongoing consultation could result in new information and additional protection measures. If previously unidentified or undiscovered gravesites, traditional cultural properties, artifacts, or similar occur, then WLMC would implement the stipulations and environmental protection measures described in this document. These measures and stipulations include procedures set forth in 43 CFR, Part 10, Native American Graves Protection and Repatriation Regulations. This resource was not carried forward for further analysis.

3.3 RESOURCES PRESENT AND BROUGHT FORWARD FOR ANALYSIS

The SFO ID team evaluated potential impacts on the supplemental authorities, resources, and resource uses listed in **Table 3-1** and **Table 3-2**. The intent was to determine if detailed analysis would be necessary. Through this process, the SFO ID team determined the following resources warrant detailed analysis in this EA:

- Geology and minerals

- Soils
- Air quality
- Water resources (quality and quantity)
- Vegetation and invasive, nonnative, and noxious species
- General wildlife
- Migratory birds
- BLM sensitive species
- Land use, recreation, and access
- Socioeconomics
- Visual resources

3.4 GEOLOGY AND MINERALS

3.4.1 Affected Environment

This section addresses the topography, regional geology, bedrock geology, surficial deposits, seismicity, geologic hazards, and mineral resources for the proposed project. The geologic elements discussed below also provide background information for characterizing the hydrogeologic conditions presented in this document. Specifically, there is less environmental risk associated with the oxide materials, while the un-oxidized sulfidic materials require specialized handling, as addressed in **Section 2.1**.

Trace minerals containing environmentally relevant constituents are silver, arsenic, barium, copper, mercury, lead, antimony, sulfate, and zinc. The extent of hydrothermal alteration of aluminosilicates to low permeability clays in fault zones influences whether the fault is primarily a conduit or a barrier to infiltration and groundwater flow addressed in **Section 3.7**.

The geological environment of the project area has been defined through literature review and consultation with project geologists. Faulting and seismicity data were obtained from the US Geological Survey (USGS) National Seismic Hazard Mapping Project (USGS 2008).

The regional geological map in this report was based on the geologic map of the Gabbs Mountain, Mount Ferguson, Luning, and Sunrise Flat Quadrangles, Mineral and Nye Counties, Nevada, by Ekren and Byers (USGS 1985).

Regional Geology

The geology of the project region is shown on Figure 2A in the plan of operations, and the geology of the project area is shown on Figures 3A, 3B, and 3C of the plan of operations (Welsh Hagen 2017). The project is in the central portion of Walker Lane, a major northwest-trending zone on the western border of Nevada. It is characterized by a series of closely spaced dextral strike-slip faults that have

exhibited sporadic activity for about 24 million years (Surpless 2008). It is a complex geologic structural zone, up to 60 miles wide and 400 to 600 miles long, that lies on the boundary between the Basin and Range Province and the Sierra Nevada Province. Numerous gold deposits occur in Walker Lane.

In this structural setting, ancient volcanic rocks cover much of the project area, including lava flows and volcanic ash flows. The volcanic rocks unconformably overlie Mesozoic sedimentary and granitic rocks. The geology of the project area is shown on **Figure 3-1**.

Three major fault zones trend through the project region (see **Figure 3-2**, Quaternary Faults). The Gumdrops Hills Fault Zone passes 1.7 miles southwest of the project area boundary at its nearest approach. The Bettles Well-Petrified Springs Fault Zone passes 3.8 miles northeast of the project area boundary at its nearest approach. There are, in addition, a number of unnamed faults beneath Gabbs Valley, passing 2.5 miles northeast of the project area boundary at its nearest approach.

The known pre-Tertiary basement rocks in the project area include the Triassic Luning Formation, which is composed of medium- to thick-bedded limestone, with some dolomite and silici-clastic rocks. This formation was intruded by stocks and dikes of Jurassic or Cretaceous diorite, porphyritic quartz monzonite, and granite.

The basement rocks are overlain by a sequence of late Oligocene ash-flow tuffs that exceed 3,000 feet in thickness and include minor associated lavas and intrusive rocks. From oldest to youngest, the Oligocene units are the Lavas of Giroux Valley; the Mickey Pass Tuff, the Singatse Tuff, and the Petrified Spring Tuff, which are members of the Benton Spring Group; and the Blue Sphinx Tuff.

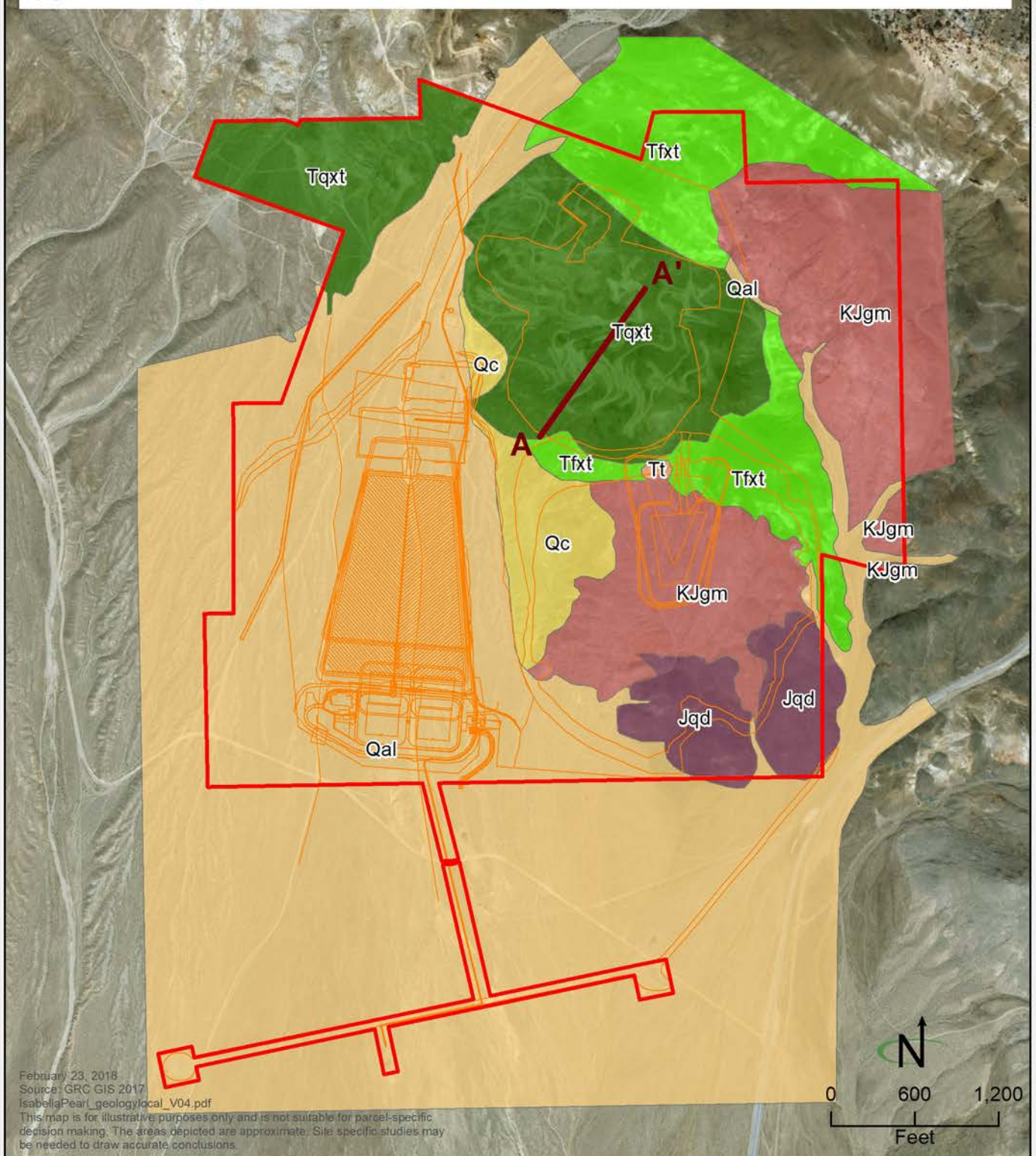
These units are overlain by the early to middle Miocene Lavas of Mount Ferguson, and they are locally crosscut by associated rhyolitic intrusions. The volcanic rocks range in age from 16 to 29 million years, with the most voluminous volcanism occurring between 24 and 28 million years. Other precious metal districts of central Walker Lane (Borealis, Aurora, and Paradise Peak) are temporally and spatially related to volcanic rocks of similar age.

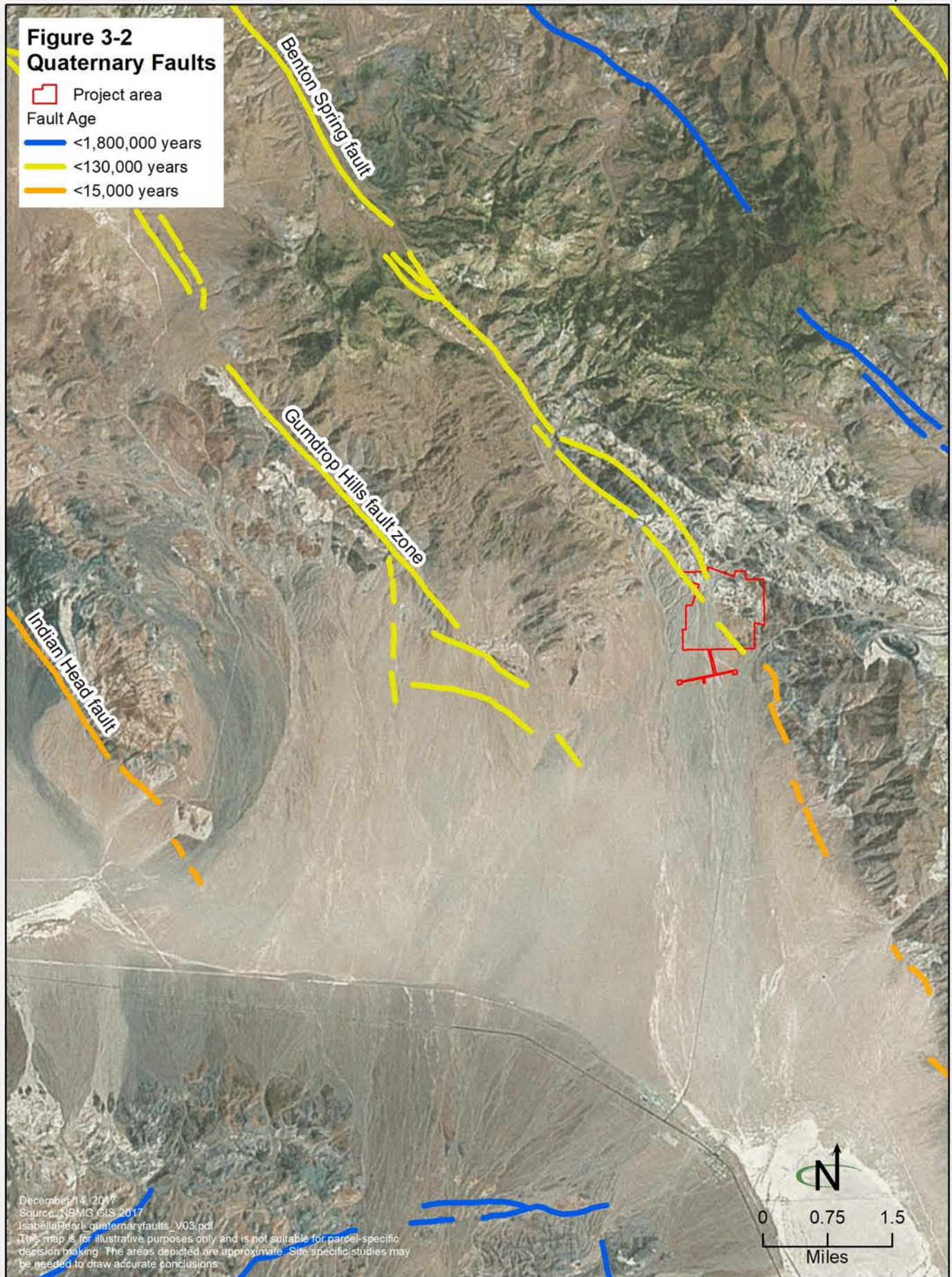
Deposit Geology

The gold-silver resources that WLMC proposes to recover are the Isabella, Pearl, and Civit Cat oxide deposits and the Pearl sulfide deposit. Alteration and mineral assemblages, including widespread argillic alteration and generally abundant alunite, indicate that the deposits belong to the high-sulfidation class of epithermal mineral deposits. Potassium-argon age determinations suggest that the mineralization is about 19 million years old, some 7 to 10 million years younger than the age of the host rocks. This early Miocene age conforms to the age of other high-sulfidation precious metal deposits in the Walker Lane, such as the Goldfield, Paradise Peak, and Borealis deposits.

Figure 3-1
Local Geology

- | | |
|--|---|
|  Project area |  Qc- Quaternary colluvium |
|  Project components |  Tfx- Rhyolite: Moderately to extremely densely welded rhyolite tuff |
|  Jqd- Quartz diorite |  Tqxt- Rhyolite: Moderately to poorly welded pumiceous quartz and alkali feldspar-crystal-rich rhyolite tuff |
|  KJgm- Granite/Quartz Monzonite |  Tt- Basal unit: Waterlain airfall tuff and local regolith on basement |
|  Qal- Quaternary alluvium | |





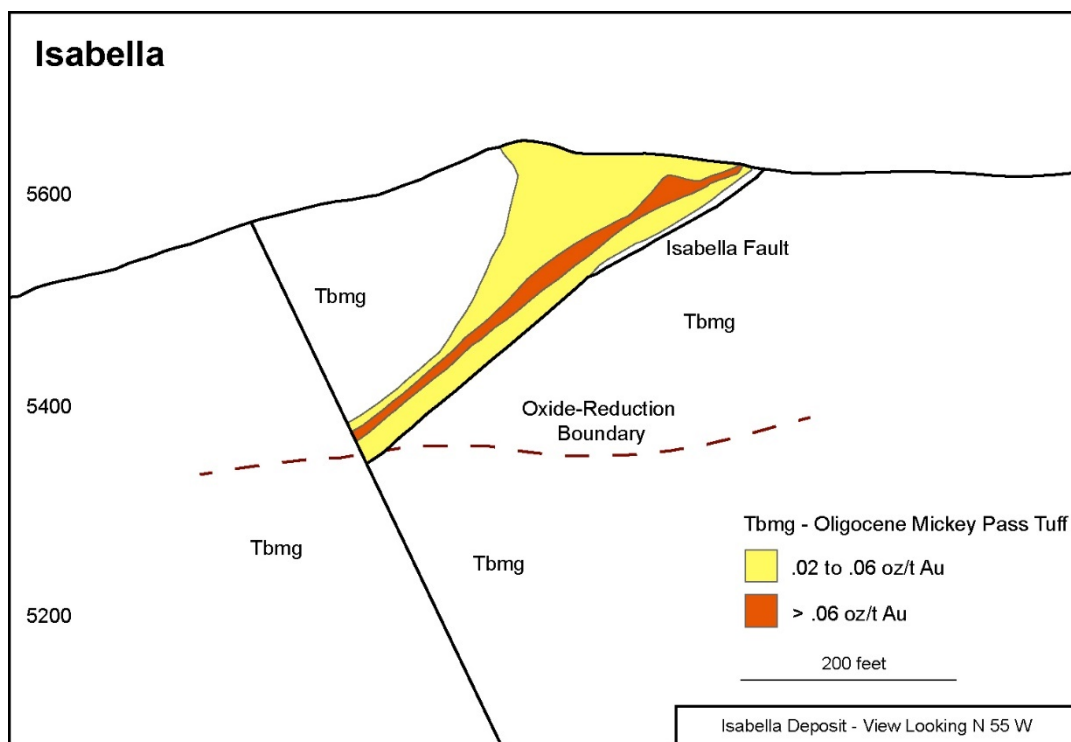
In this type of deposit, silicification at the core generally grades outward into alteration of host rock with production of clays and sulfur minerals. Silicification is localized by faults and shears, and in many areas silica has replaced large masses of both the volcanic and granitic rocks. Gold is associated with this silicification, occurring primarily in the Guild Mine Member in the lower part of the Mickey Pass Tuff at the project. This alteration assemblage is also present in the lower, more densely welded tuff characteristic of the Pearl deposit, but it is tightly confined around the core of silicification that is mineralized.

Shallow Isabella mineralization (**Figure 3-3**, Cross Section of the Isabella Deposit) is primarily oxidized and very siliceous. Narrow, structurally controlled zones of silica-pyrite, as well as the more pervasive silica replacement bodies, generally grade outward into silica and clayey zones with local alunite ($\text{KAl}_3(\text{SO}_4)_2(\text{OH})_6$) envelopes. The iron oxide minerals goethite, jarosite, and hematite are present in the siliceous groundmass.

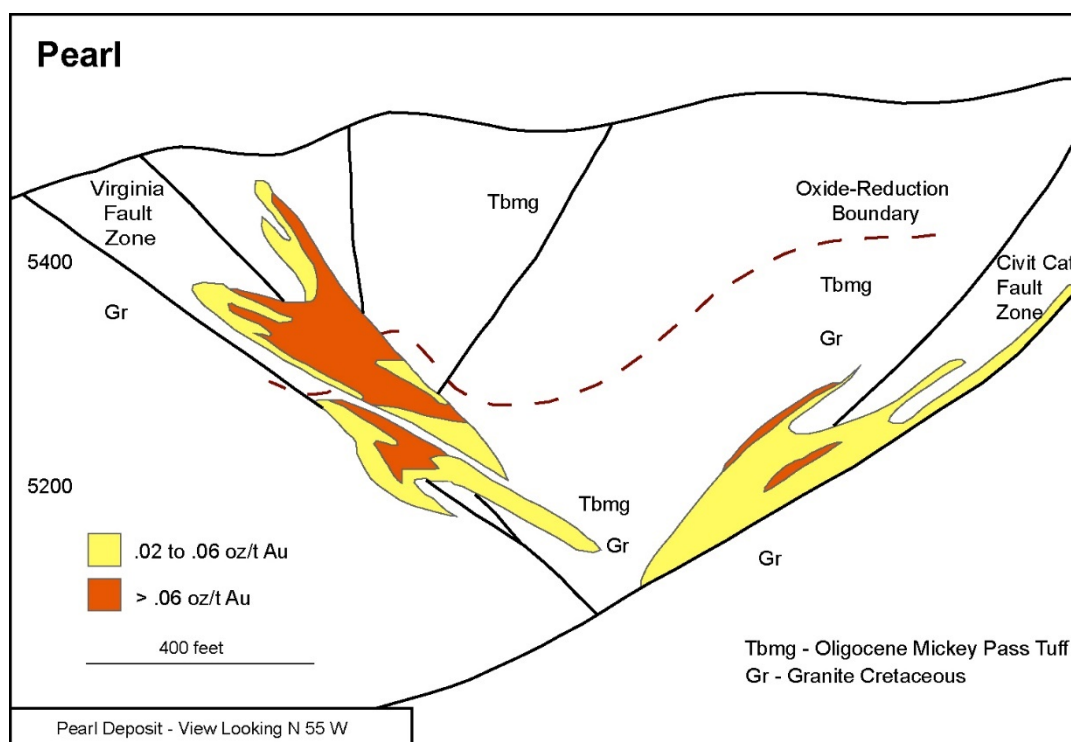
Gold occurs as very small (less than 34 microns) liberated particles in cavities and along fracture surfaces. Rare secondary minerals are barite, cinnabar, and scorodite, which contain barium, mercury, and arsenic, respectively. A near-horizontal zone of hydrothermal alteration clays with alunite occurs above the Isabela deposit in the upper, poorly to moderately welded rhyolitic ash-flow tuff of the Guild Mine Member.

The Pearl deposit (**Figure 3-4**, Cross Section of the Pearl Deposit) is hosted by the lower, densely welded portion of the Guild Mine Member (Tbmg on **Figures 3-3** and **3-4**) and, to a lesser extent, by Cretaceous granite. Mineralization is largely controlled by the northwest-striking, northeast-dipping Virginia fault zone that marks the contact between the granite on the southwest and Tertiary volcanic rocks on the northeast. Strong silicification accompanies gold mineralization and is associated with fracture fillings and replacement of the welded tuff.

Sulfide minerals in sulfide ore in the Pearl deposit commonly exceed 10 percent and are composed primarily of crystalline grains and aggregates of iron sulfide minerals in dark microcrystalline quartz. This quartz has replaced both the volcanic and intrusive host rocks. In the granite, alteration has resulted in the complete leaching of feldspars and ferromagnesian silicates, and iron sulfides have filled the voids left by the silicate dissolution. Rare sulfide minerals observed in thin and polished sections are silver, arsenic, antimony, and lead. Uneconomical quantities of copper and zinc base metals are also present. Such materials have a significant potential to produce metal-bearing acid rock drainage (ARD), warranting special handling provisions described in **Section 2.1**.

Figure 3-3: Cross Section of the Isabella Deposit

Source: <https://www.goldresourcecorp.com/NV-development.php> (additional cross sections are presented in JBR 2012)

Figure 3-4: Cross Section of the Pearl Deposit

Source: <https://www.goldresourcecorp.com/NV-development.php> (Additional cross sections are presented in JBR 2012)

The oxidation boundary is depressed over and immediately around the Pearl deposit, with oxide mineralization extending to more than 500 feet below the surface (**Figure 3-4, Cross Section of the Pearl Deposit**). Goethite, jarosite, and manganese oxide are common, and barite and chlorargyrite occur rarely in the siliceous groundmass. Gold in the oxide mineralization occurs as both locked and liberated particles and as electrum.

Sulfidic ore remaining in the Pearl deposit under the Proposed Action would be covered by 20 feet of oxide material to prevent environmental degradation from sulfide oxidation. This protective measure would not fully condemn underlying mineral resources, but it would add expense to access them in the future, if warranted.

The Civit Cat mineralization, which is relatively minor and poorly defined by drilling, lies to the north of the Pearl deposit and is associated with the northwest-striking, southwest-dipping Civit Cat fault. The controls on mineralization by the Virginia and Civit Cat faults, which have similar strikes but opposing dips, result in northwest-trending, roughly lens-shaped zones of mineralization that flank both sides of a graben-like structural trough. Alteration of host rock is similar to that described in the Pearl deposit.

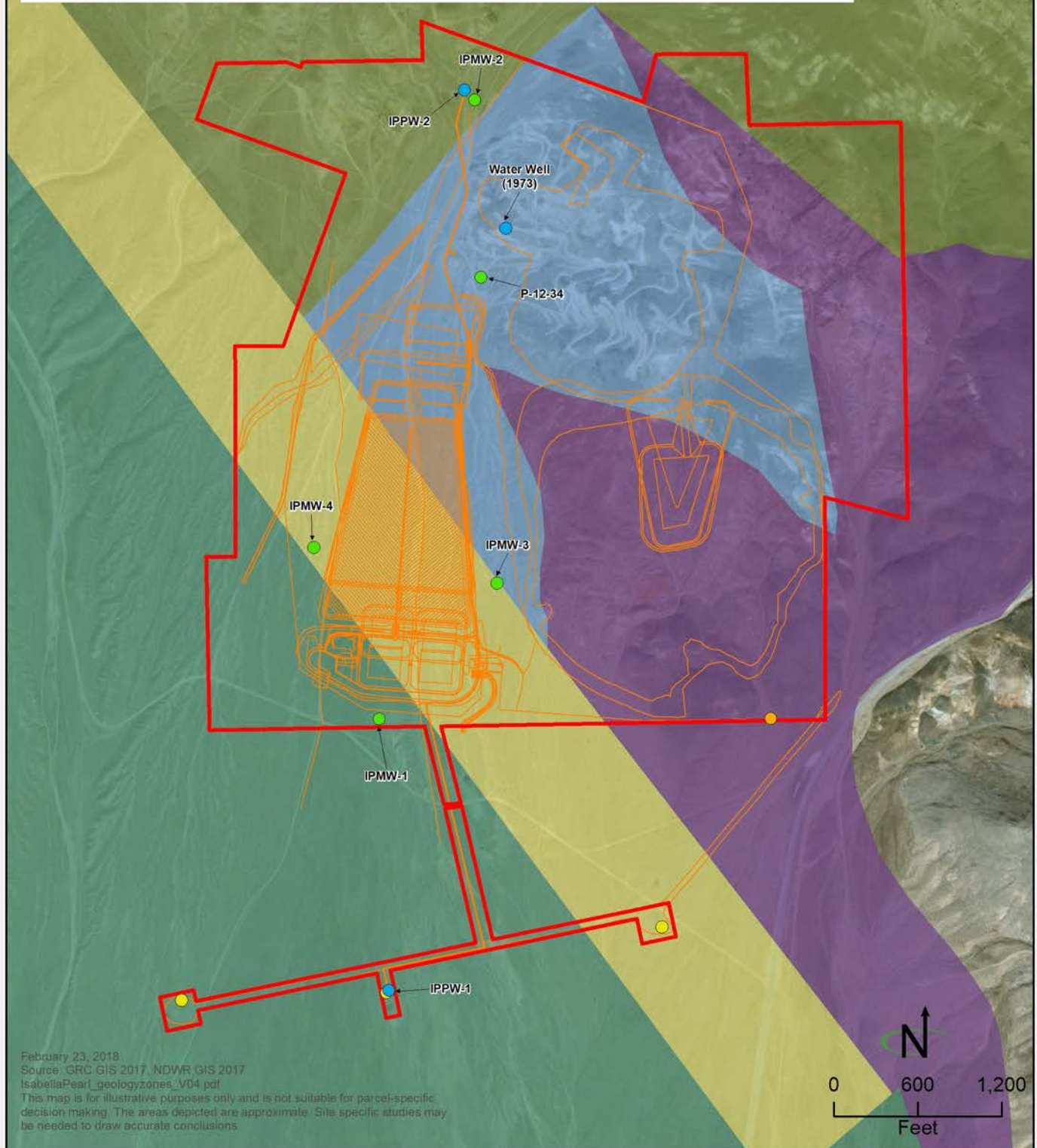
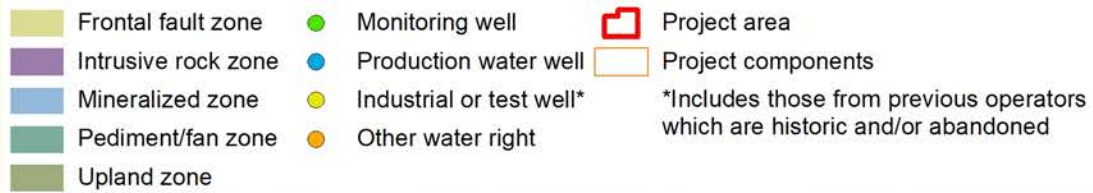
Faulting and Seismicity

Faulting

According to a 1985 USGS map, a single fault splay of the Benton Springs fault traverses the project area at an uncertain location; however, more recent photogrammetric analyses by the Nevada Bureau of Mines has identified the Benton Springs structure not as a single fault but as a broad zone of en echelon shearing that shows no evidence of having suffered movement since the late Quaternary (see **Figure 3-2, Quaternary Faults**), about 130,000 years before present. The Gumdrops Hills and Bettes Well-Petrified Springs faults exhibit even greater antiquity by showing no evidence of displacement in the past 750,000 to 1.8 million years. In summary, no faults classified as active are in the project area, and other faults in the region of the project do not affect the safety of the proposed development beyond the consideration of seismic acceleration incorporated in slope stability analyses for design of the project.

Active (Late Quaternary-Holocene) faults are those that exhibit evidence of movement within the last 10,000 years (Hart and Bryant 1997). A potentially active fault is one that has had surface movement in the past 1.6 million years (Quaternary Time). The southeastern-most splay of the potentially active Benton Springs Fault Zone has been mapped at the site (**Figure 3-5, Geologic Zones**). The 30-mile-long, right-lateral fault bounds the southwest front of the Gabbs Valley Range and has seen movement during the latest Quaternary. The slip rate on the fault zone is estimated to be between 0.2 and 1.0 millimeters

Figure 3-5
Geologic Zones



per year (Sawyer and Adams 1999). Given this estimated slip rate, the probability of fault rupture on-site during the life of the proposed project is extremely low.

Seismicity

The USGS National Seismic Hazard Mapping Project (USGS 2008) indicates a peak horizontal free-field ground acceleration of 0.21g's for an earthquake with a 475-year return period in the area. This acceleration would be considered in the design of mine pits, waste rock disposal facilities, and ore heaps.

The site region is regarded as moderately seismic due to the presence of numerous Quaternary faults. The nearest active faults are the Bettles Well-Petrified Springs fault and the Benton Spring fault, passing within 2 and 3 miles of the site, respectively. Their characteristic magnitudes are 7.23 and 7.32. The return periods for such events would be on the order of 10,000 years or more.

3.4.2 Environmental Consequences

Proposed Action

The impact of the Proposed Action on minerals would be the permanent removal of some of the precious metals and the relocation of mineralized material and waste material. WLMC proposes to relocate up to approximately 18.9 million tons of material over 3 years. Approximately 3 million tons would be in the form of oxide and mixed ore and would be stacked at the heap leach facility; approximately 64,000 tons would be in the form of sulfide ore and would be placed on containment before being transported to toll milling facilities.

Waste rock would account for approximately 15.8 million tons and would be stacked at the waste rock disposal facility (WRDF) shown on **Figure 2-1**, Site Development Plan. Of the 15.8 million tons of waste rock, approximately 209,000 tons would be in the form of sulfidic waste rock that would be interred in the WRDF to inhibit oxidation.

The risk of solutes from waste rock to affect groundwater requires analysis. There are two primary potential solute sources: the encapsulated sulfidic material and the latent mineral salts, such as alunite, remaining on the oxide waste rock.

The encapsulated sulfide rock is 1.3 percent of the total waste rock mass and would be bounded by 60 feet of oxide material above and below. This would provide a large mass of pH buffering and would effectively deprive the sulfide mass of oxygen required to support ARD oxidation reactions.

Additionally, a designed cover installed after reclamation would deprive the sulfide waste rock of water needed to promote ARD oxidation reactions and solute leaching. Accordingly, there is minimal risk of ARD solutes forming or

leaching from the sulfide waste rock when it is encapsulated in relatively large amounts of oxide material and effectively covered, as proposed in **Section 2.1**.

Next, alunite metal sulfate salts occur as ubiquitous alteration products in the upper oxide materials. Alunite generally appears in nature as a supergroup of numerous metal sulfates (dominated by aluminum and iron) that often contain arsenic in solid solution as a substitute for sulfate (Bayliss et al. 2010; Sunyer 2013). As such, alunite minerals can sequester sulfate and arsenic, serving to limit upper ranges of concentrations of those solutes, while simultaneously acting as a potential source of relatively moderate concentration. Alunite formation occurs from historical natural oxidation of pyrite, in the presence of native minerals, following hydrothermal venting in the fault system 19 million years ago; this resulted in gold and pyrite emplacement.

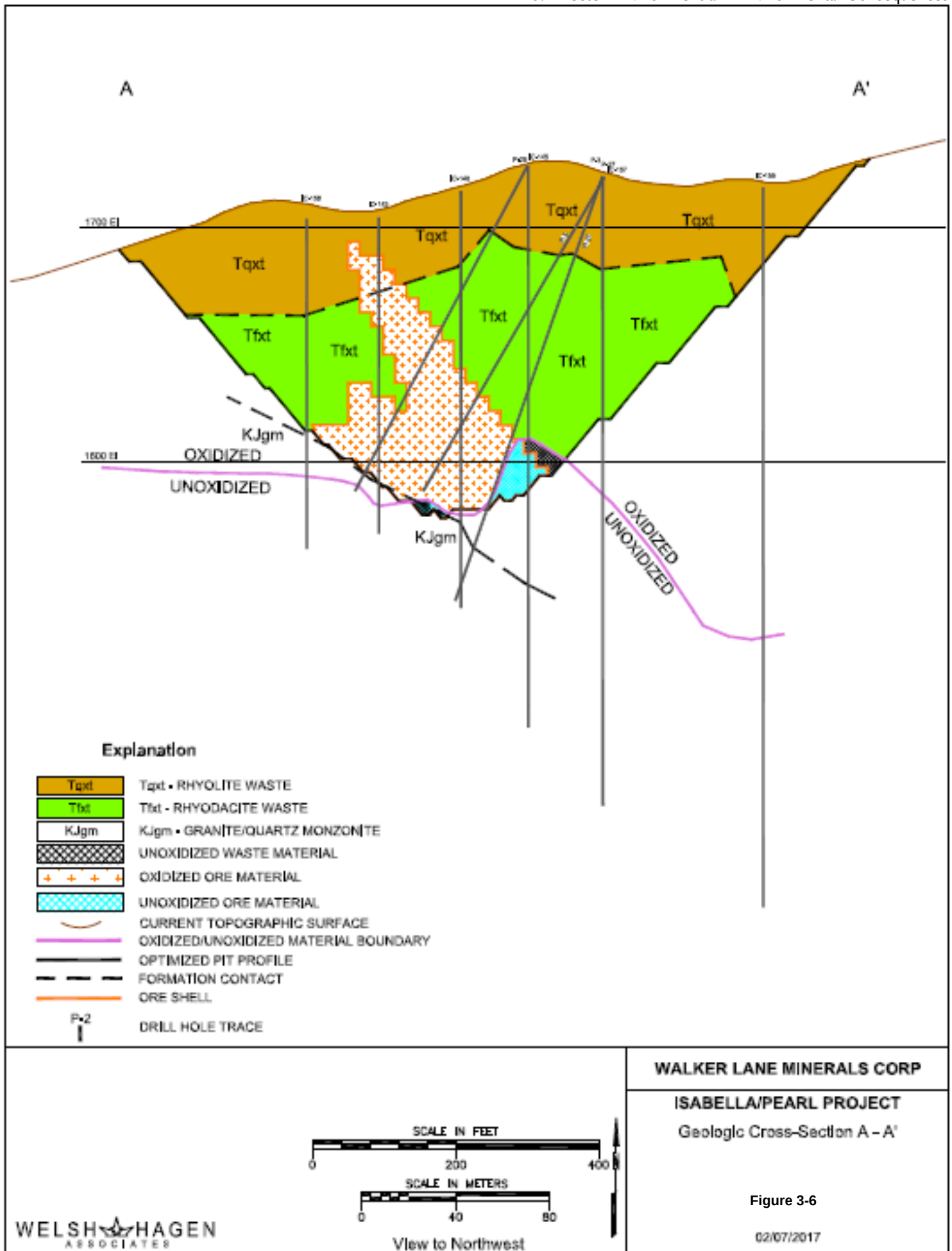
The groundwater exhibits slightly elevated levels of sulfate and arsenic, most likely as a result of these oxidized alunites forming on the conductive pathways in the rock. Unlike a sulfidic waste rock, which produces increased risk when fragmented by mining, fracturing oxide rock through mining in this volcanic geologic setting liberates feldspathic minerals that can hydrolyze to clays and adsorb solutes (**Figure 3-6**, Geologic Cross Section). Accordingly, the fragmented oxide waste rock does not likely exceed the risk to groundwater already posed by native alunite emplacement; it may even result in groundwater quality improvement. Moreover, groundwater is approximately 775 feet below the mine area and does not produce yields locally that are feasible for development.

A revegetated WRDF and an open pit with a maximum depth of approximately 600 feet from crest to toe would remain after reclamation has been completed. Consequently, the open pit would not be backfilled, except locally, as described below.

Sulfide ore zones that may be left in the floor of the Pearl sub-pit when mining ceases would have an estimated extent of at most 39,054 square feet (0.90 acres). These zones would be capped with a minimum of 20 feet of non-potentially acid-generating oxidized waste in final reclamation; therefore, no undue degradation of groundwater is anticipated.

No scientifically important paleontological resources have been identified in the geologic formations in the immediate area. Direct and indirect impacts on paleontology are unlikely.

The WRDF and mine pit walls were designed in accordance with NDEP specifications for the regional climate cycles, storm conditions, and seismic activity. The risk of seismic activity would be incorporated into engineering designs for mine facilities; accordingly, no impacts from seismic activity on the proposed project facilities are expected.



No Action

Under the no action scenario, minerals would not be removed, and the mine facilities would not be constructed.

3.5 SOILS**3.5.1 Affected Environment**

The region of influence for soils is the project area, which encompasses approximately 490 acres.

Soils in the project area are a mixture of loams, gravelly loams, cobbly loam, sodic loams, and course gravelly loams. The washes are the only sandy sites. Runoff from periodic precipitation disturbs these areas, and vegetation is limited in the sandy soils from this periodic disturbance. Between the project area and Luning, the soils lower on the skirt fan have higher sand content. The soils on the remainder of the project area are coarse with cobble and gravel, with lesser amounts of sand. Extensive areas of sandy soils are lower in elevation, near US Highway 95 (GBE 2017). Soil map units in the project area are listed in **Table 3-3**, below, and are displayed on **Figure 3-7**, Soils.

Table 3-3
Project Area Soils

Map Unit Symbol and Name	Acres
1130 Uripnes-Rock outcrop association	189
1155 Gynelle-Izo association	169
1970 Pintwater-Blacktop-Rock outcrop association	80
5101 Oricto-Izo association	52
Total	490

Source: USDA 2017a

The properties of project area soils are listed in **Table 3-4**, Project Area Soil Properties. The potential for compaction is significant for all soils.

Soils can be rated based on their susceptibility to degradation in the fragile soil index interpretation. Fragile soils are those that are most vulnerable to degradation. Over half of the proposed area contains highly fragile soils (USDA 2017b).

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Erosion factor Kw (whole soil) indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill water erosion (USDA 2017d).

**Figure 3-7
Soils**

- | | |
|--|---|
|  Project area |  Gynelle-Izo association |
|  Project components |  Pintwater-Blacktop-Rock outcrop association |
|  Uripnes-Rock outcrop association |  Oricto-Izo association |

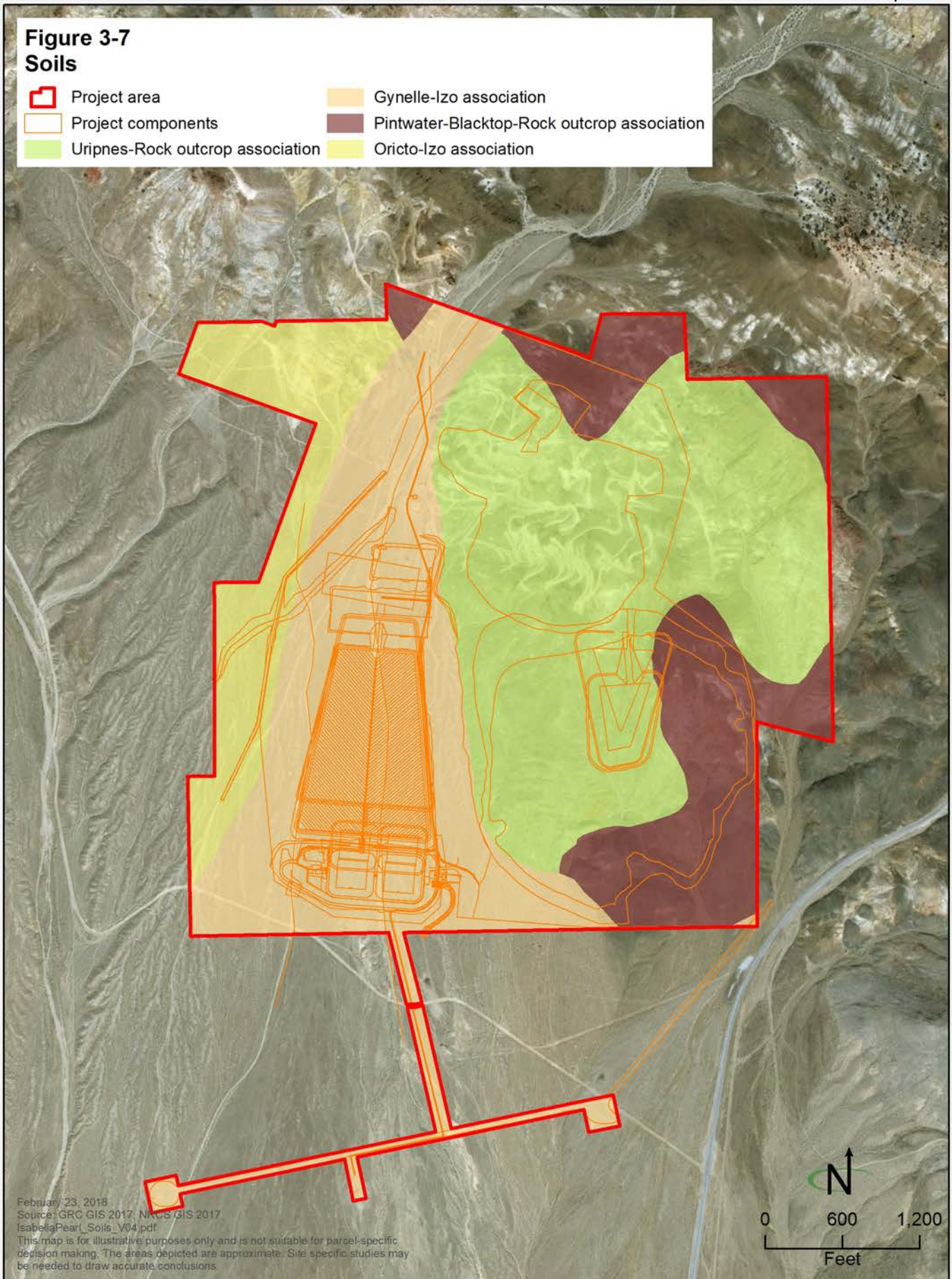


Table 3-4
Project Area Soil Properties

Property	Uripnes-Rock outcrop association	Gynelle-Izo association	Pintwater- Blacktop-Rock outcrop association	Oricto-Izo association
Fragile soil index	Highly fragile	Not rated	Highly fragile	Fragile
Soil susceptibility to compaction	Medium	Medium	Medium	Medium
K factor—whole soil	0.10	0.05	0.10	0.05
Wind erodibility group	6	3	6	6
Wind erodibility index (tons per acre per year)	48	86	48	48
Drainage class—natural	Well drained	Somewhat excessively	Well drained	Well drained
Representative slope (percent)	33	6	33	4

Sources: USDA 2017b, 2017c, 2017d, 2017e, 2017f, and 2017g

A wind erodibility group consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to Group 1 are the most susceptible to wind erosion, and those assigned to Group 8 are the least susceptible. All the soils are in the same wind erodibility group, except the Gynelle-Izo association (USDA 2017e).

The wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion. All the soils are in the same wind erodibility index, except the Gynelle-Izo association (USDA 2017f).

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration, unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized as excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the Soil Survey Manual (NRCS 2017). All the soils are in the same drainage class (natural), except the Gynelle-Izo association (USDA 2017g).

3.5.2 Environmental Consequences

Proposed Action

Total anticipated new surface disturbance for the Proposed Action, including the mine pits, is 292.9 acres, or approximately 60 percent of the project area.

During mineral development and operation, vehicles would be used to deliver supplies and materials and for mining. This vehicle traffic would compact soils and alter erosion conditions. Based on the soils present, the potential for compaction is significant for the entire proposed area. These direct impacts would persist until compacted soils are rehabilitated.

Soil erosion by surface water runoff would change as soils are compacted. Where erosion increases, topsoil would be redistributed; however, all the soils have a relatively low susceptibility to water erosion. Also, mining involving excavation would result in the relocation of topsoil. Many of these direct and indirect impacts would persist until excavated topsoil was returned to its original location.

As soils are collected, stored, and redistributed, the soil horizons would become mixed. This may change soil texture, permeability, and depth. These direct impacts would be long term, because mixed soil horizons cannot be returned to their original condition.

The Proposed Action would also generate fugitive dust from vehicle movement, mining, and wind blowing across exposed soil. Fugitive dust would redistribute exposed soil. All the soils are in the same wind erodibility group, except the Gynelle-Izo association, which has a higher susceptibility to wind erosion. This would be a long-term impact, because the loss of soil in fugitive dust cannot be reclaimed.

During development and operations, vehicles, equipment, and materials would be used, which require the use of hazardous materials. The accidental release of hazardous materials, such as fuel or oil, can contaminate soils. This impact can range from short term to long term, depending on the quantity, location, and cleanup associated with the hazardous material release and established best management practices.

Design, construction, project maintenance, and concurrent reclamation are all planned to prevent unnecessary or undue degradation of lands affected by the Proposed Action throughout its life and at closure. The goals of the reclamation plan are to reestablish productive post-mining land use and to provide for long-term public safety and site stabilization. Measures to be taken to prevent unnecessary and undue degradation from the Proposed Action are as follows (Welsh Hagen Associates 2017):

- Surface disturbance would be minimized, while optimizing the recovery of mineral resources. Grading plans are based on careful cut-and-fill balances to reduce surface disturbances to the extent practicable.
- Where suitable as a growth medium, surficial soils and alluvial material would be managed as a topsoil resource and removed, stockpiled, and replaced during reclamation.
- The reclamation plan would specify earthwork and contouring, revegetation, and stabilization.

Reclamation activities are detailed in the Plan of Operations and Reclamation Plan (Welsh Hagen Associates 2017). Reclamation would reduce, but not eliminate, impacts on soils. For example, soil blown away as fugitive dust can never be replaced. Also, an open pit with a maximum depth of approximately 600 feet from crest to toe would remain after reclamation has been completed. The open pit would not be backfilled. After successful reclamation, there would be moderate long-term impacts on soils. This is because most of the soils are fragile or highly fragile, which can limit reclamation opportunities. These impacts would largely be associated with bare soil exposed to erosion, such as at the open pit mine.

No Action

There would be no new impacts on soils, because there would be no change in the use of project area lands.

3.6 AIR QUALITY

3.6.1 Affected Environment

WLMC contracted with Robison Engineering Company, Inc., to conduct an air quality study for the project (Robison Engineering Company, Inc. 2017). The results of Robison's study, as well as current meteorological data attained from the Western Regional Climate Center, are the basis of this air quality section.

Climate

The climate is dry, with average annual precipitation of 3.66, 6.05, and 5.24 inches at the nearby Hawthorne, Mina, and Tonopah Meteorological Stations, respectively (see **Table 3-5**, below). Average annual minimum temperatures are in the high 30s and low 40s, while average annual maximum temperatures are in the high 60s and low 70s (see **Table 3-6**, Average Monthly Minimum and Maximum Temperatures, 1981–2010 (°F)). Winds are predominantly from the north and northwest (Robison Engineering Company, Inc. 2017).

Table 3-5
Average Monthly Precipitation, 1981–2010 (Inches)

Month	Hawthorne	Mina	Tonopah
January	0.30	0.51	0.49
February	0.32	0.50	0.52
March	0.32	0.60	0.57
April	0.35	0.74	0.42
May	0.52	0.84	0.53
June	0.26	0.43	0.28
July	0.34	0.51	0.45
August	0.11	0.33	0.51
September	0.20	0.28	0.38
October	0.22	0.48	0.34
November	0.53	0.40	0.44
December	0.19	0.43	0.31
Total	3.66	6.05	5.24

Source: Western Regional Climate Center 2017a, 2017b, 2017c

Table 3-6
Average Monthly Minimum and Maximum Temperatures, 1981–2010 (°F)

Month	Hawthorne		Mina		Tonopah	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
January	25.0	47.3	23.6	46.7	20.3	44.8
February	28.3	53.9	27.4	52.5	24.3	49.2
March	33.8	61.4	32.7	60.2	29.0	56.8
April	38.4	67.8	38.3	66.8	34.6	64.4
May	47.7	76.7	47.2	76.3	43.2	74.4
June	55.5	86.8	56.4	87.1	51.5	84.8
July	61.8	94.7	63.3	95.3	57.5	91.9
August	60.9	92.6	60.6	93.4	55.4	89.7
September	51.9	84.2	51.2	84.4	48.1	80.8
October	41.1	71.3	39.7	71.0	37.5	68.1
November	31.3	55.8	30.4	56.5	26.5	53.8
December	24.6	47.4	22.7	46.0	19.4	44.3
Average	41.8	70.1	41.2	69.8	37.3	67.0

Source: Western Regional Climate Center 2017a, 2017b, 2017c

Classification of Air Basin

The US Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants: particulate matter less than 10 microns in diameter (PM₁₀), particulate matter less than 2.5 microns in diameter (PM_{2.5}), sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, and lead (EPA 2017). Based on measured ambient criteria air pollutant concentrations, the EPA classifies areas of the US according to whether they meet the NAAQS.

The proposed project is in Mineral County, in Hydrographic Area 121A, East Part of Soda Springs Valley of the Central Region. Hydrographic Area 121A is designated attainment or unclassifiable for all of the NAAQS. Because of this, a formal Clean Air Act conformity determination is not required.

Air Quality Modeling Analysis

Air dispersion modeling was performed in support of a Class II operating permit for the proposed crushing and screening equipment and to determine whether the proposed project operations would exceed any of the NAAQS outside of the project site boundaries. Details of the air dispersion modeling method are contained in the Air Dispersion Modeling Environmental Evaluation Report (Robison Engineering Company, Inc. 2017).

Emissions of PM₁₀, PM_{2.5}, carbon monoxide, sulfur dioxide, and nitrogen oxides were modeled and compared against their respective NAAQS.

The Nevada Bureau of Air Pollution Control does not operate any ambient monitoring sites near the proposed project site. In accordance with the Bureau of Air Pollution Control guidelines, background concentrations of particulates were taken from Lehman Caves in Great Basin National Monument to represent expected concentrations seen in rural areas of Nevada. These concentrations were 7.0 micrograms per cubic meters (µg/m³) for the PM_{2.5} 24-hour averaging period, 2.4 µg/m³ for the PM_{2.5} annual averaging period, and 10.2 µg/m³ for the PM₁₀ 24-hour averaging period (Robison Engineering Company, Inc. 2017). These background concentrations of particulates were added to the modeled particulate emissions to determine the cumulative impact of the proposed project on air quality.

3.6.2 Environmental Consequences

Proposed Action

Air pollutant emissions from the Proposed Action would be localized and short term, lasting for the 3-year operational life of the project. A lesser amount of pollutant emissions would occur during reclamation of the project site. The primary sources of emissions would be particulate emissions from crushing and screening operations and criteria pollutant emissions, greenhouse gas emissions, and small amounts of hazardous pollutant emissions from diesel generators used to supply power to the project site.

Lessor sources of emissions would be fugitive dust from travel on unpaved surfaces and roadways and exhaust-related emissions from worker vehicles, on-road trucks, and construction equipment. As described in the plan of operations, measures would be taken to prevent unnecessary and undue degradation, as required by the BLM under its surface management regulations (43 CFR, Part 3809) and NDEP air quality regulations. Specifically, fugitive dust from disturbed and exposed surfaces would be controlled.

As described in the subsection above, air dispersion modeling was performed to determine if the project would have the potential to expose the public to air pollutant concentrations above the NAAQS. The results of the air dispersion modeling are shown in **Table 3-7**, Maximum Modeled Concentrations of Criteria Pollutants. As shown in this table, maximum modeled pollutant concentrations were below the NAAQS for all pollutants. The point of maximum concentration for each pollutant was generally south of the southwest corner of the project site boundary (Robison Engineering Company, Inc. 2017).

In addition to the air dispersion modeling, the likely ozone impacts were assessed, using the Scheffe Ozone Screening Analysis. Based on this analysis, the estimated impacts on ozone from the project would be 1.6 percent of the NAAQS for ozone (Robison Engineering Company, Inc. 2017). As such, the project would not affect ozone levels in the project area.

The Proposed Action would not have a significant impact on air quality. Project operations would not exceed the NAAQS, and emissions would be in compliance with the Federal New Source Performance Standards for the metallic mineral processing industry.

Table 3-7
Maximum Modeled Concentrations of Criteria Pollutants

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)	Percent of NAAQS
Carbon Monoxide	1-hour	77.97	—	77.97	40,000	0.19
	8-hour	73.27	—	73.27	10,000	0.73
Nitrogen Oxides	1-hour	174.83	—	174.83	188	92.99
	Annual	14.91	—	14.91	100	14.91
Sulfur Dioxide	1-hour	78.3	—	78.3	196	39.95
	3-hour	76.4	—	76.4	1,300	5.88
	24-hour	38.5	—	38.5	365	10.55
	Annual	5.93	—	5.93	80	7.41
PM ₁₀	24-hour	53.1	10.2	63.30	150	42.2
PM _{2.5}	24-hour	4.568	7.0	11.57	35	33.05
	Annual	1.038	2.4	3.44	12	28.65

Source: Robison Engineering Company, Inc. 2017

No Action

The No Action Alternative would have no impact on air quality, as there would be no change in the use of project area lands.

3.7 WATER RESOURCES

3.7.1 Affected Environment

The project area is in the Eastern Part Soda Spring Valley Hydrographic Basin (No. 121A) within the Central Hydrographic Region. Hydrographic Basin 121A is classified as “Designated-Irrigation Denied” under the provisions of Nevada State Engineers Order Number 824, dated September 9, 1983. Under this order, the state engineer declared irrigation in the Eastern Part Soda Spring Valley Hydrographic Basin to be a non-preferred use, due to limited groundwater. The project area is included in the land area designated as groundwater basins, coming under the provisions of Chapter 534 Nevada Revised Statute (Conservation and Distribution of Underground Waters).

Hydrographic Basin 121A (**Figure 3-8**, Hydrographic Basins) is typical of arid drainage basins in central Nevada, where precipitation is generally insufficient to support perennial stream flow. The general area is drained by numerous ephemeral drainages originating in the mountains of the Gabbs Valley Range. These are typically dry, but they carry some runoff onto alluvial fans and into playas during summer thunderstorms. The ephemeral drainages in the project area do not exhibit vegetation that differs from adjacent upland and alluvial vegetation.

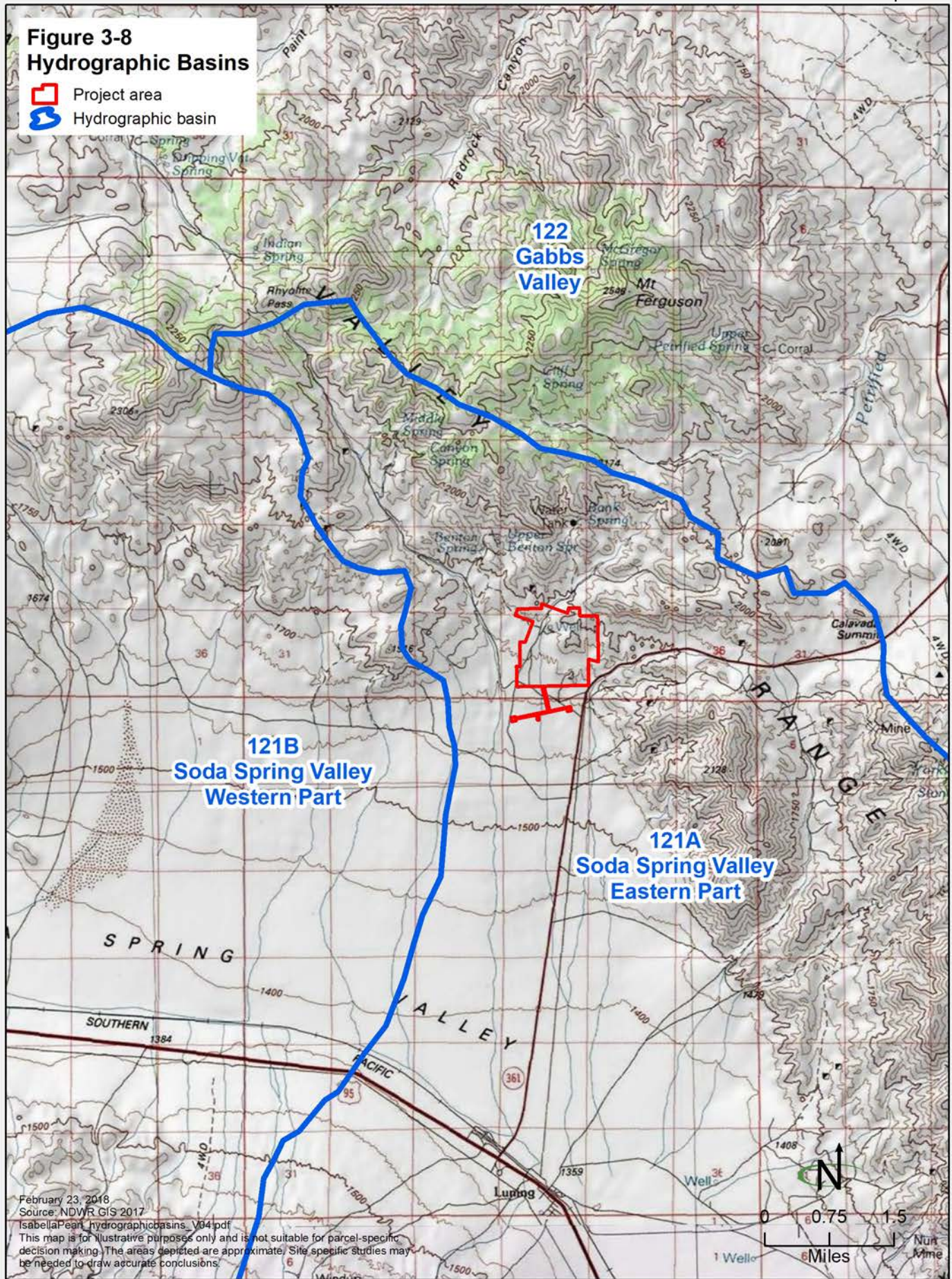
The climatic conditions are generally dry and are discussed in more detail in **Section 3.6**, Air Quality.

Groundwater

A hydrogeological study was conducted by Aqua Hydrogeologic Consulting, LLC (Aqua) in September 2012 to determine regional hydrogeologic conditions underlying the area. In December 2016, an Updated Groundwater Model Report was completed, and it was revised in October 2017. Groundwater movement in the project area and surrounding area appears to be controlled by the Walker Lane fault system. The faults within this system are primarily northwest-southeast trending. The overall groundwater gradient is toward the south and southwest, roughly perpendicular to major fault structures.

The main range-front fault (Benton Spring fault, shown on **Figure 3-2**, Quaternary Faults) appears to act as a barrier to nearly all of the groundwater movement. As discussed previously, the Nevada Bureau of Mines and Geology has identified the Benton Spring fault to be composed of a broad zone of en echelon⁸ shearing, as opposed to a single fault. Water movement within and northeast of the Benton Spring Fault Zone occurs in tuffs and underlying granitic rocks, predominantly through fractures associated with faulting. South of the proposed mine area across the Benton Spring Fault Zone and toward Soda

⁸ in approximately parallel formation at an oblique angle to a particular direction.



Spring valley, the groundwater table flattens and is dominated by flow through more permeable alluvial deposits.

There are three principle geologic zones in the groundwater system. The northern-most geologic zone is composed of consolidated bedrock material northeast of the Benton Spring Fault Zone. Flow within the consolidated bedrock is believed to be fracture dominated. The estimated hydraulic conductivity of the consolidated bedrock is 0.03 feet per day, based on the pump test conducted on IPMW-2 in 2010.

The second geologic zone comprises less permeable geologic material within the Benton Spring Fault Zone in the immediate area of the proposed pits. There has been no pumping test conducted on this geologic material. Airlift results during the drilling and construction of PW-12-33 indicated minimal flow, with mist being discharged from the monitoring well after a couple of minutes of airlifting.

The third geologic zone/aquifer, southwest of the Benton Spring Fault Zone, is most likely controlled by the porous alluvial materials encountered in the Isabella Pearl production well. The estimated hydraulic conductivity of the alluvial aquifer is 0.13 feet per day, based on pump testing on the Isabella Pearl production well (2016).

The groundwater model was supported by an empirical pumping test program and analysis on the Isabella Pearl Production Well conducted in 2016. A transient analysis was conducted based on actual predicted monthly water requirements for mine operations, ranging from 22 gallons per minute (gpm) to 176 gpm. Modeling predicts up to 200 feet of drawdown would occur in the alluvial aquifer near the production well after 5 years of pumping. Complete recovery of the alluvial aquifer is predicted within the first year after pumping ceases.

The modeled cone of depression associated with production well pumping did not intercept other groundwater wells; therefore, production well pumping is not anticipated to compete with current groundwater uses by others in the vicinity of proposed operations. Also, because first groundwater was encountered at 845 feet below the surface in the alluvial aquifer, the cone of depression caused by production well pumping is not predicted to affect surface water springs and seeps in the area.

As noted in **Section 2.1.1**, the Nevada State Engineer's Office issued permits for groundwater withdrawals up to 484 acre-feet annually (300 gpm, withdrawn round the clock). This exceeds the anticipated demand for water under the current plan of operations and also exceeds the capacity of the existing well system. Step pumping tests performed on the recently constructed production well demonstrated that the sustained capacity of the well is approximately 90 to 100 gpm (Aqua 2016). Installation of two nearby contingent wells in similar

materials and producing similar yields would likely increase capacity to 270 to 300 gpm.

To the extent groundwater production exceeds rates applied in the groundwater model, drawdowns would be deeper, and the recovery time of the aquifer would be increased approximately linearly. The drawdown cone of depression would also increase laterally. Nevertheless, because there are no other production wells completed in the alluvial aquifer within several miles of the proposed production well, no other groundwater users are likely to be affected.

WLMC has committed to continue monitoring groundwater levels and quality throughout the mining and closure phases of operation to ensure other groundwater users are not affected.

Two monitoring well drilling programs conducted by IPLLC in the area of the project area have resulted in five active monitoring wells. Two monitoring wells were drilled in May 2009 by Leach Drilling, and three monitoring wells were drilled by National Drilling in 2012. All monitoring wells were installed in a manner that complies with Nevada Department of Environmental Protection requirements. The locations of THE monitoring wells are shown on **Figure 2-1**, Site Development Plan.

Monitoring wells PW-12-33 and 1973 Well would be abandoned and destroyed during mine development. Two additional monitoring wells, PIPMW-3 and PIPMW-4, would be installed at the locations shown on **Figure 2-1** during project construction.

Monitoring Well IPMW-1 penetrates to a depth of 800 feet bgs and is downgradient of the proposed processing facilities. The depth to groundwater in IPMW-1 was approximately 775 feet at installation, in 2009; however, it was dry when observed in 2012 and has remained dry as of February 2018. The entirety of the well penetrates through alluvial gravel, sand, silt, and clay interbeds; the bedrock horizon was not penetrated.

Three historical downgradient water wells south of the project area (**Figure 2-1**) had depths to groundwater of more than 800 feet bgs. These wells, numbers 85225, 85226, and 85227, were drilled in 1990 to provide production water for the nearby Santa Fe Mine by Homestake Mining Company of California. Homestake retains water rights certificates for the wells, which are classified as mining and milling use wells; however, the wells were abandoned and plugged in 2001. The historical well depths and depths to groundwater are shown on **Table 3-8**.

Bedrock Groundwater Depths Avoid Pit Lake Development

Aqua (2012) conducted a monitoring well drilling program to determine depths to groundwater in the vicinity of the proposed mine pit. Three wells were

Table 3-8
Alluvial Groundwater and Total Well Depths

Log Number	Water Depth (Feet)	Total Well Depth (Feet)
85225	865	1,301
85226	865	1,393
85227	845	1,117

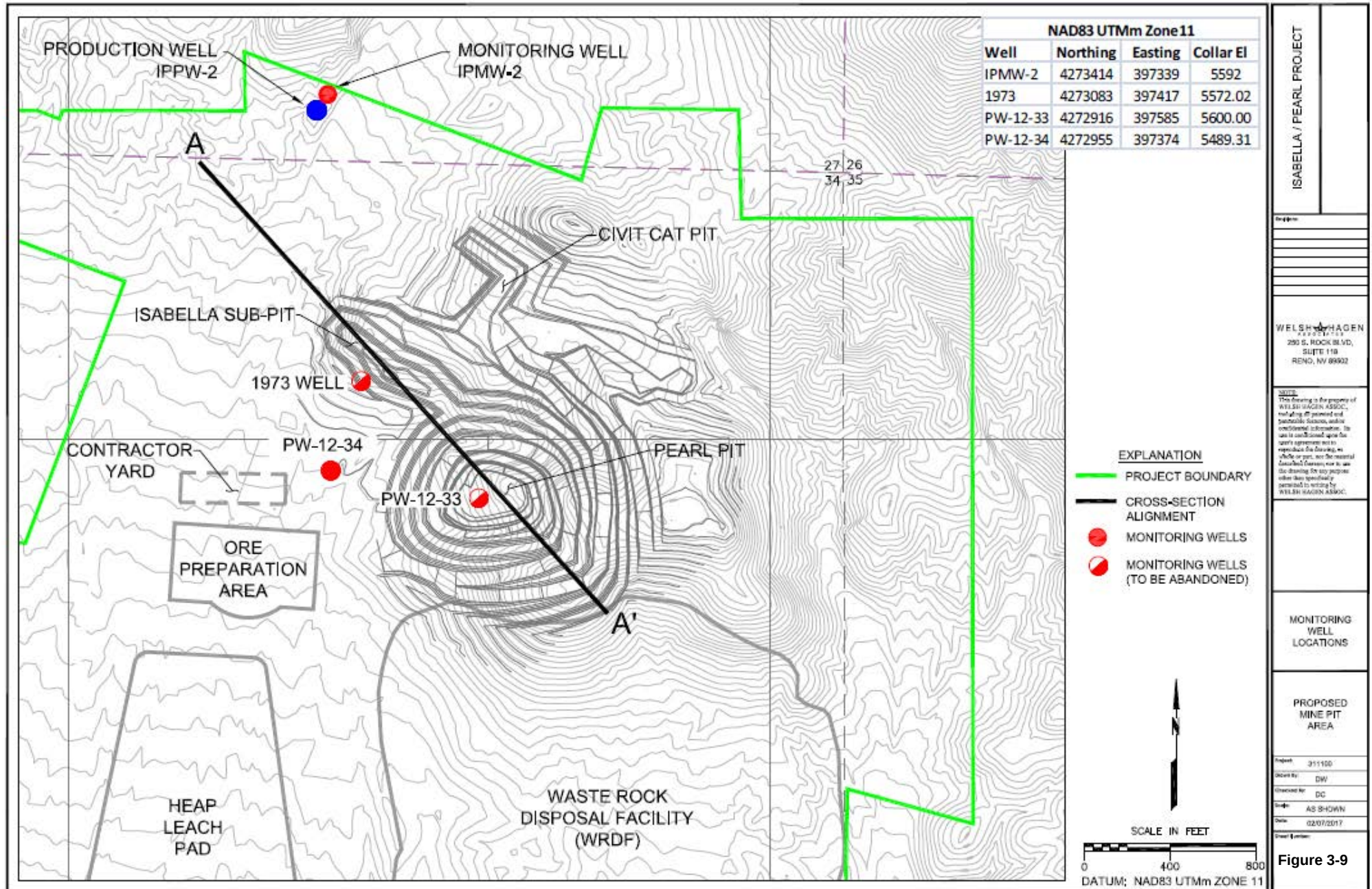
drilled to the depth of 5,064 feet above mean sea level (amsl), 100 feet below the lowest portion of the proposed mine pit bottom. These are the 1973 Well, PZ-12-33, and PZ-12-34 (**Figure 3-9**, Existing Monitoring Wells and Depths to Groundwater). The monitoring program consisted of monthly water level readings and quarterly water chemistry analyses to characterize groundwater levels and flow patterns and to acquire baseline groundwater chemistry data.

The groundwater gradient across the project area is generally toward the south-southwest, roughly perpendicular to major fault structures, and out into Soda Spring Valley. Hydrologic compartmentalization related to faulting in the project area is evidenced by variable depths to groundwater measured across fault structures. The depth to groundwater varies from an elevation of 5,512 feet, approximately 1,000 feet northwest of the proposed mine pit at IPMW-2, to 5,134 feet in the center of the proposed pit at PW-12-33 (**Figure 3-9**, Existing Monitoring Wells and Depths to Groundwater).

A water level cross section diagram (**Figure 3-10**) has been developed using four locations where water was encountered. On the cross-section diagram, water levels measured at PW-12-33, PW-12-34, and 1973 Well from April through September 2012 are listed. As the groundwater moves southward toward the alluvial basin (Soda Spring Valley), the depth to water from the ground surface increases significantly, to approximately 1,000 feet (4,300 feet elevation).

Based on the monitoring well water level readings, groundwater would not be encountered at the maximum depth of the proposed mine pit (5,164 feet amsl). The static groundwater level at monitoring well PW-12-33, which penetrates the deepest portion of the proposed Pearl Pit, has been measured monthly from April through September 2012. After initial static water level stabilization in April, groundwater depths measured in May through September ranged from 5,132.91 feet amsl to 5,136.04 feet amsl. Based on the groundwater level measurements, the deepest portion of the proposed mine pit would be 31.09 feet to 27.96 feet above the groundwater table; therefore, a pit lake would not develop during mining operations or after final mine closure.

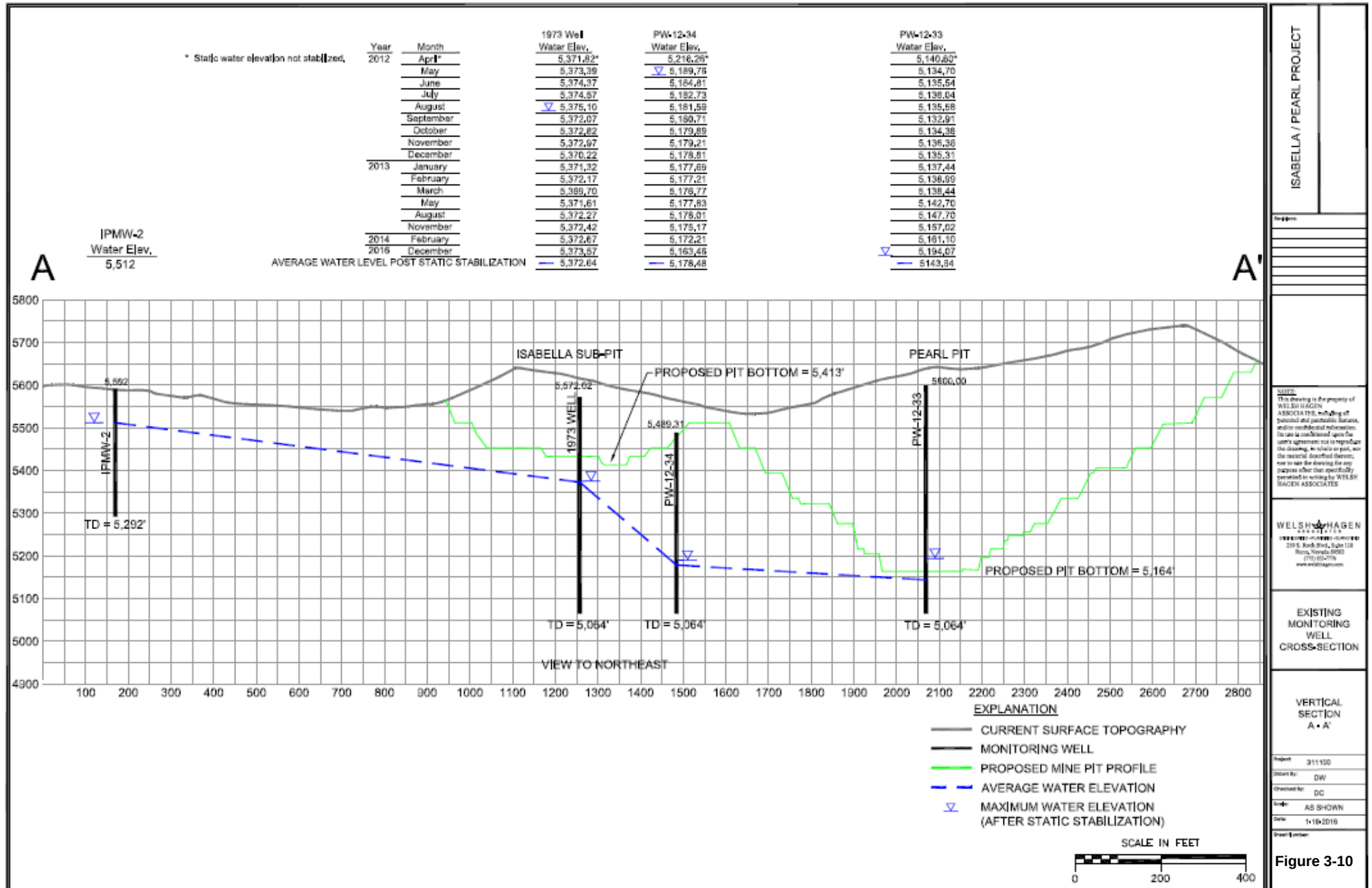
The 1973 Well, located in the central portion of the Isabella sub-pit, was redrilled and extended to a depth of 5,064 feet amsl. The maximum elevation of



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groundwater after initial water level stabilization was measured in August 2012 at 5,375.10 feet amsl. At this location, the proposed Isabella sub-pit bottom would be 5,413 feet amsl, 37.9 feet above the maximum measured groundwater elevation. The water level measurements taken from the 1973 Well show that the groundwater table would not be penetrated in the Isabella sub-pit; therefore, no pit lake would develop during or after mining operations.

Well PW-12-34 is collared approximately 300 feet westerly of the westernmost crest of the proposed mine pit. The maximum water level after initial static water level stabilization was measured in May 2012 at approximately 5,189 feet amsl. While the water level reading is above the minimum elevation of the proposed mine pit bottom, this monitoring site is outside the pit footprint. For this reason, it is afforded less weight than in-pit wells for predicting the likelihood of a pit lake forming. Additionally, the mine site is in a very arid environment at the edge of a hydrologic basin, where there is insufficient surface water recharge available to sustain a pit lake.

Groundwater Quality

Groundwater chemistry data were obtained from current monitoring wells, beginning in 2012 and continuing through 2014 (NDEP Profile Reporting Form, Permit Number: NEV2009102. 2008 to 2014 reporting). Average results are set forth in **Table 3-9**, below, along with NDEP Profile II reference values. Results indicate groundwater is naturally elevated in several constituents, likely due to proximity of the mineralized area.

Table 3-9
Groundwater Chemistry (Averages from 2012 to 2014)

Parameter	IPMW-2 Result	PW-12-33 Result	PW-12-34 Result	1973 Well Result	NDEP Profile II Reference Value (mg/L)*
Alkalinity, total	62	235	136	218	-
Alkalinity/bicarbonate	62	173	136	218	-
alkalinity/carbonate	<2	62	<2	<2	-
Alkalinity/hydroxide	<2	<2	<2	<2	-
Aluminum-ICP-OES	<0.05	2.15**	0.18	0.3**	0.2
Antimony-ICP-MS	<0.002	0.019**	<0.002	0.01**	0.006
Arsenic-ICP-MS	0.016**	0.057**	0.525**	0.006	0.010
Barium-ICP-MS	0.019	0.029	0.075	0.034	2.0
Beryllium-ICP-MS	<0.002	<0.004	<0.002	<0.004	0.004
Bismuth	<0.1	<0.2	<0.1	<0.2	-
Boron (Sept. 2012)	0.49	2.1	0.30	1.1	-
Cadmium-ICP-MS	<0.002	<0.004	<0.002	<0.004	0.005
Calcium-ICP-OES	260	36	176	29	-
Chloride-ion chromatography	44	82	39	65	400
Chromium-ICP-MS	<0.002	0.010	<0.002	<0.004	0.1

Table 3-9
Groundwater Chemistry (Averages from 2012 to 2014)

Parameter	IPMW-2 Result	PW-12-33 Result	PW-12-34 Result	1973 Well Result	NDEP Profile II Reference Value (mg/L)*
Cobalt	0.009	<0.004	<0.002	<0.004	-
Copper-ICP-MS	<0.002	0.006	0.002	<0.004	1.0
Cyanide	<0.005	<0.005	<0.005	<0.005	0.2
Fluoride-ion chromatography	0.5	5.1**	0.9	2.6	4.0
Gallium (Sept. 2012)	<0.1	<0.2	<0.1	<0.2	-
Iron-ICP-OES	33**	1.5**	7.3**	1.8**	0.6
Kjeldahl nitrogen	<0.1	26	0.4	0.3	-
Lead-ICP-MS	<0.002	0.030**	0.011	0.018**	0.015
Lithium (9/2012)	<0.1	0.44	<0.1	0.3	-
Magnesium-ICP-OES	24	2	18	4	150
Manganese-ICP-MS	5.8**	0.05	0.74**	0.47**	0.10
Mercury-AA‡ cold vapor	<0.0002	<0.0002	<0.0002	<0.0002	0.002
Molybdenum (Sept. 2012)	0.002	0.048	0.006	0.026	-
Nickel-ICP-MS	0.011	<0.007	0.01	0.006	0.1
Nitrate-N-ion Chromatography (Sept. 2012)	<0.05	<0.05	0.08	<0.05	10
Nitrite-N-ion chromatography (Sept. 2012)	<0.05	<0.05	<0.05	<0.05	-
NO3+NO2 (Sept. 2012)	<0.1	<0.1	<0.13	<0.1	-
pH	6.79	8.86**	7.42	8.01	6.5-8.5
pH-temperature (°C) (Sept. 2012)	19.0	18.4	18.5	18.3	-
Phosphorus (Sept. 2012)	0.20	0.22	0.09	0.07	-
Potassium-ICP-OES	25	11	13	6	-
Scandium	<0.05	<0.1	<0.05	<0.1	-
Selenium-ICP-MS	<0.01	<0.02	<0.01	<0.02	0.05
Silver-ICP-MS	<0.002	<0.004	<0.002	<0.004	0.1
Sodium-ICP-OES	123	492	110	470	-
Strontium (Sept. 2012)	1.9	0.5	1.5	0.5	-
Sulfate-ion chromatography	900**	775**	520**	740**	500
Thallium-ICP-MS	<0.001	<0.002	<0.001	<0.002	0.002
Tin (Sept. 2012)	<0.1	<0.2	<0.1	<0.2	-
Titanium (Sept. 2012)	<0.05	<0.1	<0.05	<0.1	-
Total dissolved solids	1578**	1775*	998	1500**	1000
Total nitrogen as N	<0.2	24**	<0.6	<0.4	10
Vanadium (Sept. 2012)	<0.002	0.014	<0.002	<0.004	-
Zinc-ICP-MS	1.0	0.06	0.02	0.04	5.0

Source: Welsh Hagen 2017

*milligrams per liter

**Value exceeds NDEP Profile II reference value

‡atomic absorption

Under NAC 445A, the NDEP Profile I and II reference values have been established as water quality standards for groundwater at mining operations in Nevada. Four monitoring wells in the project area that penetrate bedrock groundwater sources, IPMW-2, P-12-33, P-12-34, and 1973 Well, have been sampled and analyzed for NDEP Profile II constituents. All analyses were performed by an NDEP-certified laboratory.

Monitoring well IPMW-1 is downgradient of the proposed processing facilities and is collared in alluvial sediments extending to depths greater than 800 feet. Testing determined the static water level to be 775 feet bgs. Analysis of the groundwater encountered by the well in 2009 indicated the influence of sediments acidified by preservative in the water sample. The well has been measured periodically and found to be dry, but it would be resampled if sufficient groundwater is identified in the future.

Baseline water quality analysis results indicate groundwater from monitoring well IPMW-2, approximately 1,000 feet north of the proposed mine pit, exceed the NDEP Profile II reference value in arsenic, iron, manganese, sulfate, and total dissolved solids. Analysis of PW-12-33 water from the central portion of the proposed Pearl Pit returned elevated levels of aluminum, antimony, arsenic, fluoride, iron, lead, sulfate, total dissolved solids, and total nitrogen. The pH value for the sample from PW-12-33 was measured to be slightly alkaline and outside NDEP water quality standards (Welsh Hagen 2017).

Analysis of PW-12-34 water returned elevated levels of arsenic, iron, manganese, and total dissolved solids. Results from 1973 Well, which is near the central portion of the proposed Isabella sub-pit, returned elevated levels of aluminum, antimony, lead, manganese, sulfate, and total dissolved solids.

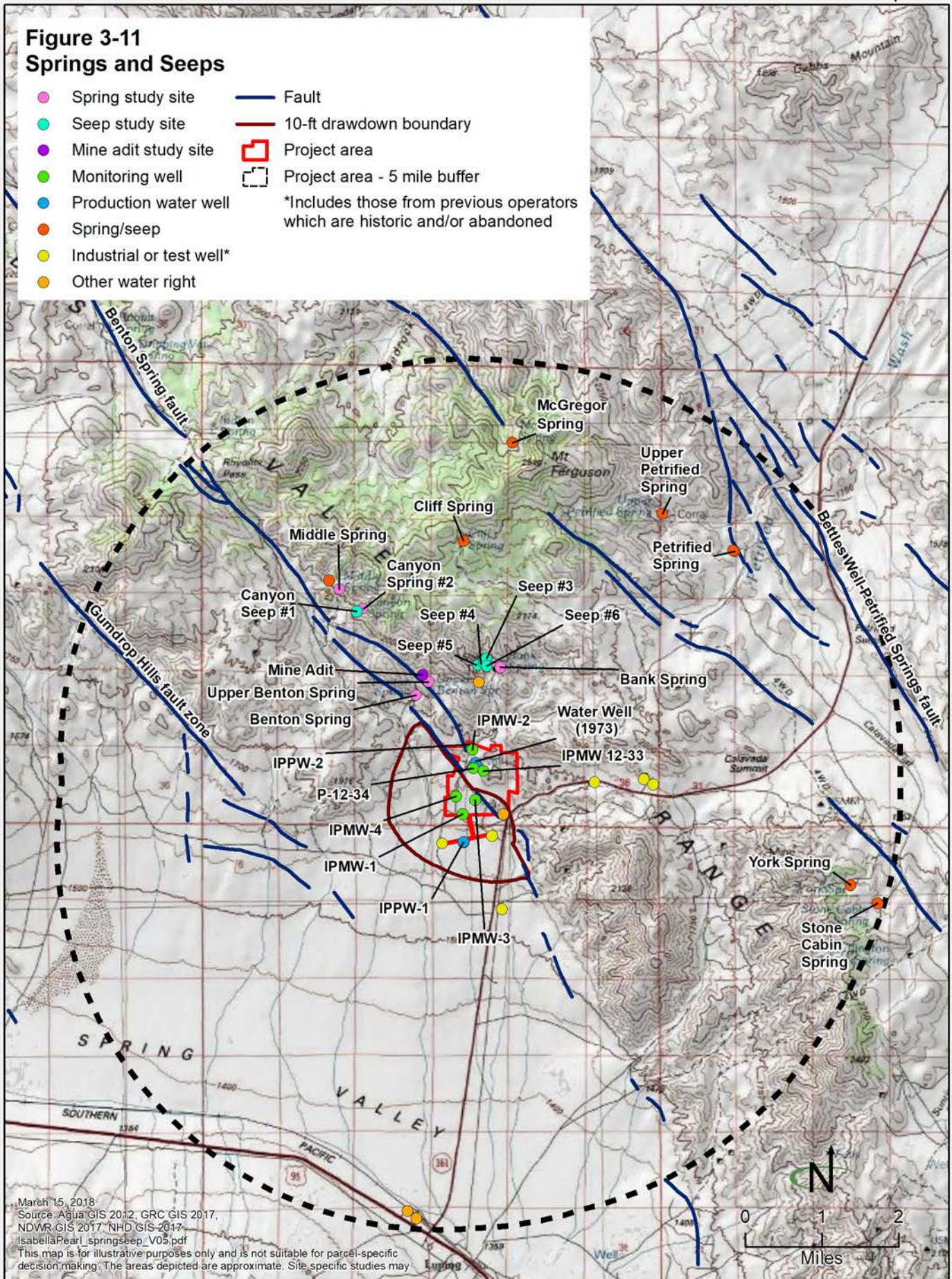
Surface Water

Surface Water Quantity

No surface water bodies, springs, or seeps are within a 1-mile radius of the proposed mine facilities; however, several seeps and springs are within a 5-mile radius, generally to the north and at higher elevations. Spring and seep locations are displayed in **Figure 3-11**, Springs and Seeps. The potential for groundwater withdrawals from mine production wells to affect the springs is brought forward for analysis.

Understanding the geological context for seeps and springs in the area is critical to analyzing the potential for groundwater withdrawals to affect their discharge volume. All seeps and springs in the area emanate from volcanic tuff (pumice and heat-welded ash grains). These tuffs are compartmentalized by extensive faulting, producing different elevations and tilting for the base of the tuff units in each compartment (USGS 1985).

**Figure 3-11
Springs and Seeps**



Most of the springs occur in or near the margins of the Guild Mine Member of the Mickey Pass Tuff (Tbmg on Figure 3 of the plan of operations and **Figures 3-3** and **3-4**). This volcanic unit is characterized by relatively porous conditions and pumice in the upper portion that can support infiltration and some storage of water; however, the base of the unit exhibits more flattened pumice (USGS 1985) and contains mineral constituents that have a greater tendency, when weathered, to create swelling clays that resist water movement. When infiltration from the more permeable upper part of the unit exceeds the infiltration capacity of the less permeable lower part, water can pool on the less permeable surfaces and move laterally. Pooled water can exit one compartment and cascade into a lower, adjacent compartment, or it can exit to the surface as seeps and springs.

All of the seeps and springs identified within a 5-mile radius of the project area are hundreds of feet higher in elevation than groundwater elevations recorded in WLMC's proposed production wells. The closest and uppermost production well is IPPW-2 (**Figure 3-11**, Springs and Seeps), which is in a tuff compartment below the alluvial wash. This drains a 2,218-acre watershed above (Figure 10A in the plan of operations). Accordingly, the source of water for that well is overflow from upgradient tuff compartments and infiltration from the alluvium above, when it is discharging runoff from the watershed.

IPPW-2 is 420 feet deep in fractured tuff and can produce only the water it receives from infiltration and upgradient sources. A pump test on the well indicated that it is in low permeable material, capable of providing only a modest supplement to water production from alluvium in the valley below the mine.

The springs and seeps themselves provide evidence for the compartmentalized hydrogeology of the mountainous region above the mine. Without low permeability boundaries to support the springs, they would not exist; rather, infiltration would simply descend to a common regional water table. Compartmentalization is additionally supported by highly disparate water levels in the monitoring well network at the mine site; thus, the conclusion is that production from downgradient wells in the alluvium and in IPPW-2 would not be reasonably expected to influence high elevation springs and seeps near the proposed mine.

An interim monitoring program was implemented for seeps and springs that are approximately 1.5 miles north of the project area (Welsh Hagen 2017; **Figure 3-11**, Springs and Seeps). Most of the springs do not flow regularly. Monitoring was conducted on a quarterly basis and included Benton Spring, Upper Benton Spring, and Bank spring. Monitoring parameters include discharge and Nevada Profile II chemistry if the springs are flowing. Monitoring of these springs is recommended and, if mining is approved, the NDEP would determine a final monitoring plan.

Surface Water Quality

No surface water bodies, springs, or seeps are within a 1-mile radius of the proposed mine facilities. Benton Spring, Upper Benton Spring, and Bank Spring, the closest ephemeral springs, are upgradient and approximately 1.5 miles north of the central project area and over 1 mile from the outer reaches of the proposed mine pit and processing facilities.

Aqua made a baseline hydrological study in February 2011. Its purpose was to acquire quarterly spring water chemistry data and flow rates for nine upgradient springs and one historic mine adit water source within a 3-mile radius of the project area. Of the 10 sampling sites, water samples were taken from Upper Benton Spring and the mine adit; all other sites were dry throughout the 18-month duration of the sampling program. The surface water study sites are shown on **Figure 3-11**, Springs and Seeps.

The results of the study are detailed in Aqua's report, titled Isabella Pearl Monitoring Program, dated August 2012, which is on file at the BLM Stillwater Field Office. Upper Benton Spring water quality analyses (Appendix 2 of the Plan of Operations) returned elevated levels of arsenic, iron, manganese, sulfate, and total dissolved solids relative to NDEP Profile II reference values. The flow rate at the spring was estimated to be approximately 250 milliliters per minute.

The mine adit water quality analyses (Appendix 2 from the Plan of Operations) returned elevated levels of manganese, sulfate, and total dissolved solids. During the surface water study, no flow was perceived exiting the mine adit; however, there was evidence of minimal amounts of water seeping from the ground surface next to the adit.

Water Rights

There are 23 water rights within a 5-mile buffer of the project area, as shown in **Table 3-10**. These underground, spring, and other surface water rights are primarily for mining and stock use near the project area.

Table 3-10
Water Rights within 5 Miles of the Project Area

Application Number	Application Status	Source	Type of Use	Owner of Record
10562	Certified	Underground	Mining	Basic, Inc.
11114	Certified	Underground	Other	Basic, Inc.
48163	Certified	Underground	Mining	Gateway Gold (USA) Corp.
53187	Certified	Underground	Mining	Gateway Gold (USA) Corp.
	Expired	Underground		
	Certified	Underground		
55001	Certified	Underground	Mining	Gateway Gold (USA) Corp.

Table 3-10
Water Rights within 5 Miles of the Project Area

Application Number	Application Status	Source	Type of Use	Owner of Record
83484	Permitted	Underground	Mining	Walker Lane Minerals Corp.
83485	Permitted	Underground	Mining	Walker Lane Minerals Corp.
V06208	Vested	Other Surface Waters	Stock	Holmgren, David G.
48660	Certified	Underground	Mining	Gateway Gold (USA) Corp.
48663	Certified	Underground	Mining	Gateway Gold (USA) Corp.
	Withdrawn	Underground		
79096	Permitted	Underground	Mining	Walker Lane Minerals Corp.
	Withdrawn	Underground		
82498	Vested	Spring	Mining	Walker Lane Minerals Corp.
	Vested	Spring		
V09857	Vested	Spring	Stock	Holmgren, David G. and Jackie A.
V09858	Vested	Spring	Stock	Holmgren, David G. and Jackie A.
V09859	Vested	Spring	Stock	Holmgren, David G. and Jackie A.
V09860	Vested	Spring	Stock	Holmgren, David G. and Jackie A.
V09861	Vested	Spring	Stock	Holmgren, David G. and Jackie A.
V09862	Vested	Spring	Stock	Holmgren, David G. and Jackie A.

Source: Nevada Division of Water Resources 2018

3.7.2 Rock and Soil Geochemistry

This section is a discussion of the results of analyzing representative samples of in situ soils, bedrock, overburden, waste, and ore. The goal was to determine the potential of these materials to release pollutants. JBR Environmental Consultants, Inc. (JBR) of Sandy, Utah, prepared an investigation report that includes an assessment of acid-generating potential (AGP), acid-neutralizing potential (ANP), and constituent leachability for waste rock and heap-leach ore. JBR's Isabella-Pearl Project Summary and Interpretation of Waste Rock Characterization Studies is included in the Plan of Operations, Appendix II.B-JBR Waste Rock Characterization (Welsh Hagen 2017).

Representative rock samples were obtained from oxidized, unoxidized, and mixed material from available drill core. The samples were delivered to the

laboratories shown on **Table 3-11** for static, kinetic, and mineralogical testing. Sierra Environmental Monitoring (SEM) of Reno, performed acid-base accounting (ABA) analyses on 10 samples of waste rock, ore, and bedrock materials. SEM also performed meteoric water mobility procedures (MWMP) on 7 samples representative of waste rock and ore.

SVL Analytical, Inc. (SVL) of Kellogg, Idaho, performed ABA analyses on 19 samples representative of waste rock, ore, and bedrock materials. McClelland Laboratories, Inc. of Sparks performed humidity cell analyses on 12 drill core samples. Western Environmental Testing Laboratory of Sparks performed all humidity cell eluate analyses on 12 samples, using NDEP Profile I constituent parameters. The Mineral Lab of Golden, Colorado, performed x-ray diffraction analyses on 9 samples representative of waste rock and ore. The analysis reports and sample descriptions for all ABA, MWMP, humidity cell, and x-ray diffraction testing materials are included in JBR 2012.

Table 3-11
Static, Kinetic, and Mineralogical Testing Laboratories

Laboratory	Acid-Base Accounting	Meteoric Water Mobility	Humidity Cell	Humidity Cell Profile I	X-Ray Diffraction
Sierra Environmental Monitoring	10	7	N/A	N/A	N/A
SVL	19	N/A	N/A	N/A	N/A
McClelland Laboratories, Inc.	N/A	N/A	12	N/A	N/A
Western Environmental Testing Laboratory	N/A	N/A	N/A	12	N/A
The Mineral Lab	N/A	N/A	N/A	N/A	9
Total	29	7	12	12	9

Source: Welsh Hagen 2017

N/A = not available

Samples Considered in the Characterization Study

A description of the various sampling campaigns and descriptions of samples considered in the waste characterization study are included in JBR 2012. That report also includes analyses performed on samples, in addition to a summary of sample characteristics and classifications.

Core holes were selected for analysis from the following three areas:

- Along a northwest-southeast transect across the projected Isabella Pit; intervals within these holes were selected to represent all major waste rock units and ore-grade mineralized rock, with and without supergene (oxidative) alteration

- At locations within the footprint of the waste rock disposal facility, representing the various lithologies expected to underlie the facility
- At multiple locations in areas underlain by alluvium located southwest and downgradient of the planned pit and waste rock disposal facility

Included in JBR 2012 is a geologic map that shows the location of drill holes from which samples were obtained. The map also shows cross sections of drill holes and identify the intervals sampled for acid-base accounting and humidity cell testing. All core was standard Q wire line bit HQ size, and typically the entire core from a specified interval was included in the sample.

Static Acid-Base Accounting

ABA procedures are used as a screening process to categorize materials into potentially acid generating, potentially non-acid generating, and uncertain groups. For material where the potential for acid generation is uncertain, kinetic test work (i.e., humidity cell test) is performed to define acid generation characteristics.

Results of static ABA are tabulated in JBR 2012 and the associated explanation that follows; also included are the laboratory reports. Samples were collected and submitted for analysis in six different groups. Those collected in 2009 and 2010 were submitted to SEM, while all others were submitted to SVL. SEM conducted static ABA, following the EPA Standard Sobek Method (EPA-Sobek), while the later SVL analyses followed the Nevada Modified Sobek Method (NDEP-NMSM). Both labs determined paste pH values.

Because of differences in sulfur speciation terminology between laboratories and method description, JBR 2012 records the actual analytical parameters measured by the laboratories and derives the reportable quantities, as defined by the EPA and NDEP-NMSM methods.

Because of differences between the EPA-Sobek and NDEP-NMSM methods, the results for the 2009–2010 analytical campaigns cannot be directly compared to those of the later campaigns. Specifically, the AGP values derived from the EPA-Sobek analyses tend to be significantly higher. This is due to the inability of the acid treatments to remove low-solubility sulfates (e.g., alunite); thus, more sulfur reports to nitric acid (HNO₃) extractable sulfur.

Nevada Meteoric Water Mobility Procedure

The MWMP constitutes a static test to evaluate potential for dissolution and mobility of certain constituents from a mine rock sample by meteoric water, which is similar to rainwater. The procedure consists of a single-pass column leach over 24 hours, using a mine rock sample-to-extraction fluid (effluent) ratio of 1:1 (NMA 1996).

Results of the MWMP tests are tabulated, and analytical reports are presented in JBR 2012. Total-recoverable concentrations of Profile I analytes in MWMP extracts are listed and highlighted where those concentrations exceed the Profile I reference values. Note that ASTM-E2242-07 does not specify total-recoverable concentrations but does require acidification of extracts prior to analysis; thus, the total-recoverable values are considered applicable; however, acidification of unfiltered samples can result in the inclusion of mineral constituents, such as aluminum, that would not likely be present in environmental water.

Humidity Cell Testing

A humidity cell test (HCT) kinetic test was conducted at bench scale for several weeks (Mills 1998). The purpose was to simulate the accelerated leaching effects of precipitation infiltration to, and drainage from, material stored at the surface and exposed to the atmosphere. The humidity cell operational procedure is a cyclic one, during which the sample is subjected to 3 days of dry air permeation, 3 days of humid (water-saturated) air permeation, and 1 day of water washing with a fixed volume of water. The wash water that percolated through the sample was then collected. Leachate was analyzed for a number of parameters including pH, sulfate, acidity, alkalinity, conductivity, and metals.

Results of the humidity cell testing are tabulated in Tables 5.3-1A through 5.3-1L of Appendix 3 in JBR 2012; laboratory reports are presented in Appendix 3. In addition to sample weights and elution volumes, physicochemical and analytical parameters are presented for each elution. Concentration of constituents in eluates exceeding the Nevada Profile I reference values are shown in red.

Discussion of Static and Kinetic Results

Potential for Acidity Production

The interpretation of oxidized and unoxidized rock, as presented in the cross sections in Appendix 3 of JBR 2012 is supported by the acid-base accounting testing summarized in JBR 2012. Interpretation was based mainly on a visual assessment of core color and the presence of pyrite. Specifically, below are the associations of rock classification and ABA characteristics that can be made.

Bedrock/soil (including quartz monzonite, quartz diorite, and alluvium foundation material for the waste rock dump)—Samples in this classification were found to contain undetectable or very low sulfide concentrations; thus, the AGP values were de minimis. There were significant ANP values, resulting in net neutralization potential⁹ (NNP) and ANP:AGP ratios that were indicative of no potential for acid production.

⁹ Acid-base accounting is a screening procedure whereby the acid-neutralizing potential (assets) and acid-generating potential (liabilities) of rock samples are determined, and the difference, net neutralizing potential (equity), is calculated.

Oxidized rhyodacite waste rock—Samples of this material from the central Pearl Pit all had undetectable HNO_3 -extractable sulfur, thus zero AGP. Small ANPs for this group resulted in small positive NNP and very large ANP:AGP ratios. This material shows no potential for acid production.

Oxidized rhyolite waste rock—Five of the six samples of this material, tested by the Nevada Modified Sobek method, were found to contain no detectable HNO_3 -extractable sulfur, thus zero AGP with minor ANP concentrations. These five samples exhibited no tendency to produce acid. Sample P-12-28-29, collected from a shallow depth and tested by the same method, was described as thoroughly oxidized, with strong argillic and sericitic alteration. The sample contained 0.14 weight percentage HNO_3 -extractable sulfur and no ANP. This resulted in an AGP of 4.38, an NNP of -4.43, and an ANP:AGP ratio in the range of potentially acid-producing material.

Very likely, the reason for this discrepancy between the observed state of oxidation and the indicated AGP is found in the mineralogy (see Table 5.4-1 of Appendix 3 in the Plan of Operations). It reports the greatest abundance (7 weight percentage) of alunite found in any of the nine samples tested. This large amount of alunite is likely to have biased the HNO_3 -extractable sulfur, resulting in the large residue of HCl-insoluble sulfur, presumably in the form of alunite. Consequently, the indicated acid-producing potential of this sample is likely an overestimation, due to a finite amount of alunite (or alunite-like material) dissolution by HNO_3 .

Nevertheless, minerals from the alunite-jarosite series are generally formed as intermediate steps in ARD production after sulfide oxidation. Although such minerals are oxidized and do not release solutes in runaway reactions like sulfides, they still retain a fraction of the acidity of the parent sulfides. Additionally, they often harbor chemicals of potential concern (COPCs); therefore, MWMP results affected by alunite should still be carefully evaluated for exceedances in other COPCs. This is despite large amounts of alunite in samples likely resulting in an overestimate of acid-producing potential and hence an artificially low ANP:AGP ratio.

Samples P-2-1 and P-4-1 of this material, also described as thoroughly oxidized, were tested by the Sobek method and were also indicated to contain low (or zero) ANP and pyritic sulfur. This resulted in an AGP that predicts a potential for acid production; however, 80 to 97 percent of the total sulfur reported as insoluble sulfur indicated alunite. As in the case of sample P-12-28-29, indicated potential for acid production is considered suspect.

Unoxidized waste rock—These three samples were collected from depths at or below the projected pit bottom and near the oxidized-unoxidized interface. One of the three samples in this group (IP-UW) was tested according to the Nevada Modified Sobek method. It was found to contain significant pyrite and to

have a large potential for acid production. The other two samples, tested according to the Sobek method, were indicated to contain less pyritic sulfur.

Unoxidized waste rock is considered to have significant potential for acid production and release of ARD solutes when exposed to the atmosphere. Accordingly, the methods of encapsulating unoxidized waste rock, as set forth in **Section 2.1**, provide essential buffering to inhibit oxidation of the sulfides.

Ore zone material—This includes oxidized, mixed, and unoxidized (i.e., sulfidic) material. One of two oxidized ore samples (IP-OO) and a mixed ore-grade sample (IP-MO) were tested according to the Nevada Modified Sobek method. The other oxidized sample (P-I-1) and an unoxidized or sulfidic sample (P-4-3) were tested using the Sobek method. The limited number of samples, combined with the differing analytical techniques, make comparison of these results difficult.

- The unoxidized ore sample indicates the potential for significant sulfide content and high acid-producing potential, although there may be some overestimation due to alunite.
- The mixed ore sample and the oxide sample tested by the Nevada Modified Sobek method were found to contain no sulfide sulfur and thus no potential for acid production. This estimation of acid-producing potential is considered more accurate than an estimation obtained via the original Sobek method. This is because of the provision for separating alunite-sulfur from sulfide-sulfur.
- The oxidized ore sample tested by the Sobek technique indicated moderate sulfide sulfur and AGP; however, a large insoluble sulfur content suggests alunite and thus overestimation of the sulfide sulfur.

It is apparent from these results that the ore-grade rock in the unoxidized condition contains significant pyrite and acid-producing potential, probably exceeding that of the unoxidized waste rock in general; however, the supergene oxidation that effectively removed the pyrite from the waste rock appears to have been equally effective at removing pyrite from the ore-grade rock; consequently, the thoroughly oxidized ore-grade rock contains little acid-producing potential.

Mixed ore-grade rock may vary spatially with respect to its sulfide sulfur, due to greater or lesser local permeability. Such spatial variability is distinguished here from a general condition of incomplete oxidation throughout the “mixed” zone. Moreover, solutes from ore-grade rock are subjected to liming in the heap leach process, which would effectively neutralize any residual acid-producing oxide minerals, such as alunite. Accordingly, any residual acidity in the ore has no significant potential to affect the environment.

Potential for Liberation of COPCs via Leachability

Table 5.2-1 of Appendix 3 in JBR 2012 reveals that unoxidized waste rock and sulfidic ore have similar COPC signatures with respect to the most readily leachable constituents. Specifically, in addition to pH and total dissolved solids, aluminum, arsenic, cadmium, iron, lead, manganese, nickel, sulfate, and thallium exceed the Nevada Profile I reference values. Of these, aluminum and iron exceed the reference values by the largest factor, but both may be overestimated due to suspended iron and aluminum oxyhydroxides. Their tendency to precipitate readily when neutralized further limits their importance as COPCs. Additionally, when they do precipitate, they tend to adsorb and sequester COPCs discussed in this paragraph. Of greater environmental concern are arsenic, lead, cadmium, antimony, and titanium in leachates from unoxidized material.

With very few and minor exceptions, all these COPCs are absent in the MWMP leachates from oxidized samples.

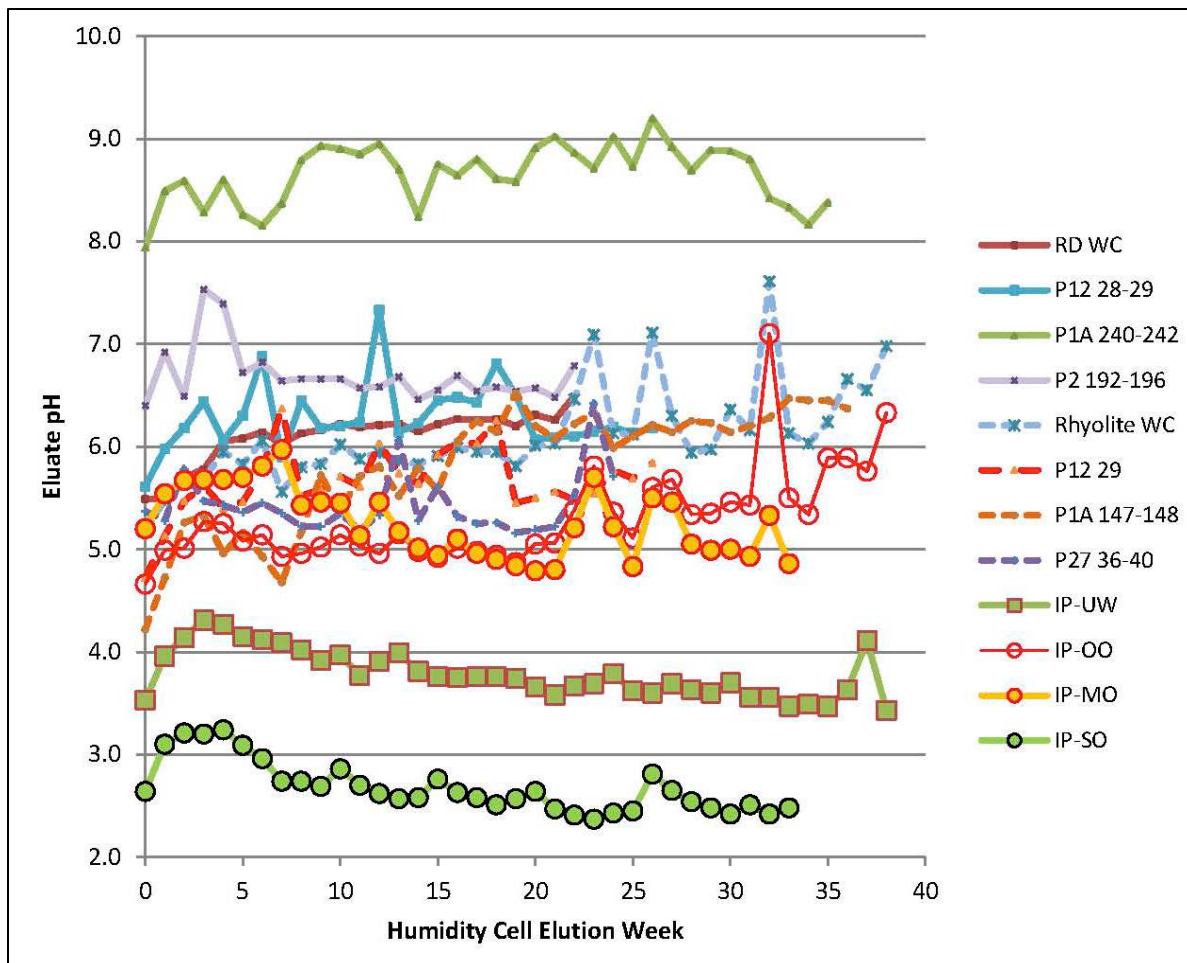
Behavior of Materials under Accelerated Oxidation (Humidity Cells)

Figure 3-12, Eluate pH of Humidity Cell Analyses, and **Figure 3-13**, Eluate Conductivity of Humidity Cell Analyses, illustrate the progress of sulfide oxidation and acidity generation in the humidity cells. They clearly contrast all six oxidized waste rock samples with one sample of unoxidized waste rock and one sample of sulfidic ore. **Figure 3-13** shows that all samples tested exhibit an initial increase in eluate pH during the first 5 weeks. Only the samples of unoxidized waste rock (IP-UW) and sulfidic ore (IP-SO) exhibited a decreasing trend in eluate pH as the humidity cell tests progress after 5 weeks. These materials would be segregated from the environment.

All oxidized waste rock and oxidized ore exhibited steadily increasing eluate pHs, trending toward pH 7 or a pH that remained above 8.0 for the duration of the experiments. The mixed ore sample (IP-MO) exhibited a short-duration (15 weeks) rise and fall of pH before settling at approximately pH 5. The oxidized and mixed ore would be segregated from the environment and neutralized by the heap leach process.

Figure 3-13, Eluate Conductivity of Humidity Cell Analyses, documents a rapid decrease in eluate electrical conductivity (EC) for all samples tested in humidity cells. (Electrical conductivity was selected for plotting because of the weekly data record, as opposed to less frequent, but more comprehensive, determinations of sulfate, for example.)

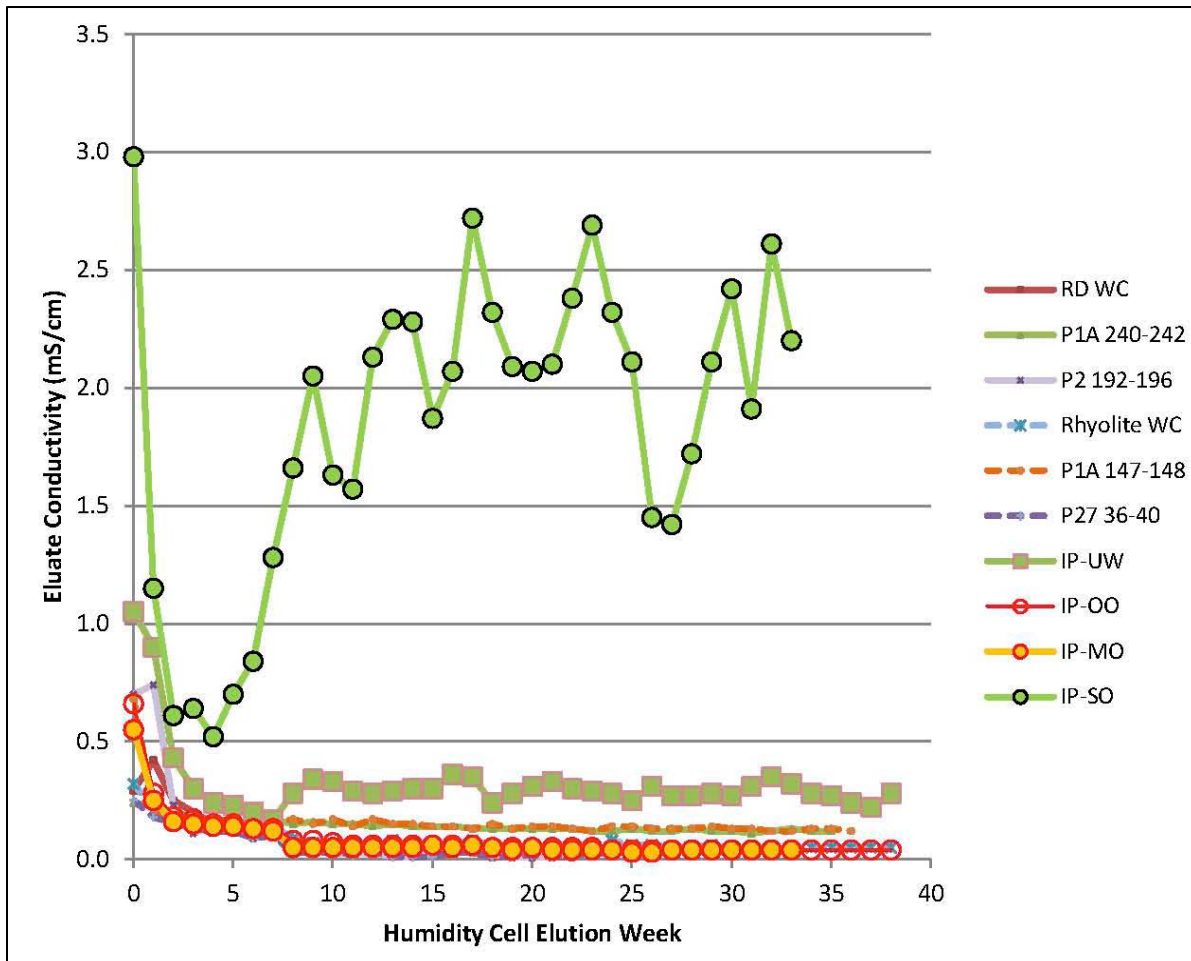
Contributions to EC were dominated by sulfate, so the decreases are indicative of rapid solubilization of low-solubility sulfate minerals. All oxidized waste rock and ore samples and the mixed ore sample continued to exhibit decreasing eluate EC values throughout the duration of the testing, indicating the exhaustion of readily soluble sulfate phases. The unoxidized waste rock sample

Figure 3-12: Eluate pH of Humidity Cell Analyses

Source: NDEP Profile Reporting Form, Permit Number: NEV2009102. 2008 to 2014 reporting. Sent 12/11/2017 to EMPSi from Walker Lane Mineral Corp.

(IP-UW) showed a decrease in EC through week seven, followed by a doubling of the EC, which then remains essentially constant through the end of the experiment. The sulfidic ore sample (IP-SO) decreases from an initial value eluate conductivity of 3 milliseconds per centimeter through week four; then it rapidly rises to a level nearly equal to the initial value, then fluctuates plus or minus 25 percent through the course of the experiment.

With the exception of the unoxidized waste rock and sulfidic ore, none of the samples tested exhibit any tendency for sulfide mineral oxidation with the associated creation of acidity. The initially low eluate pH for all but two humidity cells coincides with past pHs for oxidized and unoxidized waste rock and ore. It suggests rapid hydrolysis reactions involving secondary sulfates with contained acidity. This is supported by the initial decrease in EC. Such phases may include jarosite or poorly crystallized Al-hydroxy sulfate phases, such as basaluminite.

Figure 3-13: Eluate Conductivity of Humidity Cell Analyses

Source: NDEP Profile Reporting Form, Permit Number: NEV2009102. 2008 to 2014 reporting. Sent 12/11/2017 to EMPSi from Walker Lane Mineral Corp.

The unoxidized waste rock and sulfidic ore samples show decreasing pHs and increasing EC values after the initial 5 weeks, indicating oxidation of sulfide minerals. These materials are considered potentially acid producing. Constituents liberated during the sulfidic ore humidity cell experiments with concentrations exceeding the Nevada Profile I reference values, at least initially, includes aluminum, antimony, arsenic, beryllium, cadmium, fluorine, iron, lead, manganese, nickel, sulfate, thallium, total dissolved solids, and zinc. With the exception of beryllium, fluorine, nickel, total dissolved solids, and zinc, exceedances for these constituents continued through week 28 of the humidity cell testing.

The unoxidized waste rock sample shows long-lived exceedances for many of the same constituents liberated from the sulfidic ore, namely aluminum, arsenic, cadmium, iron, manganese, and thallium. Exceedances of manganese and thallium remained, in the case of the mixed and oxidized ore, despite the oxidation; however, they showed only rare and discontinuous exceedances of aluminum,

arsenic, cadmium, iron and manganese and thallium occur in eluates derived from the oxidized waste rock samples tested.

Soil pH

The United States Department of Agriculture, Natural Resources Conservation Service's National Cooperative Soil Survey was used to determine the regional soil characteristics of the project area. An area of 1,535 acres encompassing the project was selected as the area of interest (AOI) for the study. The study indicated that the soils in this AOI are chiefly neutral to slightly alkaline, with pH values ranging from 7.0 to 9.1.

Map unit number 1130 encompasses the proposed mine pit and a portion of the proposed WRDF and has an indicated pH of 7.0. Map unit number 1155 encompasses the proposed crusher area, heap leach pad (HLP), and processing facilities and has an indicated pH of 8.8. **Table 3-12** lists the soil pH ratings in the AOI.

Table 3-12
pH of Soils in the Area of Interest

pH (1 to 1 Water), Summary by Map Unit, Mineral County Area, Nevada				
Map Unit Symbol	Map Unit Name	Rating	Acres in AOI	Percent of AOI
1130	Uripnes-Rock outcrop association	7.0	194.7	12.7
1155	Gynelle-Izo association	8.8	564.9	36.8
1910	Izo, rarely flooded-Izo association	8.5	48.0	3.1
1970	Pintwater-Blacktop-Rock outcrop association	8.5	343.7	22.4
2030	Theriot-Theriot, very steep-Rock outcrop association	8.6	26.5	1.7
4150	Stewval-Lomoin association	7.9	22.6	1.5
4182	Candelaria-Gynelle-Izo association	9.1	9.6	0.6
5101	Oricto-Izo association	9.1	324.9	21.2
Total for Area of Interest			1534.9	100.0

Source: Natural Resources Conservation Service, Web Soil Survey, 2015.

3.7.3 Environmental Consequences

Proposed Action

Surface Water

No perennial, surface water bodies, springs, or seeps are within a 1-mile radius of the proposed mine facilities. Benton Spring, Upper Benton Spring, and Bank Spring, the closest ephemeral springs, are approximately 1.5 miles to the north of the central project area and over 1 mile from the outer reaches of the project area. These springs are upgradient of the project area and therefore could not be affected by runoff from the site. Nevertheless, WLMC would monitor these springs quarterly for Profile II constituents.

Activities conducted under the Proposed Action would avoid all surface water, since there are no springs, seeps, or perennial drainages in or next to the project area. As outlined in **Chapter 2**, WLMC has committed to a number of environmental protection measures during construction, operation, and reclamation. This is to minimize sedimentation or erosion resulting from spring runoff or precipitation. All applicable permits have been obtained, as outlined in the Plan of Operations (Welsh Hagen 2017). Berms would be established to prevent comingling of ephemeral surface waters with mine materials, the pit, and process units.

All springs and seeps within 3 miles of the project area are upgradient of the proposed project; therefore, it is not possible for stormwater runoff from the project area to affect these springs and seeps.

There are no receiving surface water bodies in the project area or the immediate vicinity other than intermittent or ephemeral drainages. Runoff and sedimentation in the project area would be minimized by the use of standard protection measures; consequently, impacts on surface water quality through sedimentation would be minimal.

Groundwater

Mine operations would withdraw approximately 800 acre-feet of water from a limited resource in an arid environment over the course of 5 years. Groundwater modeling predicts rapid recovery of the fault-confined alluvium in less than 1 year. The Proposed Action is not anticipated to interfere with neighboring water rights or surface water flows. Any groundwater produced during mining operations would be consumed by evaporation and would not be available for reuse beyond the mining project.

Mine Pit

There are numerous intermittent drainages that originate in the hills above the project that bear water only during intense summer thunderstorms. The operational stage diversions of drainage channels that discharged into the pit area prior to mining would be permanent post-reclamation features. The diversion features have been designed to handle a 100-year, 24-hour storm. These diversions would channel any stormwater away from the pits and would eliminate the potential for these waters to flow into the pit area. On completion of operations, the pit perimeter would also be protected by 5-foot-high berms. Direct precipitation into the pits is expected to be dispelled rapidly by evaporation and infiltration.

Groundwater data acquired from three monitoring wells in the proposed mine pit area indicate that groundwater would not be encountered to the total depth of the mine pit excavation. The total depth of the Isabella Sub-Pit would be 5,413 amsl, 37.9 feet above the maximum measured groundwater elevation. Based on the groundwater level measurements, the deepest portion of the proposed mine pit (the Pearl Pit) would be 31.09 to 27.96 feet above the

groundwater table. Neither the Isabella Pit nor the Pearl Pit would go deeper than depth to groundwater.

Additionally, the WLMC Plan of Operations stipulates that the Pearl Pit (the main pit) would be backfilled with 20 feet of oxidized waste material to further increase the depth to groundwater from the bottom of the mine pit. Based on the data presented in **Sections 3.4** and **3.7** of this EA, the development of the proposed Isabella Sub-pit and Pearl Pit would not intercept the groundwater; therefore, a pit lake or pond would not develop during mining or after final mine closure.

Sulfide Ore Stockpile

Approximately 64,000 tons of sulfide ore would be removed from the bottom of the Pearl Pit toward the end of mining operations. This acid-generating ore would be temporarily stored on lined containment before it is shipped to a third-party toll milling facility. The sulfide ore has proven to have significant economic value; however, as specified in the plan of operations (Welsh Hagen 2017), the sulfide ore stockpile would be covered with 19 feet of oxidized waste and 1 foot of growth media. This would happen in the unlikely event that the material was to remain on-site after final reclamation; in such an event, the lined containment would be a permanent post-reclamation feature.

Additionally, the designed soil and oxide waste rock cover would prevent rainwater from infiltrating the stockpile beyond 2 feet into the oxidized waste cover (Applied Soil Water Technologies 2012). This material would therefore have no effect on the water resource environment.

Heap Leach Pad

The HLP would be constructed on alluvium at the southern end of the project area. A monitoring well drilled near the south perimeter of the proposed HLP, and historically drilled water wells, indicate groundwater depths to be in excess of 775 feet bgs in this area. Due to the great depth of groundwater at the proposed leach pad, degradation of the water resource is not likely. In the unlikely event of a leach pad breach, leak detection systems designed for the HLP would warn of any contamination danger, and an emergency cleanup response would begin immediately.

Additionally, two wells would be constructed in the HLP area to monitor groundwater chemistry. In the event that harmful chemical constituents are detected in a monitoring well, an emergency response would begin to minimize potential impacts. The emergency response plan is contained in the plan of operations on file with the BLM.

Waste Rock Disposal Facility

The WRDF has been designed to eliminate any undue degradation of Waters of the US. Oxidized and unoxidized waste was tested by static, kinetic, and mineralogical methods. This was done to determine each material's potential to

generate acid and release harmful constituents into the water resource environment.

ABA results have been tabulated, and it has been determined that oxidized waste rock has no net potential to produce acid (JBR 2012). Additionally, MWMP analyses indicate that oxidized waste rock has minimal potential to release COPCs beyond background levels. Sample P-4-1 exhibited arsenic at 0.14 mg/L, while all others were below 0.01 mg/L. Native groundwater in the immediate area of the mine exhibits naturally elevated arsenic concentrations.

Slightly elevated aluminum in neutral pH occurs frequently in the MWMP, generally as a result of inclusion of fine rock solids in the unfiltered test water; it is not a COPC in this context. Aluminum and manganese readily precipitate in slightly alkaline environments; however, ABA and MWMP results indicate that unoxidized waste has a potential to generate acid and COPCs.

Humidity cell tests demonstrated that all oxidized waste rock exhibited steadily increasing eluate pHs trending toward pH 7, or a pH that increased during the duration of the experiments. The unoxidized waste rock exhibited a decreasing trend in eluate pH, indicating a potential to generate acid.

Meteoric water infiltration into the WRDF would be the potential mechanism for the release of acid and COPCs from unoxidized waste into the water. The WRDF has been designed to isolate unoxidized waste rock to eliminate the potential for release of acid and COPCs. Plans for WRDF management call for segregating and placing the unoxidized (greater than 2 percent iron sulfide) waste material in an encapsulation cell. It would be enclosed and covered by a minimum of 60 feet of oxidized material, thus minimizing the potential for acid leachate generation.

The WRDF has used oxidized waste rock for isolating potentially acid-generating unoxidized waste in the event of meteoric water infiltration; however, post-reclamation soil cover on the entirety of the WRDF has been designed to minimize the potential for meteoric water infiltration. This would further minimize the potential for acid and COPCs to leach into the water.

Engineered cover modeling and design by Applied Soil Water Technologies (2012) of Reno indicate that a final reclamation cover of 1 foot of colluvial soil over compacted oxidized rhyodacite waste rock would prevent precipitation infiltration beyond a depth of 2 feet into the oxidized waste. This would be of benefit during the wettest winters and most intense rainfalls expected in the area. An additional 60 feet of oxidized material over the unoxidized waste cell that would occupy the core of the WRDF would further protect Waters of the State; moreover, expected limited precipitation on the WRDF would quickly evaporate in this arid environment.

Impacts on water quality in the WRDF area are not expected. This is because of the relatively benign character of oxidized waste rock and encapsulation of unoxidized waste rock by oxidized waste rock. It also would be due to a post-reclamation soil cover designed to limit meteoric water infiltration into the WRDF to not more than 2 feet into oxidized waste cover; therefore, impacts on water quality by implementing the Proposed Action would not likely occur.

The waste rock facility would be designed to accommodate potential seismicity in the area. In the unlikely event of a seismic event, response may be required at the facility to prevent precipitation infiltration and sulfide oxidation. Response could range from a simple inspection for a mild event to grading and cover repair for a large event.

No Action

Under the no action scenario, the Proposed Action would not occur, and minerals would not be removed. As with the Proposed Action, no action would have no impacts on surface water and would not affect groundwater. It also would not protect or preserve groundwater. This is because native mineralization produces groundwater that is slightly impaired by arsenic and sulfate in the mine area. In addition, the groundwater is in poorly conductive units and is too deep to feasibly access as a water resource.

3.8 VEGETATION AND INVASIVE, NONNATIVE, AND NOXIOUS SPECIES

3.8.1 Affected Environment

Vegetation

The Great Basin Ecology, Inc. (GBE 2009, 2017) survey is the basis of the vegetation resources study. GBE conducted vegetation surveys on August 16 and 17, 2009, and again on June 1 and 2, 2017.

The subject lands are within the Intermountain Basins Mixed Salt Desert Scrub vegetation community, which is the most extensive habitat type in Nevada (USGS 2005). Vegetation communities are dominated by members of the goosefoot (*Chenopodiaceae*) family, including shadscale (*Atriplex confertifolia*), four-wing saltbush (*A. canescens*), spiny hopsage (*Grayia spinosa*), and greasewood (*Sarcobatus vermiculatus*). Shadscale is the dominant shrub, but it is found in a variety of plant associations that are all included in the Intermountain Basins Mixed Salt Desert Scrub.

The vegetation is similar throughout the project area, except for the amount of grass between areas and the spacing between plants. The portion of the project area associated with the Uripnes-Rock outcrop association had more grass plants and grass species than the lower alluvial fan area and the relatively bare mountains associated with the Pintwater-Blacktop-Rock outcrop association. In addition, the cover was greater at the higher elevations, primarily due to closer

spacing (i.e., higher density) of shrubs. **Table 3-13** is a list of plant species observed in the project area.

Table 3-13
Plant Species Observed in the Project Area

Common Name	Scientific Name
Grasses	
Bottlebrush squirreltail	<i>Elymus elymoides</i>
Cheatgrass	<i>Bromus tectorum</i>
Desert needlegrass	<i>Stipa speciosa</i>
Galleta grass	<i>Pleuraphis jamesii</i>
Indian ricegrass	<i>Achnatherum hymenoides</i>
Sandberg bluegrass	<i>Poa secunda</i>
Forbs	
Basin rayless daisy	<i>Erigeron aphanactis</i>
Birdnest buckwheat	<i>Eriogonum nidularium</i>
Buckwheat	<i>E. sp.</i>
Cleftleaf wild heliotrope	<i>Phacelia crenulata</i>
Common pepperweed	<i>Lepidium densiflorum</i>
Coulter's lupine	<i>Lupinus sparsiflorus</i>
Cryptantha	<i>Cryptantha sp.</i>
Desert dandelion	<i>Malacothrix glabrata</i>
Desert globe mallow	<i>Sphaeralcea ambigua</i>
Desert trumpet	<i>Eriogonum inflatum</i>
Douglas dustymaiden	<i>Chaenactis douglasii</i>
Goldenweed	<i>Happlopappus sp.</i>
Great Basin langloisia	<i>Langloisia setosissima</i>
Halogeton	<i>Halogeton glomeratus</i>
Indian paintbrush	<i>Castilleja sp.</i>
Larkspur	<i>Delphinium sp.</i>
Lomatium	<i>Lomatium sp.</i>
Medium fiddleneck	<i>Amsinckia intermedia</i>
Miniature wooly star	<i>Eriastrum diffusum</i>
Munro's globemallow	<i>Sphaeralcea munroana</i>
Phacelia	<i>Phacelia sp.</i>
Pinnate tansy mustard	<i>Descurainia pinnata</i>
Prince's plume	<i>Stanleya pinnata</i>
Rockcress	<i>Arabis sp.</i>
Roundleaf oxytheca	<i>Oxytheca perofilata</i>
Russian thistle	<i>Salsola iberica</i>
Spreading fleabane	<i>Erigeron divergens</i>
Vetch	<i>Astragalus sp.</i>
Shrubs	
Bailey greasewood	<i>Sarcobatus baileyi</i>
Black greasewood	<i>S. vermiculatus</i>
Bud sagebrush	<i>Picrothamnus desertorum</i>
Burrobrush	<i>Hymenoclea salsola</i>
Desert bitterbrush	<i>Purshia glandulosa</i>

Table 3-13
Plant Species Observed in the Project Area

Common Name	Scientific Name
Fourwing saltbush	<i>Atriplex canescens</i>
Littleleaf horsebrush	<i>Tetradymia glabrata</i>
Mormon tea	<i>Ephedra viridis</i>
Nevada dalea	<i>Psoralea polydenia</i>
Nevada jointfir	<i>Ephedra nevadensis</i>
Plains pricklypear	<i>Opuntia polyacantha</i>
Rubber rabbitbrush	<i>Ericameria nauseosus</i>
Shadscale	<i>Atriplex confertifolia</i>
Spiny horsebrush	<i>Tetradymia spinosa</i>
Spiny hopsage	<i>Grayia spinosa</i>
Spiny menodora	<i>Menodora spinescens</i>
Winged four o'clock	<i>Mirabilis alipes</i>
Winterfat	<i>Krascheninnikovia lanata</i>
Yellow rabbitbrush	<i>Chrysothamnus viscidiflorus</i>

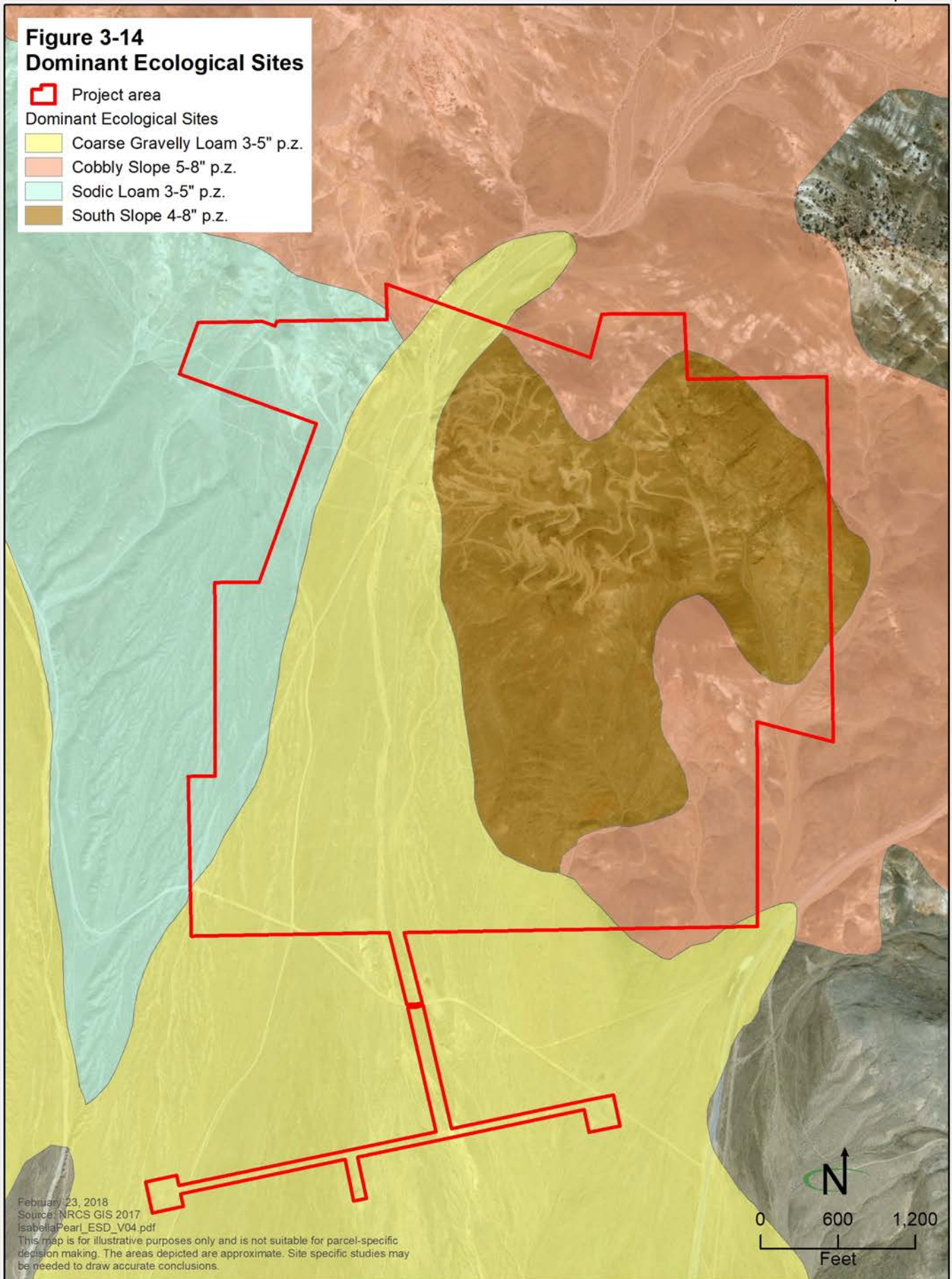
Source: Great Basin Ecology, Inc. 2017

The alluvial fan was defined in the soil and ecological site (**Figure 3-14**, Dominant Ecological Sites). The coarse gravelly loam 3–5-inch precipitation zone (p.z.) extended from the mouth of the canyon. Then it spread out to form the fan between the mountains and hills on the east and dissected fans on the west. There were trenches in this area that revealed lenses of sand and gravel, mixed with lenses of stones and cobble, indicating a relatively high variability in water flow in this area. This area was drought-like with very low production. Similar vegetation species were observed in this ecological site as the rest of the project area, but the vegetation cover was very low.

The dissected fan on the west side of the project area had similar vegetation density and composition, with primarily shrubs and very few grass plants. The sodic loam 3–5-inch p.z. occurs in this area.

The eastern half of the area contains two ecological sites: cobbly slope 5–8-inch p.z. and the south slope 4–8-inch p.z. sites. The steeper slopes, higher-precipitation zone, and rocky surface provided conditions conducive to increased grass production.

At the very north end of the project area, there were a few pinyon pines (*Pinus monophylla*) scattered in the hills. The trees were more abundant just north of the project area. Portions of the area, primarily the hills on the east side of the project area, had been subject to historic mining and modern exploration. These areas lacked vegetation or were dominated by halogeton (*Halogeton glomeratus*).



Invasive, Nonnative, and Noxious Species

The BLM defines an invasive species as a one that is nonnative to the ecosystem under investigation and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health (Executive Order 13112; February 3, 1999). Invasive, nonnative species are those that are highly competitive and highly aggressive and are easily spread. They include plants designated as noxious and animals designated as pests by federal or state law.

A noxious weed is a plant that interferes with management objectives for a given area of land at a given point in time. The BLM Nevada strategy for noxious weed management is to prevent and control their spread through local and regional cooperative efforts to ensure maintenance and restoration of healthy ecosystems on BLM-administered lands. Noxious weed control would be based on prevention, education, detection, and quick control of small infestations. The Nevada Department of Agriculture maintains the Nevada Noxious Weed List (NDA 2012).

Animal species designated as pests are generally those that are injurious to agricultural and nursery interests or vectors of diseases that could be transmissible and injurious to humans.

While several invasive species, such as cheatgrass (*Bromus tectorum*), common pepperweed (*Lepidium densiflorum*), halogeton, pinnate tansy mustard (*Descurainia pinnata*), and Russian thistle (*Salsola iberica*), were observed in the project area (GBE 2017), none are included on the Nevada Noxious Weed List (NDA 2012).

3.8.2 Environmental Consequences

Proposed Action

Vegetation

The Proposed Action would result in additional surface disturbance of approximately 292.9 acres of Intermountain Basins Mixed Salt Desert Scrub vegetation, which is the most extensive habitat in Nevada (USGS 2005). Disturbance would occur over the life of the mine. As facilities are constructed, concurrent reclamation would begin, as practicable. At the close of mining operations, growth media would be redistributed over disturbed areas, followed by seeding with an approved mix. Plant species used in the seed mix may result in a slightly different vegetation community until the area is naturally seeded by species from surrounding, undisturbed areas.

At the close of operations, all non-pit disturbed surfaces not classified as preexisting, rock outcrop, or ground with natural slopes exceeding 2(H):1(V) would be revegetated. This would control runoff, reduce erosion, provide forage for wildlife, and reduce visual impacts. Seeding would be timed to take advantage of optimal climate and would be coordinated with other reclamation activities.

Invasive, Nonnative, and Noxious Species

Invasive, nonnative, and noxious plant species are typically very aggressive and have the ability to dominate sites. This causes dramatic impacts on native plant communities and decreases the available amount of forage for livestock and wildlife. Noxious weed species outcompete native plant communities for moisture during the initial years following disturbance or seeding.

Invasive, nonnative, and noxious species may be introduced into or spread within the project area as an indirect result of exploration. Common methods of introduction and spread are the movement of contaminated equipment across uncontaminated lands and spreading gravel, road fill, and topsoil contaminated with noxious weed seed in areas that were previously weed free.

Moisture made available by watering roads and other traffic areas for dust suppression during construction, mining, hauling, and exploration could temporarily increase some opportunistic plant species next to roadways or other watered surface areas. Similarly, areas favorable to noxious weed growth may be created in other moist areas, such as new low spots or drainage areas where water could pond in the drill pads.

Since surface disturbance creates an environment conducive to the support of noxious weed species, the Proposed Action would result in approximately 292.9 acres of surface disturbance that would be susceptible to infestation of invasive, nonnative, and noxious species.

By implementing standard practices and control measures, the potential for introduction or spread of noxious weeds and other invasive and nonnative species as a result of the Proposed Action would be minimized. Noxious weed populations would be monitored annually in the project area. Any infestations would be treated as required by the BLM.

Herbicides may be applied to reduce the size of noxious weed populations with BLM approval. Vehicles being used in off-site areas with noxious weeds would be washed before allowed onto the site. In addition, only seed mix that has been certified to not contain noxious or invasive species would be used for reseeding the project area.

No Action

Under the no action alternative, there would be no additional surface disturbance. Vegetation communities would not be affected, and no additional noxious weed populations would occur.

3.9 GENERAL WILDLIFE

3.9.1 Affected Environment

As discussed in **Section 3.8**, Vegetation, the dominant vegetation of the proposed project is the Intermountain Basins Mixed Salt Desert Scrub (GBE

2009). The salt desert scrub habitat is relatively low in plant diversity due to the lower precipitation in this area; as a result, this community does not provide habitat for many species of wildlife or for large populations. Great Basin Ecology conducted surveys for general wildlife on August 16 and 17, 2009, and on June 1 and 2, 2017.

Game Species

Nevada game species that have the potential to occur in the project area are shown in **Table 3-14**. Of the species listed, the desert bighorn sheep (*Ovis canadensis nelsoni*) are known to occur in the area and were observed during baseline surveys (GBE 2017). **Figure 3-15**, Desert Bighorn Sheep, shows the bighorn sheep range that overlaps the project area. NDOW has identified pronghorn antelope (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) as having the potential to occur in the area, but they were not observed during baseline surveys (GBE 2017).

Table 3-14
Potential for Occurrence of Key Great Basin Game Species

Common Name	Scientific Name	Habitat	Occurrence
Mountain lion	<i>Puma concolor</i>	Dense cover or rocky, rugged terrain and desert areas; pinyon pine, juniper, and mountain mahogany	Could occur but food source is limited
Pronghorn antelope	<i>Antilocapra americana</i>	Gentle rolling to flat, open topography; low sagebrush and northern desert shrubs are preferred vegetation types	Could occur

Source: Great Basin Ecology Inc. 2009

NDOW indicates that the entire area encompasses occupied year-long antelope habitat and distribution. The project area is in NDOW management unit 21 in Esmeralda County. The 2016–2017 Big Game Status Report (NDOW 2017) indicates that the spring fawn recruitment was good in 2014 and 2016 and that the herd experienced above-average recruitment. No formal ground composition surveys were conducted in 2015 (NDOW 2017).

The pronghorn antelope population in unit 21 is made up of two core herds, one of which inhabits the region near Goldfield and Silver Peak. According to NDOW, the pronghorn antelope population in this unit is considered stable to slightly increasing. No pronghorn antelope were observed during baseline surveys (GBE 2017).

The northwestern two-thirds of the project area are in limited mule deer habitat and distribution. This means that the area could support more mule deer; however, the limiting resource is water. The 2016–2017 Big Game Status

Report (NDOW 2017) indicates that the population in management unit 21 has remained static at comparatively low levels for quite some time.

It is likely that the above-average precipitation in the last several years has alleviated some of the detrimental rangeland effects caused by recent droughts. Based on aerial surveys of adjacent units, the population in management unit 21 is estimated to be static to slightly increasing (NDOW 2017). No mule deer were observed during baseline surveys (GBE 2017).

The mountainous portions in the northeastern two-thirds of the project area are included in the known range of desert bighorn sheep (**Figure 3-15, Section 3.11**). The lower alluvial fans may be used in winter. Signs of desert bighorn sheep were observed in the northern portion of the project area, including grasses in the rocky areas that had been grazed by this species. The 2016–2017 Big Game Status Report indicates that the population in management unit 21 has shown a positive trend for many years; as a result, it has been used as a source population for transplanting desert bighorn sheep to other areas, most recently in 2012 and 2016 (NDOW 2017).

Mammals

Mountain lions (*Puma concolor*) may also occur in the area due to the presence of the desert bighorn sheep. Lions depend on larger mammals for prey, and the desert bighorn and wild horses are the only large species in the area. Mountain lions were not observed during the survey (GBE 2017).

The salt desert scrub vegetation provides habitat for black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), desert packrats (*Neotoma* sp.), and rodents, such as kangaroo rats (*Dipodomys* sp.). Evidence of these four species was observed during the survey (GBE 2017).

Reptiles

The rocky and dry habitat found in the project area supports a variety of lizard species. During the wildlife surveys, the western desert horned lizard (*Phrynosoma platyrhinos*), western whiptail lizard (*Cnemidophorus tigris*), common sideblotched lizard (*Uta stansburiana*), zebra-tailed lizard (*Callisaurus draconoides*), and desert-spiny lizard (*Sceloporus magister*) were observed (GBE 2017). The NDOW has wildlife occurrence points for the following additional reptile species in the project area: western fence lizard (*Sceloporus occidentalis*); Great Basin gopher snake (*Pituophis catenifer deserticola*); zebra-tailed lizard (*Callisaurus draconoides*); desert spiny lizard (*Sceloporus magister*); yellow-backed spiny lizard (*S. uniformis*); side-blotched lizard; and coachwhip (*Masticophis flagellum*). Several BLM sensitive species have also been recorded in the area and are discussed in **Section 3.11, BLM Sensitive Species**.

3.9.2 Environmental Consequences

Proposed Action

Constructing and operating the Proposed Action could result in direct and indirect effects on terrestrial wildlife in the project area in one or more of the following ways:

- Direct mortality by vehicles during construction and operation of the project
- Alteration of vegetation composition and structure of habitats, making them less functional for wildlife
- Decreased habitat use and displacement near the project site (within a zone of effect) caused by noise and human or equipment occupancy

Direct mortality. Project-related traffic could result in wildlife mortality, particularly mammals and reptiles. Species most susceptible to vehicle-related mortality are those that are inconspicuous (e.g., lizards, snakes, and small mammals), those with limited mobility, burrowing species, nocturnal wildlife, and wildlife that may scavenge roadside carrion (Leedy 1975; Forman and Alexander 1998). Posting and enforcing speed limits reduces the likelihood of direct wildlife mortality from vehicle collision.

In addition, the Proposed Action includes protection measures (see **Section 2.1.6**) that would minimize mortality from uncapped hollow pipes by requiring them to be covered or capped. In addition, other openings where wildlife escape ramps are not practicable, such as cellar well openings, would be capped or covered so they are not a trap hazard for wildlife. WLMC would identify and remove all polyvinyl chloride mine markers within the project boundary, in accordance with State of Nevada statute or guidance.

Habitat loss and alteration. Project-related construction could result in loss of up to 292.9 acres (59.7 percent of the project area) of previously undisturbed habitat for wildlife. Removing grass and shrub vegetation would reduce hiding cover and thermal shelter for small mammals, birds, and reptiles. Surface-development would remove habitat used by big game species, such as desert bighorn sheep, pronghorn antelope, and, potentially, mountain lion.

Reclaiming disturbed areas by recontouring and revegetating would help establish plant communities that support wildlife foraging and cover habitat over the long term; however, wildlife use of reclaimed surface disturbance would depend on many factors, including species-specific responses to revegetated species, vegetation cover and density, and vegetation structure.

Altering habitats through the introduction or spread of invasive, nonnative plants and noxious weeds could interfere with reestablishment of native vegetation species and may affect wildlife habitat (see **Sections 3.8** and **3.9**).

Zone of effect. Daily traffic and mining activities would generate noise and may result in habitat avoidance for certain wildlife species. Wildlife displacement can be a response to noise; however, noise and human presence coincide, so the effects of either may not be discernible. Noise may also result in some species avoiding foraging habitat.

Big game species tend to move away from areas of human activity and roads, reducing habitat utilization. Game displacement is unlikely to lead to demographic-level effects; however, displacing animals away from roads and drilling operations would reduce the area of functional habitats. Wildlife foraging and nesting activities in the proposed project area would be dispersed into similar habitat nearby.

Long-term impacts on wildlife habitat are unlikely, since reclamation and reestablishment of shrub species would be either concurrent where possible or would take place shortly after mining and processing activities cease; therefore, the Proposed Action would have negligible long-term impacts on wildlife species and is not likely to affect local/regional wildlife populations.

No Action

Under the no action alternative, there would be no disturbance of and no impacts on wildlife populations or their habitats.

3.10 MIGRATORY BIRDS

3.10.1 Affected Environment

Regulatory Background

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) implements a series of international treaties that protect migratory birds. It authorizes the Secretary of the Interior to regulate the taking of migratory birds. Under the MBTA it is unlawful, except as permitted by regulations, “to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird” (16 USC, Section 703), but it does not regulate habitat. The list of species protected by the MBTA was revised in March 2010 and includes almost all 1,007 bird species that are native to the United States.

Migratory Birds

The migratory bird species that occur or may occur in the project area are listed in **Table 3-15**.

Table 3-15
Migratory Birds with Potential to Occur in the Project Area

BLM Migratory Birds of Concern^a—Carson City District Office				
Species	Federally Listed^b	BCC 2008^c		GBBDC^d
		BCR^e 9	BCR 15	
Black-throated sparrow				
Blue grey gnatcatcher				
California quail				
Chukar				
Common nighthawk				
Common raven				
Gambel's quail				
Horned lark				
Juniper titmouse				
Long-billed curlew		X		
Mourning dove				X
Prairie falcon				
Rock wren				
Sagebrush sparrow		X		
Western kingbird				

^a Migratory Birds of Concern are a subset of the species protected by the MBTA.

^b There are no federally listed species in the project area.

^c USFWS 2008; Birds of Conservation Concern 2008 (BCC 2008). Bird Conservation Regions 9 and 15 apply to the Carson City District Office.

^d USFWS Game Birds Below Desired Condition

^e Bird Conservation Region

BLM sensitive migratory bird species are discussed under *BLM Sensitive Wildlife*, below.

Migratory birds may be found in the project area as either seasonal residents or as migrants. The salt desert scrub habitat provides nesting habitat for the following species from that list: black-throated sparrow (*Amphispiza bilineata*), common nighthawk (*Chordeiles minor*), common raven (*Corvus corax*), horned lark (*Eremophila alpestris*), mourning dove (*Zenaida macroura*), prairie falcon (*Falco mexicanus*), rock wren (*Salpinctes obsoletus*), and sagebrush sparrow (*Artemisiospiza nevadensis*).

Mourning doves occur in almost every habitat in Nevada, including the salt desert scrub (Floyd et al. 2007).

Gambel's quail (*Callipepla gambelii*) and California quail (*C. californica*) may occur in the area, but the habitat is marginal for both species. None were observed during the survey (GBE 2017). Chukar (*Alectoris chukar*) may occur in the area as well. There are several small game wildlife guzzlers used by chukars within 3 miles of the project area, with the closest, Gabb's Valley #10, being less than 1.5 miles from the project area.

Habitat is present for the following migratory bird species, which were observed during baseline surveys: horned lark, juniper titmouse (*Baeolophus ridgwayi*), and western kingbird (*Tyrannus verticalis*). The juniper titmouse was observed foraging in a pinyon pine at the north end of the project area. None of these species are listed by the BLM as Migratory Birds of Concern. Great Basin Ecology conducted surveys for migratory birds on August 16 and 17, 2009, and on June 1 and 2, 2017.

Great Basin Bird Observatory had a survey plot within 2 miles of the project area, where the following additional species were detected: common raven, blue-gray gnat catcher (*Polioptila caerulea*), and rock wren. These species could inhabit the project area where suitable habitat exists.

Raptors

Golden eagles (*Aquila chrysaetos*), red-tailed hawks (*Buteo jamaicensis*), western burrowing owls (*Athene cunicularia*), and prairie falcons (*Falco mexicanus*) are likely to use this area for foraging and to nest in the higher mountains northwest of the project area. Golden eagles and western burrowing owls are discussed in the **Section 3.11**.

NDOW has indicated that a prairie falcon nest is northeast in Township 9 North, Range 34 East, Section 26; however, this nest is outside the project area, within 1 mile of the project boundary. It is unlikely that the Proposed Action would adversely affect the nest site. Standard NDOW raptor nest buffers would be applied to the Proposed Action if applicable.

3.10.2 Environmental Consequences

Proposed Action

Impacts on migratory birds could result from one or more of the following:

- Removal of nesting and foraging habitat during the core nesting season (March 1 to July 31)
- Removal of year-round foraging habitat
- Active nest abandonment and nestling mortality resulting from disturbances (noise and human activity)
- Permanent loss of shrub cover, thereby reducing nesting cover and substrate for birds
- Degradation of nesting habitats due to invasive and noxious weed infestations that could alter native vegetation cover and plant species composition
- Collisions with project vehicles along project access roads and highways leading to the area

- Poisoning resulting from the ingestion of toxic chemicals

Construction during the core nesting season could result in abandonment of active nests, displacement of birds, and possible mortality of nestlings, more likely early in the nesting season (egg laying and incubation) rather than late in the season (Romin and Muck 2002). The Proposed Action includes protection measures to reduce potential impacts on migratory birds, as outlined in **Section 2.1.6**. Surface-disturbing activities would not occur during the annual migratory bird nesting season, from March 1 to August 31. If surface-disturbing activities must occur during this period, pre-construction avian surveys would be conducted in appropriate habitats by qualified BLM-approved biologists not more than 7 days before activities begin. If necessary, buffers would be established, as specified in **Section 2.1.6**. In addition, most species will re-nest following a nesting failure, although the number of nesting attempts or re-nesting intensity varies among species (Marten and Geupel 1993). Also, taking an individual, nest, or eggs of a migratory bird is unlawful under the MBTA, whether or not the species will re-nest.

Nesting migratory birds could be displaced from adjacent nesting habitats, due to noise, human activity, and dust in a “zone of effect” surrounding project components. Displacement or avoidance may be short term, if it is related to noise and human presence, or long term, if it is related to habitat removal, alteration, or fragmentation. In areas where habitats are at or near carrying capacity, migratory birds in local populations could be displaced.

The temporary loss of 244.9 acres and the permanent removal of 48 acres of vegetation after implementing the Proposed Action could reduce nesting cover and substrate for birds, especially for shrub-nesting obligates. Other migratory birds observed in the project area, such as horned lark and mourning dove, nest on the ground, often near clumps of grass or other objects.

The site would be reclaimed concurrently or within 2 years after operation ceases, which should provide nesting and foraging habitat for some migratory species; however, shrubs would take longer to become reestablished. Under natural succession, it could take at least 20 years to replace shrubs that might provide suitable nesting substrates for migratory bird species.

The Proposed Action could affect bird species through degradation of nesting habitats from invasive and noxious weed infestations. This could alter native vegetation cover and plant species composition.

Additionally, noise produced by machinery, traffic, and other human activities may interfere with mate attraction, nesting site selection, pairing success, and predator alarms (Barber et al. 2009; Habib et al. 2007). Reasonable, prudent, and effective measures, such as using suitable mufflers on all internal combustion engines, could also reduce potential impacts on migratory birds.

No Action

Under the no action alternative, there would be no disturbance and no impacts on migratory birds or their habitats.

3.11 BLM SENSITIVE SPECIES

3.11.1 Affected Environment

Regulatory Background

BLM Manual 6840—Special Status Species Management

BLM Manual 6840 provides management policy for federally listed species and BLM-designated sensitive species. BLM-designated sensitive species must be native and found on BLM-administered lands. They must be species whose conservation status the BLM can significantly affect through management.

Two other factors are taken into account, as follows:

- There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend, such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range
- The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration, such that the continued viability of the species in that area would be at risk

The BLM protects and manages habitat for the enhancement and protection of the species' future existence.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (1940, as amended in 1959, 1962, 1972, and 1978) prohibits the take or possession of bald and golden eagles, with limited exceptions. Take, as defined in the act, is “to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” Disturb means to agitate or bother a bald or golden eagle to a degree that injures or is likely to injure it, based on the best scientific information available; that decreases its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or that causes it to abandon its nest by substantially interfering with normal breeding, feeding, or sheltering behavior.

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

2016 Eagle Rule

The 2016 Eagle Rule revises 50 CFR, Parts 13 and 22, regarding eagle permits and revisions to regulations for incidental take of eagles and take of eagle nests. Revisions include changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees. This rule modified the definition of the Bald and Golden Eagle Protection Act's preservation standard, which requires that permitted take be compatible with the preservation of eagles.

Nevada BLM Sensitive Species known or potentially found in the project area are outlined in **Table 3-16** and are discussed in this section.

Table 3-16
Nevada BLM Sensitive Species Known or Potentially Found in the Project Area*

Common Name	Scientific Name	Habitat	Occurrence
Plants			
Beatley buckwheat	<i>Eriogonum rosense</i> var. <i>beatleyae</i>	Low elevations, around 5,600 feet, in Great Basin scrub habitats, and also at higher elevations, around 8,745 feet, only in the Humboldt-Toiyabe Mountains. The soils include volcanic ash, deposited with high concentrations of tuff.	Potential to occur
Sand cholla	<i>Grusonia pulchella</i>	Sand on dunes, well-drained slopes, flats, and borders of dry lakes and washes in desert or sagebrush scrub, from 3,950 to 6,300 feet in elevation in western and central Nevada	Potential to occur
Watson spinecup	<i>Oxytheca watsonii</i>	Dry, open, loose or lightly disturbed, often calcareous, sandy soils of washes, roadsides, alluvial fans, and valley bottoms, in salt desert shrub communities, from 4,200 to 6,530 feet	Potential to occur
Birds			
Brewer's sparrow	<i>Spizella breweri</i>	Sagebrush and Cold Desert Scrub.	Potential to occur
Ferruginous hawk	<i>Buteo regalis</i>	Intermountain Rivers and Streams, Sagebrush, Lower Montane Woodlands	Potential to occur
Golden eagle	<i>Aquila chrysaetos</i>	Cliffs and Canyons, Sagebrush, and Lower Montane Woodland	Known
Loggerhead shrike	<i>Lanius ludovicianus</i>	Cold Desert Scrub and Sagebrush	Known

Table 3-16
Nevada BLM Sensitive Species Known or Potentially Found in the Project Area*

Common Name	Scientific Name	Habitat	Occurrence
Sage thrasher	<i>Oreoscoptes montanus</i>	Sagebrush and intermountain cold desert scrub, primarily where contiguous or interspersed with sagebrush	Potential to occur
Swainson's hawk	<i>Buteo swainsoni</i>	Agricultural lands and Intermountain Rivers and Streams	Potential to occur
Western burrowing owl	<i>Athene cunicularia</i>	Cold Desert Scrub and Sagebrush	Potential to occur
Mammals			
Big brown bat	<i>Eptesicus fuscus</i>	Caves, trees, buildings, mines, and bridges used as roost sites	Potential to occur
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>	Roosts include cliff faces, mines, caves, buildings, bridges, and hollow trees.	Potential to occur
California myotis	<i>Myotis californicus</i>	Roosts include cliff faces, mines, caves, buildings, bridges, and hollow trees.	Potential to occur
Canyon bat	<i>Parastrellus hesperus</i>	Cliff and Canyon	Potential to occur
Fringed myotis	<i>Myotis thysanodes</i>	Roosts include mines, caves, buildings, and trees.	Potential to occur
Long-eared myotis	<i>M. evotis</i>	Crevices, mines, caves, buildings, bridges, and hollow trees	Potential to occur
Long-legged myotis	<i>M. volans</i>	Crevices, mines, caves, buildings, bridges, and hollow trees	Potential to occur
Pallid bat	<i>Antrozous pallidus</i>	Rock outcrops, mines, caves, buildings, bridges, and hollow trees	Potential to occur
Spotted bat	<i>Euderma maculatum</i>	Rocky cliffs most important	Potential to occur
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	Caves and mines	Known
Western small-footed myotis	<i>Myotis ciliolabrum</i>	Cliff faces, mines, caves, buildings, bridges, and hollow trees	Potential to occur
Desert bighorn sheep	<i>Ovis canadensis nelsoni</i>	Cliffs and Canyons	Known
Dark kangaroo mouse	<i>Microdipodops megacephalus</i>	Intermountain Cold Desert Scrub and Sagebrush	Potential to occur
Pale kangaroo mouse	<i>M. pallidus</i>	Cold Desert Scrub	Potential to occur
Reptiles			
Desert horned lizard	<i>Phrynosoma platyrhinos</i>	Intermountain Cold Desert Scrub and Sagebrush	Known

Table 3-16
Nevada BLM Sensitive Species Known or Potentially Found in the Project Area*

Common Name	Scientific Name	Habitat	Occurrence
Great Basin collared lizard	<i>Crotophytus bicinctores</i>	Intermountain Cold Desert Scrub, Sagebrush, Mojave Warm Desert and Mixed Desert Scrub, Warm Desert Riparian, Lower Montane Woodlands and Chaparral, Sand Dunes and Badlands, Cliffs and Canyons, Exotic Grasslands and Forblands	Known
Long-nosed leopard lizard	<i>Gambelia wislizenii</i>	Intermountain Cold Desert Scrub, Sagebrush, Mojave Warm Desert and Mixed Desert Scrub, Warm Desert Riparian, Grasslands and Meadows, Sand Dunes and Badlands, Exotic Grasslands and Forblands, Developed Landscapes, Agricultural Land	Known

Sources: Great Basin Ecology Inc. 2009, 2017; BLM 2018

* BLM Sensitive Species list was updated in 2018 and surveys were conducted in 2017. New species were not surveyed for during baseline surveys.

BLM Sensitive Plants

The BLM Carson City District has 46 plant species listed as sensitive. The BLM sensitive species list was updated in 2018. At the time of the survey the BLM Carson City District had 34 plant species listed as sensitive. The project area was evaluated, and the potential to occur was determined for each of the 34 species. Only the Beatley buckwheat (*Eriogonum beatleyae*) was determined to have the potential to occur in the project area or in the immediate vicinity. Many of the other plant species were either wetland or sand dune dependent or were associated with forests, or the project area is out of the known geographic or elevational range of the species.

Watson spinecup (*Oxytheca watsonii*) also has the potential to occur in the project area (NNHP 2017), but it was added to the BLM sensitive species list after surveys were conducted. The BLM has identified sand cholla (*Grusonia pulchella*) near the project area; it has the potential to occur in the project area.

The Beatley buckwheat is a perennial forb that is low matted, caespitose¹⁰, and forms dense mats of yellow to reddish yellow flowers that bloom June through July. This species is found on dry, open to exposed, barren, basic, clay or rocky clay soils, or crumbling outcrops on slopes and knolls of weathering rhyolitic or

¹⁰ Growing in clusters or tufts.

andesitic volcanic deposits. This species occurs mostly on southerly to westerly aspects in the sagebrush, pinyon-juniper, mountain mahogany, and mountain sagebrush zones and is commonly associated with shadscale and low sagebrush (*Artemisia arbuscular*). Beatley buckwheat is found at elevations between 5,600 and 8,745 feet amsl (Nevada Natural Heritage Program [NNHP] 2001h).

Watson spinecup is an annual herb in the buckwheat family that is known from 10 occurrences in Eureka, Lander, Mineral, and Nye Counties in Nevada, and it also occurs in California. It grows in dry, open, loose or lightly disturbed, often calcareous, sandy soils of washes, roadsides, alluvial fans, and valley bottoms, in salt desert shrub communities, from 4,200 to 6,530 feet (NNHP 2001i).

Great Basin Ecology conducted surveys for BLM sensitive plant species on August 16 and 17, 2009, and on June 1 and 2, 2017. The project area is within the known range of elevation and the known geographic distribution for Beatley buckwheat, sand cholla, and Watson spinecup. Beatley buckwheat was surveyed for during baseline surveys. Two buckwheat species were observed during the survey, Desert trumpet (*Eriogonum inflatum*) and birdnest buckwheat (*E. nidularium*). No individuals or populations of Beatley buckwheat were observed.

BLM Sensitive Wildlife

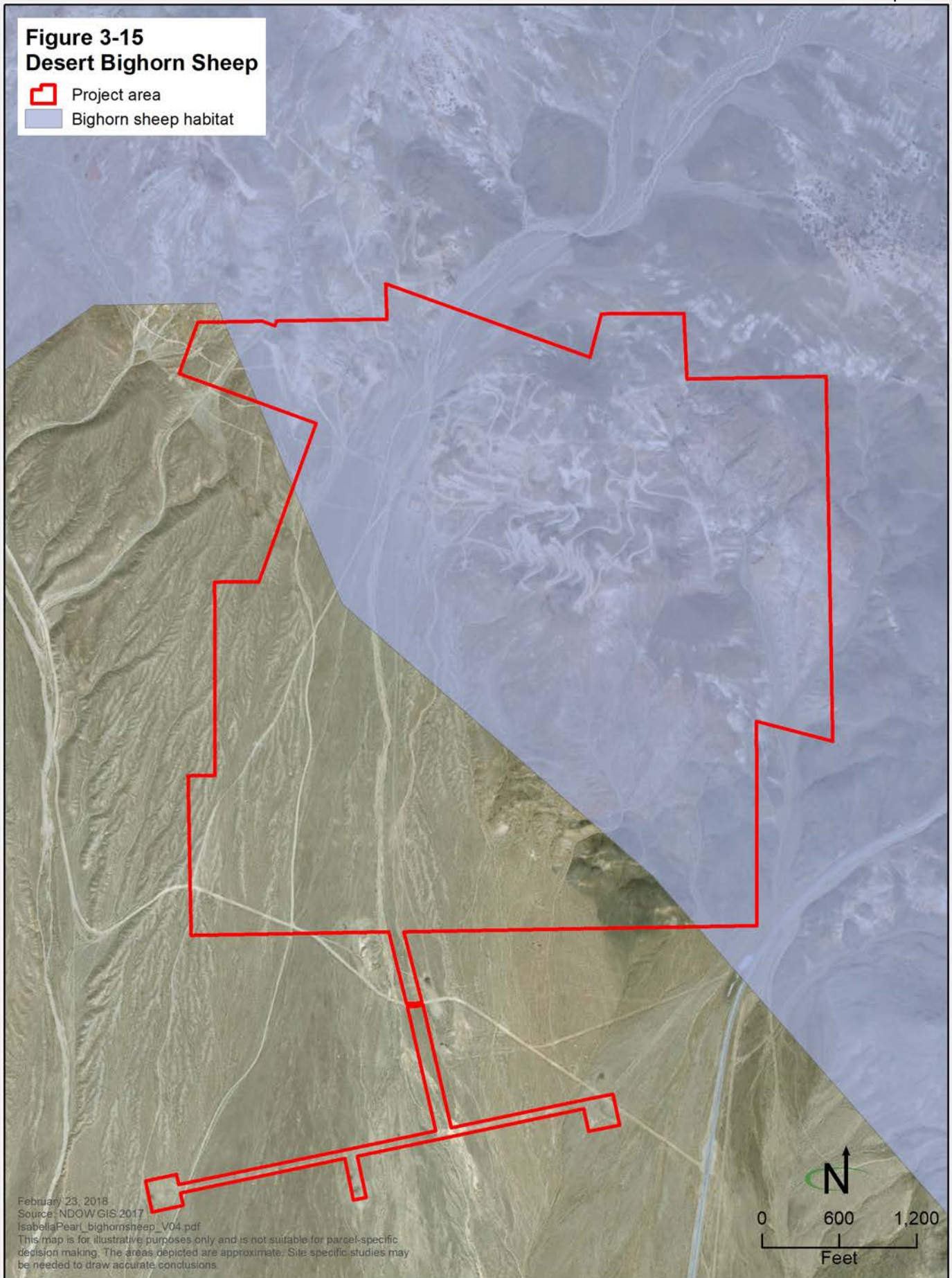
Great Basin Ecology conducted surveys for BLM sensitive wildlife on August 16 and 17, 2009, and on June 1 and 2, 2017. Before the surveys, staff assessed the species for their potential habitat in the project area. Of the 80 sensitive animal species in the Carson City District, 11 aquatic species (amphibians, fish, and mollusks) were not considered present due to the lack of perennial waters.

Mammals

Great Basin Ecology staff considered there to be potential habitat for 14 sensitive mammal species. Eleven species of bats have the potential to occur in the project area and are discussed below, along with desert bighorn sheep, dark kangaroo mouse, and pale kangaroo mouse. These species are discussed below.

The mountainous portions in the northeastern two-thirds of the project area are included in the known range of desert bighorn sheep (**Figure 3-15**, Desert Bighorn Sheep). They may use lower alluvial fans in winter. Desert bighorn sheep were observed in the project area during surveys. Signs of the species were observed in the northern portion of the project area, including grasses in the rocky areas where the species had grazed.

The 2016–2017 Big Game Status Report (NDOW 2017) indicates that the population in management unit 212 has shown a positive trend for many years; as a result, it has been used as a source population for transplanting desert bighorn sheep to other areas, most recently in 2012 and 2016.



During the 2013 aerial composition survey, a very low lamb ratio raised concerns about disease. Then, in late March 2014, a 2013 hunter-harvested ram from Lone Mountain was tested and found to be positive for *Mycoplasma ovipneumoniae*. Despite the presence of *Mycoplasma ovipneumoniae* and observations of animals showing clinical signs of disease, no significant adult mortality has been documented to date. Moreover, strong observed lamb ratios during the 2014 fall survey indicate the lamb segment of the herd did not experience unusually high mortality.

In 2014, a ewe hunt was instituted and continued for 2015 and 2016. Partially as a result of the ewe harvest and translocation, the unit 21 desert sheep population is currently showing a stable to slightly decreasing trend (NDOW 2017).

Both the dark kangaroo mouse (*Microdipodops megacephalus*) and pale kangaroo mouse (*M. pallidus*) prefer deep sandy soils, including sand dunes. The project area soils are a mixture of loams, gravelly loams, cobbly loams, sodic loams, and course gravelly loams. The washes are the only sandy sites; however, they are unstable habitats, as runoff from periodic precipitation disturbs these areas, and vegetation is limited in the sandy soils from this periodic disturbance.

These species may be present in the area between the project area and Luning, as the soils lower on the skirt fan have higher sand content. The soils on the remainder of the project area are coarse with cobble and gravel and with lesser amounts of sand. Either or both species could have been present in these more suitable sandy soils outside the project area. Neither species was observed during the 2009 or 2017 baseline survey.

Bats

Potential habitat for 11 of 16 bat species listed as sensitive is present in the project area. The BLM has records for five potential cave and bat habitat points, and NDOM has records of four AML sites in the project area. Over two dozen other cave, AML (Abandoned Mine Land), and bat potential habitat points have been documented just outside the project area boundary to the east, southeast, and north. Historic mine workings, including three adits and one shaft, were observed during baseline surveys within the project area boundary. NDOW conducted a winter use survey in March 2018 and identified four adits and two shafts in the project area.

Adit 1 was observed with a small opening. This site was less than 15 feet in length, and no guano was observed. NDOW confirmed in 2018 that this site does not serve as bat habitat.

NDOW identified Adit 2 during winter surveys. It is 30 feet deep, has no associated workings, and has a west-facing portal. This adit does not serve as bat roosting habitat.

Adit 3 is at the northeast portion of the project area and is approximately 15 to 18 feet deep. Bat guano was observed on the floor. There were no other declines, shafts, or workings connected to this shallow adit. NDOW identified it as a day roost for bats. No bats were observed in the adit during the baseline or winter survey. The amount of light penetrating the adit was sufficient to light up its entire length.

Another, more extensive adit, Hazard MI-1199, is in the area of exploration near the wash. This adit appears to be approximately 50 to 60 feet long before it forks. One fork extends an additional 15 feet, and the second fork extends an additional 40 feet, for a total length of approximately 100 feet. NDOW reported over 300 feet of workings, including several drifts. This adit has a slight grade of approximately 1 degree. No air flow was detected, and no other connecting workings were observed. There is evidence of a fairly high level of recreational use.

Bat guano was observed near the entrance and about 10 feet into the adit. It appears to be a night roost, and no bats were present within the first 15 feet of the adit. During winter surveys, NDOW observed guano in a circular pattern and scattered throughout the working. In addition, grasshopper and moth wings were observed in the main drift. This working was identified as a bat hibernation and summer maternity roost, specifically for Townsend's big-eared bat (*Corynorhinus townsendii*); it was noted in torpor during winter surveys. Pallid bat (*Antrozous pallidus*) is suspected to have a maternity colony in the working.

A shaft, Hazard MI-1200, is near Adit 3 and is partially covered with wood planks at the head frame. The horizontal shaft extends approximately 50 feet and has the potential of horizontal workings to the east, at the bottom of the shaft. This shaft was not examined internally because of safety concerns, but it does not have connectivity to any other surface feature. Bat use of this feature is unknown.

Hazard MI-1221 is an inclined shaft that is approximately 35 feet deep. This working is mostly collapsed and has no associated drifts. It does not serve as bat habitat.

No acoustic surveys have been completed to determine potential species presence or time of use of the adits and shafts with appropriate habitat.

Birds

Of the 14 sensitive bird species, potential habitat for four species (loggerhead shrike [*Lanius ludovicianus*], western burrowing owl, Brewer's sparrow [*Spizella breweri*], and golden eagle) was found in the project area during baseline surveys. Potential habitat for the sage thrasher (*Oreoscoptes montanus*), ferruginous hawk (*Buteo regalis*), and Swainson's hawk (*B. swainsoni*) may also be present in the project area. Both hawks have the potential to occur in the area, where there is potential foraging habitat. Neither species was observed during baseline surveys.

The Brewer's sparrow and sage sparrow are both common in the salt desert scrub vegetation, but sagebrush habitat is their preferred habitat (Floyd et al. 2007).

The loggerhead shrike is one of the more common species in the salt desert scrub, especially if greasewood is present. The *Nevada Bird Atlas* (Floyd et al. 2007) reported that loggerhead shrikes were widely distributed around the state and are common inhabitants of the salt desert. The project area has habitat suitable for this species, and loggerhead shrike was observed there.

The western burrowing owl is found in the salt desert scrub community. During the field survey, 33 burrows were observed. None had any indication that burrowing owls had used them for nesting in 2009 or 2017; however, the availability of burrows in this habitat provides potential habitat for this species.

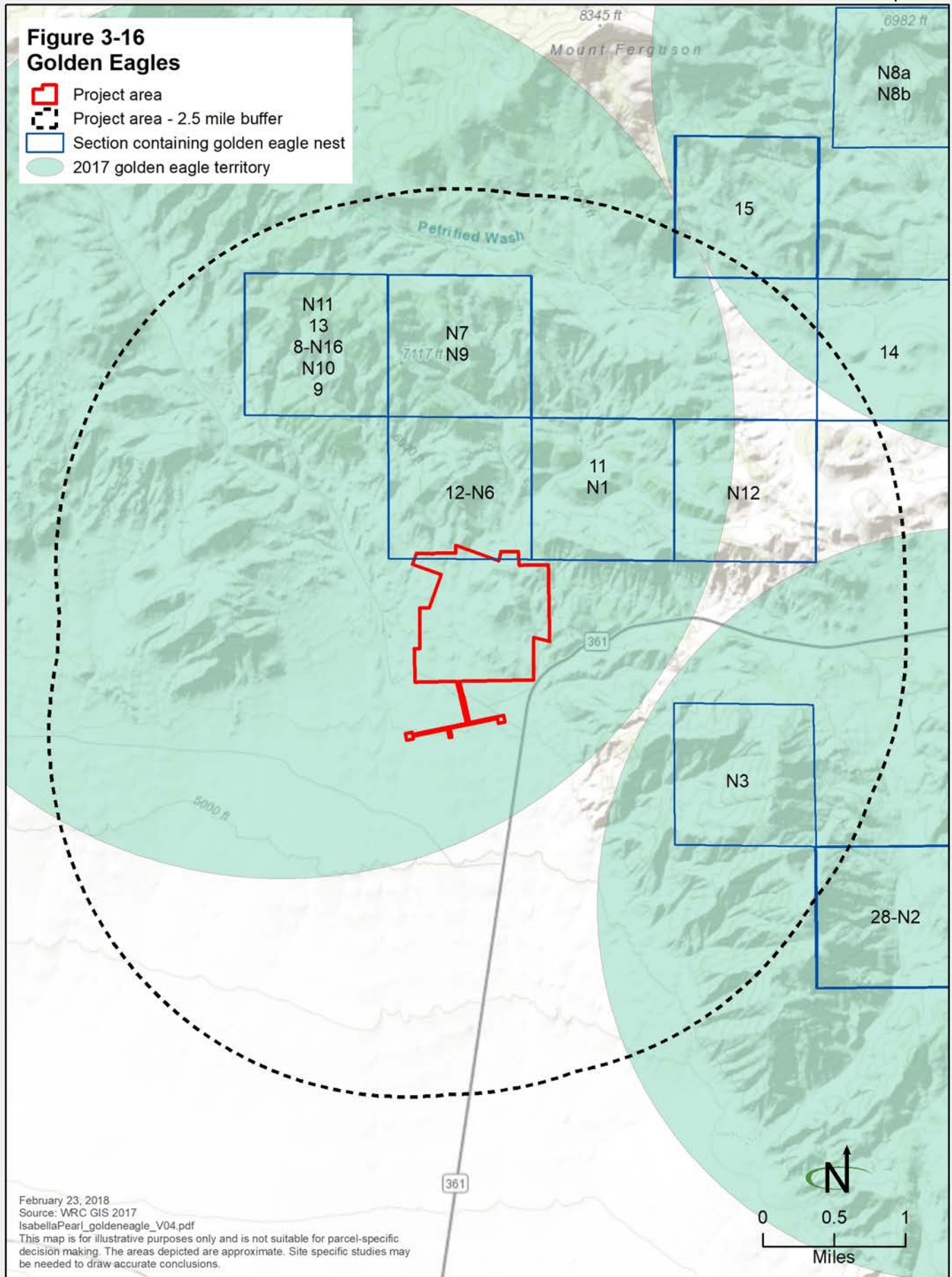
The golden eagle has potential to occur in the project area. Foraging habitat is present, but no suitable nesting habitat was identified during the field survey. In May and June 2017, Wildlife Resource Consultants LLC (WRC 2017) conducted an aerial nesting survey for golden eagles and other raptors for the Isabella Pearl project. Forty-six golden eagle nests were observed within the 10-mile buffer of the project area (see **Figure 3-16**, Golden Eagles). No golden eagle nests were found in the project area itself.

Thirteen golden eagle nests were occupied by golden eagles in 2017. Six nests were active, with eggs or young observed, while the other seven were classified as occupied, based on the presence of an adult sitting on the nest or fresh greens placed in the nest. Out of the six active nests, seven chicks were observed in June 2017. The chicks were 8 weeks of age or older and can be assumed to have successfully fledged.

The mean, project area, inter-nest distance for occupied golden eagle nests was 2.5 miles. Thirteen nests were within this area, five of which are potentially within the line of sight of some of the proposed activities. One of the nests in mean project area inter-nest distance was active in 2017, with one chick observed in both May and June. An adult was observed flying near the nest in May. The active nest nearest the project area is approximately 1.5 miles away, on a 150-foot-tall cliff, approximately 100 feet up the cliff back. This nest is potentially in the line of sight of the proposed activities. The eagle nest was also recorded as active in 2013.

Reptiles

In 2017 the desert horned lizard (*Phrynosoma platyrhinos*), Great Basin collared lizard (*Crotaphytus bicinctores*), and long-nosed leopard lizard (*Gambelia wislizenii*) were added to the BLM sensitive species list. These three reptile species are known to occur in the project area, but they were not surveyed for during baseline surveys. During the wildlife surveys, the desert horned lizard was



observed in the project area. The NDOW has wildlife occurrence points for long-nosed leopard lizard and Great Basin collared lizard.

Potential habitat may be present for the shovel-nosed snake (*Chlonactis occipitalis talpines*) in washes, dunes, sandy flats, and rocky hillsides in the project area.

State Sensitive Species

The State of Nevada regulates cacti and yucca. Digging up cactus and yucca on public or private land in Nevada is a regulated activity. On BLM-administered land, permits and tags are required. Prickly pear cactus is known to be present in the project area.

3.11.2 Environmental Consequences

Proposed Action

BLM Sensitive Plants

Due to the methods and timing of surveys, BLM sensitive plant species could have been missed during the project baseline surveys. In addition, additional species are now identified as being potentially present or are now BLM sensitive species. Before WLMC disturbs the ground, the BLM would require that it conduct sensitive plant surveys in the proposed areas of disturbance. Qualified botanists would conduct Pre-construction surveys two weeks beforehand. They would survey all known and potential occurrences of BLM sensitive and NNHP at-risk plant species in suitable habitat of the project area footprint, following BLM-approved protocol.

If sensitive plant species are identified in the project work area, WLMC would avoid impacts by flagging or fencing the area and by applying an appropriate buffer, determined by the qualified botanist and the BLM. If avoidance is not feasible, the BLM would determine the appropriate mitigation to ensure no net loss of sensitive plants. Mitigation could include transplanting sensitive species into adjacent habitat or collecting their seeds.

BLM Sensitive Wildlife

Mammals

Project activities, including construction and mining, would create noise and visual intrusion and could result in habitat fragmentation. Desert bighorn sheep would temporarily lose approximately 292.9 acres of foraging habitat and may avoid a larger area due to noise and human presence. Impacts on bighorn sheep would be similar to those for general wildlife described in **Section 3.9**.

Bats

The four adits and two shafts with evidence of use by bats observed on the project area would be removed by project activities during the construction

phase. Impacts on night roosting habitat would displace bats into adjacent habitat and may directly affect individual bats.

The Proposed Action could affect bats during construction and operation by adversely affecting foraging habitats and generating noise that could interfere with echolocation. For example, some bats use sound to capture prey; for these species, noise may serve as a fragmenting agent (Barber et al. 2009). This could result in them avoiding foraging habitat near drill rigs, vehicles, heavy equipment, and other noise sources.

Construction and operation of all project components would generate noise levels that exceed ambient levels at various distances from roads and the mining operations. Impacts from people and equipment noise are temporary (up to the life of the project) auditory irritation of individuals on or near the proposed activity areas and spatial redistribution of individuals or habitat use patterns in the vicinity. Loss or reduction of foraging habitat may adversely affect bats because they rely on summer foraging to accumulate fat reserves for hibernation or migration, depending on the species (USFWS 2008).

As outlined in **Section 2.1.6**, Environmental Protection Measures, before any construction work begins near bat roosting habitat, an experienced biologist would survey the area for potential bat habitat (including maternity habitat and hibernacula), using BLM- and NDOW-approved protocols. WLMC would work with the NDOW to survey for bat use at the adits and shafts in advance of any disturbance to these areas. The company would follow any mitigation measures proposed to protect BLM sensitive bat species. Active roosts and hibernacula would not be disturbed until bats have left the sites, and other suitable nearby adits and shafts would be protected to offset impacts.

Adit 3 and Hazard MI-1199 would be closed following appropriate bat-compatible exclusions. Adit 2 and Hazard MI-1221 do not serve as wildlife habitat and can be closed without exclusion.

A protection measure would be implemented (**Section 2.1.6**) to reduce impacts on birds and bats. To minimize light pollution, WLMC would follow dark sky lighting practices by keeping it to the absolute minimum, with the lowest level of lumens possible. Fixture locations would be in pertinent sites only, and light fixtures would be with hoods and shields and would be faced downward.

Birds

Vegetation disturbance associated with the Proposed Action could reduce nesting cover and substrate for shrub-nesting obligates such as the Brewer's sparrow and loggerhead shrike.

There is potential nesting habitat for burrowing owls in the project area, and this species may occur there. The Proposed Action would lead to a temporary

loss of approximately 244.9 acres of nesting and foraging habitat, and the permanent loss of 48 acres of nesting and foraging habitat associated with the pit.

Noise and human disturbances to nesting raptors, including golden eagles, during construction and operation can lead to nest abandonment and nestling mortality. Impacts from noise also include temporary auditory irritation of individuals on or near the proposed activity areas and temporary redistribution of individuals or habitat use patterns in the vicinity.

Under the Proposed Action (**Section 2.1.6**), WLMC would not disturb the surface within a 0.5-mile radius of any active raptor nests, which is the USFWS recommended buffer distance for golden eagles (USFWS 2002). Golden eagles are more likely to be disturbed at the five nests within the mean project area inter-nest distance and to those within the proposed project line of sight. Nests within 2.5 miles of the project area would be monitored annually for the life of the project following the methods in Pagel et al. (USFWS 2010) for ground surveys. Within 10 miles of the project area boundary, a survey would be conducted in 2018 before construction begins.

Reptiles

Surface disturbance during construction and operation could affect sensitive reptile species and small mammals. The potential impacts are direct mortality from vehicle collision and heavy equipment during ground clearing activities and habitat loss. Impacts are similar to those for general wildlife, discussed in **Section 3.9**.

Section 2.1.6 details protection measures that would minimize mortality to wildlife and sensitive species by requiring all uncapped hollow pipes to be covered or capped. In addition, other openings where wildlife escape ramps are not practicable, such as cellar well openings, would be capped or covered so they are not a trap hazard for wildlife. WLMC also would identify and remove all polyvinyl chloride mine markers within the project boundary, in accordance with State of Nevada statute or guidance.

State Listed Species

Before construction, WLMC would have a qualified BLM-approved botanist survey the project area for cacti and would secure state permits for transplanting all cacti that could not be avoided during construction. Cacti would be transplanted into adjacent appropriate habitat at appropriate timing determined by the approved botanist. Transplanted plants would be monitored annually for the life of the project. If the transplant is unsuccessful, it may be necessary to collect seeds.

No Action

Under the no action alternative, there would be no disturbance and no impacts on BLM Sensitive Species or their habitats.

3.12 LAND USE, RECREATION, AND ACCESS

3.12.1 Affected Environment

The region of influence for land use is the project area and adjacent lands. The proposed project would be on public lands in the Santa Fe Mining District of Mineral County. It is approximately 108 miles southeast of Reno and 233 miles northwest of Las Vegas (Welsh Hagen Associates 2017). The closest town is Luning, approximately 6 miles south of the project area (BLM 2011).

Land use in the project area consists of mineral exploration and development on BLM-administered land. Beyond this area, there are other mining prospects, sparse livestock grazing, wild horse herd management, and occasional recreation. The Gabbs Valley Wilderness Study Area is approximately 0.3 miles to the north of the project area (BLM 2011). Recreation and access for the area include dispersed off-highway vehicle use, periodic SRP activities, and hunting.

3.12.2 Environmental Consequences

Proposed Action

Modern mineral exploration occurred in the project area before WLMC acquired it. WLMC proposes to conduct additional mineral exploration, which would include maintaining access roads, building roads, constructing the drill pad, and conducting exploration drilling. The Proposed Action would be an open-pit mine and cyanide heap leach facility.

The proposed mine site and processing facilities would be in a district that has seen mining operations dating back to the late nineteenth century (Welsh Hagen Associates 2017). The Proposed Action would occur on public lands previously used for mineral exploration. There are no other active land use authorizations in the project area, and there would be no change in land uses as a result of the Proposed Action; therefore, there would be no impacts on land use.

The existing main entrance to the project area is a 4-wheel drive track that traverses a sharply incised drainage channel northward to reconnect to Highway 361, 6 miles east of the project area. Recreationists, including seasonal hunters and off-road vehicle enthusiasts, occasionally use this route. The road would be gated north and south of the project area during preproduction development, and a bypass would be constructed to provide continuing public access to areas to the north.

Following final mine closure, existing dirt roads and the new bypass would remain open for public access. WLMC proposes to construct a fence surrounding the mining and processing facility to prevent wildlife and the general public from entering the active mine site. Upon closure, this fencing would be removed. During mining operations at the site, public access to surrounding areas would be unaffected due to the construction of the new bypass. Temporary and long-term impacts on recreation and access would be minimal.

No Action

There would be no new impacts on land use, recreation, or access because there would be no new roads and no change in the use of project area lands.

3.13 SOCIOECONOMICS

3.13.1 Affected Environment

Hawthorne, which is approximately 25 miles west of the project, has a population of approximately 3,023 (Nevada State Demographer 2017). It has sufficient resources to provide general amenities, housing, and services. It is the home of the Hawthorne Army Ammunition Plant, which provides much of the employment in the area.

The small town of Luning is about 6 miles to the south of the project area; the population estimate is 98 (Nevada State Demographer 2017), and the town provides minimal services and amenities.

Mineral County's estimated population for 2016 was 4,449 (US Census Bureau 2017). Based on the 2010 Census, there were 2,830 housing units in Mineral County, 590 of which were vacant. In October 2017, the Mineral County labor force was 2,104 individuals, with an unemployment rate of 5.1 percent (Nevada Department of Employment Training and Rehabilitation 2017).

3.13.2 Environmental Consequences

Proposed Action

The mine would have a life span of 3 to 5 years, from preconstruction through final reclamation and site monitoring. It would employ approximately 100 to 125 people for construction, mining, processing, monitoring, and administration positions. Based on the limited workforce in Mineral County and the low unemployment rate, it is likely that the workforce would come from out of the area.

The presence of mine personnel and contract workers for the Proposed Action may cause impacts on the communities of Hawthorne, Mina, and Gabbs. These temporary workers would require housing and public services in these communities, thus increasing the demand for 3 to 5 years. Beneficial impacts would be from increased taxes and income in these communities, which may spur secondary businesses and employment, thus bolstering economic activity.

No Action

Under the no action alternative, there would be no new demands for goods and services or for housing; however, there would also be no beneficial impacts associated with increased economic activity.

3.14 VISUAL RESOURCES MANAGEMENT

3.14.1 Affected Environment

Visual resources are the visible physical features on a landscape, such as land, water, vegetation, animals, and structures. The BLM manages visual resources through its visual resource management (VRM) system. VRM classes provide the visual management standards for the design and development of future projects and for rehabilitating existing projects (BLM 1984). The VRM classes are based, in part, on information from a visual resource inventory (VRI), which is a means for determining the visual values of BLM-administered lands (BLM 1986a).

VRI Classes I to IV are the categories that the BLM uses to classify the visual character of the landscape; they are a way to communicate the degree of visual quality in the area. Generally, VRI Class I indicates high visual quality, and VRI Class IV indicates low visual quality. For more information on the VRI process, refer to BLM Handbook H-8410-1, VRI (BLM 1986a).

A visual resource inventory involves identifying the visual resources of an area and assigning them to inventory classes using the BLM's resource inventory process. The process involves rating the visual appeal of a tract of land (scenic quality evaluation), measuring public concern for scenic quality (viewer sensitivity level analysis), and determining whether the tract of land is visible from travel routes or observation points (delineation of distance zones). This process is described in detail in BLM Handbook H-8410-1, VRI (BLM 1986a).

The region of influence for visual resources is a 3-mile buffer around the project area. This distance was selected because it falls within the foreground-middle ground distance zone of the BLM VRM system. This zone includes areas seen from highways, rivers, or other viewing locations that are less than 3 to 5 miles away (BLM 1986a). All of the BLM-administered lands in the region of influence are undesignated for a VRM class, except for the Gabbs Valley Wilderness Study Area approximately 1/2 mile to the north of the proposed site; it is designated as VRM Class I (BLM GIS 2017).

The visual resource inventory process rates landscapes as A, B, or C as well as VRM Classes I through IV. The project area and surrounding lands were given a scenic quality evaluation rating of B, which is given to lands with a medium level of scenic quality (BLM GIS 2017). This rating, along with the sensitivity level analysis and delineation of distance zones, resulted in most of the project area receiving a VRI Class IV designation, except for 10 acres that received a VRI Class III designation. The VRI Class III acres are in the southernmost area of the Proposed Action.

Lands in the project area are viewable from US Highway 95 to motorists traveling eastward from Hawthorne and those traveling north on State Route 361 near Luning. Also, portions of the project area may be visible from viewpoints on high mountain peaks more than a mile away from the project

area. These peaks are accessible only to hikers, and they lack archaeological, historic, and natural features that might attract visitors (BLM 2011).

The project area is in the Basin and Range province, a major physiographic region of the western United States. The region is typified by north-northeast-trending mountain ranges, separated by broad, flat alluvium-filled valleys. This type of landscape allows for long viewing distances. Locally, the mountain ranges trend northwesterly, making this area rather anomalous in relation to typical Nevada physiography. Elevations in the project area range from a minimum of 5,240 feet in the valley to a maximum of 5,829 feet at the uppermost elevation (Welsh Hagen Associates 2017). The proposed activities would be on the alluvial fan and foothills of the Gabbs Valley Range. The slopes and fan have a southern aspect (BLM 2011).

The Gabbs Valley Range forms the backdrop for views of the project area. The natural forms of the mountains are pyramidal, with angular lines. The alluvial fan and valley floor appear flat. The colors of the mountains are light tan to dark brown. The valley and alluvial fan soils are gray to light brown. The texture of the mountains is coarse, and the texture of the valley floor is fine. A power transmission line and a two-track road in the valley add linear elements (BLM 2011).

The vegetation on the mountains is patchy and discontinuous, due to past mining disturbance, rock outcrops, and variations in soil characteristics. The vegetation at lower elevations is also patchy, but the patch size is much larger and appears continuous. The texture of the vegetation is coarse on the mountains and fine textured at lower elevations. Depending on viewing location, evidence of historic mining is not very apparent (BLM 2011).

3.14.2 Environmental Consequences

Proposed Action

Because the project area is undesignated for VRM classes, the VRI classes form the basis for analysis in this section.

When assessing scenic quality, seven factors are considered: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. The Proposed Action has the highest potential to change landform, vegetation, and color. Viewer sensitivity and distance zones would not be affected by the Proposed Action, so the analysis focuses on proposed activities that would change the scenic quality rating. Changes to the scenic quality rating can change the VRI class designation for the area.

The expected life of the mine is 3 to 5 years from the start of preproduction development to final reclamation. During this time, changes to the form, line, color, and texture of the landscape would be noticeable. Earthmoving would alter the form and line of the terrain by replacing rounded and curved features

with flat and angular ones. As the surface is moved and vegetation is removed, newly exposed soils with different colors would become visible. This would also create new lines of vegetation and alter the texture of the landscape.

These impacts would occur only where the surface is moved and vegetation is removed; however, not all the impacts would be visible to the public. For example, the mine pit would not be visible from public roadways, but the mine waste rock dump and heap would be visible from public access roads. These direct impacts would last until the area is reclaimed.

During mineral development and operations, there would be vehicles, equipment, and materials in the Proposed Action area. Their color and geometric, boxy forms would contrast with the terrain and vegetation. The rigid vertical elements would create various focal points on a mostly open landscape and would not mimic other landscape elements, which are mostly vegetation. Their color would not resemble the muted tans and greens of the terrain and vegetation. These direct impacts would last until the area is reclaimed.

The mine would be in operation 24 hours a day, 7 days a week. Lights would be used to illuminate work areas. This would affect dark skies by adding artificial sources of illumination that would increase ambient light levels at night. This direct impact would last for the duration of the Proposed Action.

The above impacts on visual resources during operations would be enough to lower the scenic quality rating for the area from B to C; however, reclamation would reduce the intensity of visual changes to the landscape. Every attempt would be made to minimize the impact on visual resources from these activities.

Note that activities from the Proposed Action that lower the scenic quality rating of the project area would not also lower the VRI class rating for most of the project area. This is because all but 10 acres of the project area are already in VRI Class IV, which is the lowest rating; consequently, the 10 acres with a VRI Class III designation are where the Proposed Action would have the greatest potential for lowering the VRI rating from VRI Class III to VRI Class IV, due to a scenic quality rating change from B to C.

Design, construction, project maintenance, and reclamation are all planned to prevent unnecessary or undue degradation of lands affected throughout the life of the Proposed Action and on closure. The goals of the reclamation plan are to reestablish productive post-mining land use and to provide for long-term public safety and site stabilization.

Measures to be taken to prevent unnecessary and undue degradation from the Proposed Action are as follows (Welsh Hagen Associates 2017):

- Surface disturbance would be minimized while optimizing the recovery of mineral resources. Grading plans are based on careful

cut-and-fill balances to reduce surface disturbances to the extent practicable.

- Where suitable as a growth medium, surficial soils and alluvial material would be managed as a topsoil resource and would be removed, stockpiled, and replaced during reclamation.
- A reclamation plan would be implemented, specifying earthwork and contouring, revegetation, and stabilization.

In addition, the Proposed Action includes protection measures (**Section 2.1.6**) that would minimize impacts, such as the use of light shields, directional lighting, disturbed areas reclamation, and screening berms.

Reclamation activities are detailed in the Plan of Operations and Reclamation Plan (Welsh Hagen Associates 2017). Reclamation would reduce, but not eliminate, the visual contrasts created by mining. This would result in minor to moderate long-term impacts on visual resources, depending on the outcomes of reclamation activities.

No Action

There would be no new impacts on visual resources, because there would be no new mineral development from the Proposed Action and no change in the use of project area lands.

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CHAPTER 4

CUMULATIVE IMPACTS ANALYSIS

The CEQ (40 CFR, Subpart 1508.7) formally defines cumulative impacts as follows:

...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

For the purpose of this EA, the cumulative impacts are the sum of all past, present (including proposed actions), and reasonably foreseeable future actions (RFFAs). The purpose of the cumulative analysis in this EA is to evaluate the significance of the Proposed Action's contributions to cumulative environmental impacts.

As required under NEPA, this chapter addresses those cumulative effects on the environmental resources in the Cumulative Effects Study Areas (CESAs) that could result from implementing the Proposed Action and No Action Alternative, past actions, present actions, and RFFAs. The extent of the CESA varies by resource, based on the geographic or biological limits of the specific resource and is specified for each resource analysis below.

The time frame considered to be most appropriate for evaluating the incremental effects of RFFAs is the extent of the Proposed Action (3 to 5 years). The reasonable scope of the cumulative analysis would be restricted to connected, cumulative, and similar actions to the Proposed Action within the CESA.

Only those resources analyzed in **Chapter 3** that were found to have impacts from the Proposed Action are carried forward into the cumulative impacts analysis. They are the following:

- Geology and minerals
- Soils
- Air quality
- Water resources (quality and quantity)
- Vegetation and invasive, nonnative, and noxious species
- General wildlife
- Migratory birds
- BLM sensitive species
- Socioeconomics
- Visual resources

The Proposed Action would have minimal or no impacts on land use, recreation, and access (**Section 3.12**); therefore, they are not carried forward for analysis under cumulative impacts.

4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Past actions are those whose impacts on one or more of the affected resources have persisted to present day. Present actions are those occurring at the time of this evaluation and during implementation of the Proposed Action. RFFAs constitute those actions that are known or could reasonably be anticipated to occur in the analysis area for each resource, within a time frame appropriate to the expected impacts from the Proposed Action.

The past and present action and RFFAs applicable to the assessment area are identified in **Table 4-1**, below. A past and present action within approximately three miles of the project area is Liberty Utilities' Luning Solar Plant. The 50-megawatt solar generation plant, located along State Route 361 near Luning, has been in operation since April 2017. In addition to the facility there is a 120-kV power line that connects the plant to NV Energy's Table Mountain substation 1.6 miles away.

A past action in the project area was a right-of-way (ROW) for an NDOT mineral material pit, serial number NVCC-021188. WLMC talked with NDOT, which relinquished the ROW.

RFFAs include an expanded exploration project and discovery of additional adjacent mineralization. Future mineral discoveries in the surrounding area could also affect the resource environment. Other RFFAs may include an increase in motor vehicle recreation, future public land sales, improvements in the condition of grazing allotments, installation of livestock and wildlife watering facilities, and naturally occurring wildfires.

Table 4-1
Past, Present, and RFFAs Applicable to the CESA

Project Name or Description	Status (X)		
	Past	Present	Future
Livestock grazing	X	X	X
Recreation	X	X	X
Invasive weed inventory and treatments			X
ROW authorizations	X		X
Mining exploration and development	X	X	X
Sand and gravel operations	X		X
Mineral exploration		X	X
Range improvements			X
Luning Solar Plant	X	X	

Only those resources analyzed in **Chapter 3** that were found to have impacts as a result of the Proposed Action are carried forward into the cumulative impacts analysis.

4.2 CUMULATIVE IMPACTS ON GEOLOGY AND MINERALS

The CESA for geology and minerals is the immediate Gabbs Valley Range. Surface-mining affects geology and mineral resources through excavating, modifying, or covering natural topographic and geomorphic features and by removing mineral deposits.

The impact on geologic resources from mining in the region since the early 1900s has been the displacement of material and removal of minerals. This changes the overall geology of the area being mined. Past mining disturbances in the area are a 400-foot drift mine at the Isabella Deposit excavated in the 1930s, a small heap leach pad constructed in the early 1980s, and drill roads and pads constructed in the late 1980s and early 1990s for exploration.

At this time, none of these disturbances have been reclaimed; however, because much of this disturbance lies within the current project area, they would be encompassed in the reclamation plan for this project.

The one other mine site in the CESA, the Santa Fe Mine, has been closed and reclaimed. The Santa Fe Mine is approximately 1 mile southeast of the proposed project area. The first ore from the mine was produced in 1883, following its discovery in 1879. Exploration of the property began again in 1979, and in 1983 Lacana Gold, Inc., became operating partner of the property. Subsequently, Homestake Mining Company acquired the property. The mine was active from 1988 to 1994, extracting microscopic gold in an open-pit sodium cyanide heap leaching operation. Reclamation of the site began in 1989, and on completion in 1999, Homestake received the Nevada Excellence in Mine Reclamation Award for overall mine reclamation.

Homestake enhanced wildlife habitat by installing two small game, water guzzlers within the site boundaries, servicing a significant chukar partridge population. Homestake also constructed a big game guzzler off-site for a reintroduced population of desert bighorn sheep. The company closed the abandoned mine using the innovative Foarn System. It closed 19 openings permanently without adverse environmental impacts. The methods of Homestake's reclamation would serve as a template for future reclamation in the project area.

Present actions are related to exploration in the project area, as well as other possible mining and exploration activities in the Gabbs Valley Range vicinity.

The Proposed Action, combined with other past and reasonably foreseeable future mining operations, would continue to remove mineral deposits and modify or cover natural topographic and geomorphic features in the CESA.

4.3 CUMULATIVE IMPACTS ON SOIL RESOURCES

The CESA for the soil resources is the immediate watershed encompassing the project area and totaling 2,741 acres.

A past action is 44.46 acres of soil disturbance that occurred before WLMC's involvement in the property. There are other areas of soil disturbance in the vicinity, including old mining prospects, but the total area of these disturbances cannot be quantified. The Luning Solar Plant disturbed approximately 560 acres in the CESA.

Reasonably foreseeable future actions in the CESA for soils include the discovery of additional mineral resources and potential for expanding the proposed mining footprint; however, exploration drilling in the project area and vicinity indicates that the current mineral resource is bounded on all sides by non-mineralized material.

Cumulative impacts on the soils environment include an additional 292.9 acres of temporary soil disturbance planned for the Proposed Action (6 percent of the CESA). Reclamation of the project area lands would restore soil conditions in order to reestablish productive post-mining land use and to provide for long-term public safety and site stabilization.

The proposed excavated mine pits would, however, be a long-term impact, as they would not be reclaimed (see **Section 3.5, Soils**). In addition to mining, off-highway vehicle use and livestock grazing would continue to affect soils in the CESA; however, because there are no other known actions that would disturb large quantities of soils in the CESA, no substantial cumulative impacts are anticipated.

4.4 CUMULATIVE IMPACTS ON AIR QUALITY

The CESA for the air quality resource environment is hydrographic area 121A, the east part of Soda Spring Valley in the Central Region. There are no past actions that continue to cause emissions or affect air quality.

Present actions in the CESA that may have impacts on air quality are dispersed and permitted recreation, occasional SRPs, and mining exploration. RFFAs in the CESA that may contribute to emissions are dispersed and permitted recreation, mining of undiscovered resources, and civil engineering projects, including road maintenance and gravel extraction from pits. Potential wildfires could also contribute to impacts on air quality.

Cumulative impacts in the CESA for air resources would result from the present actions and RFFAs, when combined with the Proposed Action. The lack of significant past and present actions causing emissions in the CESA indicates that the cumulative impacts of the Proposed Action would be minimal; however, air pollution emissions created by these actions would be regulated by the Bureau of Air Pollution Control, and impacts on air quality would be reduced to levels consistent with ambient air quality standards.

4.5 CUMULATIVE IMPACTS ON WATER RESOURCES

Mining operations under the Proposed Action could affect water quantity and quality. The CESA for water quality is the Soda Spring Valley Hydrographic Basin, defined by the Nevada Division of Water Resources as hydrographic areas 121A and 121B. Impacts on water quantity would be a result of groundwater withdrawals; impacts on water quality would come from runoff, surface water sedimentation, and groundwater contamination.

4.5.1 Surface Water

As stated in **Section 3.7**, there are no receiving surface water bodies in the project area or immediate vicinity, other than intermittent or ephemeral drainages. Runoff and sedimentation in the project area would be minimized by the use of standard protection measures consistent with the NDEP permit; consequently, impacts on surface water quality through sedimentation would be minimal.

All springs and seeps in the region of the project area are uphill from and upgradient of the Proposed Action. Their water quality could not be affected by the Proposed Action or any foreseeable future mining activities at the site. This is because there is no pathway, either aboveground or below, that could transmit mining constituents to the springs.

There is little potential for groundwater withdrawals under the Proposed Action or foreseeable future actions at the project site to affect seeps and springs. This is because they are hundreds of feet upgradient of the proposed mine activities, and proposed groundwater withdrawals are in hydrogeologic regimes that are different from the springs, as explained in **Section 3.7**.

Stormwater from catchments above the mine would be routed in a channel underneath mining operations to their original drainage patterns. Additionally, groundwater withdrawals are too deep to interact with surface runoff. Accordingly, there is no significant impact on surface water runoff quantity or vested surface water rights (NV permit V06208) near the mine under the Proposed Action or foreseeable mining activities.

4.5.2 Groundwater

Groundwater withdrawals associated with most mine processing operations are regarded by the Nevada Division of Water Resources to be temporary allocations. In contrast, withdrawals for agriculture and municipal uses tend to be more permanent. Cumulative impacts from irrigation are unlikely because both basins (I21A and I21B) are restricted by State Order Number 824, denying the use of groundwater for irrigation.

There are no nearby stockwater wells. Groundwater is not likely to be used for livestock, because the water table is at 845 feet, too deep to make nearby development for stockwater economically feasible.

There are no active public supply water wells within a 5-mile radius of the Proposed Action; however, the Town of Luning has groundwater rights for municipal needs slightly more than 5 miles south of the main production well-field proposed for the mine. The temporary groundwater withdrawal under the Proposed Action does not significantly affect groundwater resources near Luning for two reasons. First, municipal production has ceased, because the water does not meet drinking water standards; second, the groundwater withdrawals under the Proposed Action would not have sufficient volume or duration to affect the potential supply at Luning.

4.5.3 Mine Pit

WLMC does not expect to encounter groundwater during pit excavation; however, significant gold resources exist below the proposed mining depths. It is foreseeable that WLMC or another company in the future might desire to mine deeper to extract that ore, depending on market conditions.

Future expansion of the surface mining at the project with depth beyond the Proposed Action may require backfill or risk creating an acidic pit lake. Additionally, such a future proposal would expand the generation of sulfidic waste rock and ore. This would require careful management and evaluation to prevent impacts on groundwater from acid mine drainage. Those factors would require evaluation at the time, if and when such future actions are proposed.

4.5.4 Mine Operations

The sulfide ore stockpile, the HLP, and the WRDF have been designed to reduce any potential for surface water or groundwater contamination. Similar production and management strategies at other mine claims would not likely produce significant cumulative impacts; however, if significant expansion of

mining at this site or at other claims in the area were proposed in sulfide zones, cumulative impacts associated with those proposals would require careful evaluation due to the potential for ARD.

4.5.5 Summary of Cumulative Water Resources Impacts

Surface water impacts from past and present actions have been limited in the range of influence area, due to the lack of surface water resources. Surface water is limited to periodic runoff from storms, and there is no indication of other activities that would produce cumulative impacts on the quality of that runoff water.

Groundwater has been temporarily affected from withdrawing groundwater for the Santa Fe Mine and the town of Luning. The withdrawal of water for the Santa Fe Mine has ceased. The withdrawal of water for the Town of Luning has also ceased, because groundwater beneath Luning fails to meet Safe Drinking Water Act quality requirements. Groundwater systems have had years to recover; groundwater modeling and pump tests demonstrate that withdrawals under the Proposed Action would not have significant cumulative impacts on groundwater quantity.

The potential for impacts on groundwater quality from the Proposed Action are discussed in **Section 3.7**. There is no indication of other activities in the project area that would have produced additional cumulative impacts on groundwater quality.

4.6 CUMULATIVE IMPACTS ON VEGETATION AND INVASIVE, NONNATIVE, AND NOXIOUS SPECIES

The CESA for vegetation resources, including nonnative, invasive, and noxious species, is the immediate watershed encompassing the project area, totaling 2,740 acres.

Cumulative impacts from the Proposed Action would be minimal. The Proposed Action would result in the temporary loss of 292.9 acres, which is 8 percent of the CESA. Past actions affecting the vegetation resource environment are the Luning Solar Plant on approximately 560 acres and 47 acres of disturbance that occurred through exploration and mining. Past vegetation disturbance from mining in the area are from a small heap leach pad constructed in the early 1980s and from exploration disturbance from drill roads and pads built in the late 1980s and early 1990s. Two nonnative, invasive vegetation species, halogeton and Russian thistle, may have been introduced during historic mining or recreational use. Other minor areas of vegetation disturbance in the CESA are historic mining prospects, but the total area of these cannot be quantified.

After operations are completed at the project site, approximately 244.9 acres of disturbance would be reclaimed, thereby reducing the long-term cumulative impacts of the project; however, the excavation of the proposed mine pits would result in a long-term impact on 48 acres of vegetation. Through the use

of standard protection measures, nonnative, invasive vegetation species would be controlled and thus would not contribute to cumulative impacts on vegetation.

In addition to mining, off-highway vehicle use and livestock grazing would continue to affect vegetation in the CESA; however, because there are no other known actions that would disturb large quantities of vegetation in the CESA, no substantial cumulative impacts are anticipated.

4.7 CUMULATIVE IMPACTS ON WILDLIFE

The CESA for wildlife is a 2-mile buffer around the project area, encompassing 14,100 acres.

Cumulative impacts from the Proposed Action would be minimal. Past actions affected 47 acres of wildlife resources through exploration and mining activities. Past wildlife habitat disturbance from mining in the area was on a small HLP constructed in the early 1980s and exploration disturbance, including drill roads and pads. Other minor areas of wildlife habitat disturbance in the CESA area are historic mining prospects, but the total area of these disturbances cannot be quantified.

There could be impacts from future mining, cattle grazing, dispersed and permitted recreation, and loss of vegetation cover from wildfires.

The Proposed Action would temporarily remove 292.9 acres of wildlife habitat in the project area. After operations are completed, approximately 244.9 acres of disturbance would be reclaimed, thereby reducing the long-term cumulative impacts of the project. Based on the analysis in **Section 3.9**, impacts on wildlife from the Proposed Action, in combination with past and present actions and RFFAs, would be minimal.

4.8 CUMULATIVE IMPACTS ON MIGRATORY BIRDS

The CESA for migratory birds is the wildlife CESA, which includes a 2-mile buffer around the project area, encompassing a total of 14,100 acres.

Cumulative impacts from the Proposed Action would be minimal. Past actions affect 47 acres of disturbance to migratory birds that occurred through exploration and mining. Past habitat disturbance from mining in the area was from a small HLP constructed in the early 1980s and exploration disturbance for drill roads and pads. Other minor areas of habitat disturbance in the CESA area are historic mining prospects, but the total area of these disturbances cannot be quantified.

There could be impacts from future mining, cattle grazing, dispersed and permitted recreation, and loss of vegetation cover from wildfires.

The Proposed Action would temporarily remove 292.9 acres of wildlife habitat in the project area. After operations are completed at the project, approximately 244.9 acres of disturbance would be reclaimed, thereby reducing the long-term cumulative impacts of the project. Based on the analysis in **Section 3.9**, impacts on wildlife from the Proposed Action, in combination with past and present actions and RFFAs, would be minimal.

4.9 CUMULATIVE IMPACTS ON BLM SENSITIVE SPECIES

The CESA for BLM Sensitive Species is the wildlife CESA, which includes a 2-mile buffer area surrounding the project area encompassing a total of 14,100 acres.

As stated in **Section 3.10**, no direct or indirect impacts on any BLM sensitive plant species are anticipated.

Past actions disturbed 47 acres of BLM sensitive species habitat through exploration and mining. Past wildlife habitat was disturbed by mining operations in the area, specifically a small HLP constructed in the early 1980s and exploration disturbance, including drill roads and pads. Other minor areas of wildlife habitat disturbance in the CESA are historic mining prospects, but the total area and locations of these disturbances cannot be determined; therefore, it is unknown if these past actions resulted in impacts on BLM sensitive species.

There could be impacts from future mining, cattle grazing, dispersed and permitted recreation, and loss of vegetation cover or BLM sensitive species from wildfires.

The Proposed Action would temporarily remove 292.9 acres of wildlife habitat in the project area. Approximately 244.9 acres of disturbance would be reclaimed, thereby reducing the long-term cumulative impacts of the project. Based on the analysis in **Section 3.10**, Migratory Birds, implementing measures to protect BLM sensitive species from the Proposed Action would make the resulting impacts, in combination with past and present actions and RFFAs, minimal.

4.10 CUMULATIVE IMPACTS ON SOCIOECONOMICS

The CESA for socioeconomics is Mineral County.

Present actions and RFFAs in the CESA that could contribute to socioeconomic impacts are continued exploration for precious metals, operation of the Luning Solar Plant, and dispersed and permitted recreation. These actions are not clearly defined or are speculative and cannot be quantified within the socioeconomic CESA; therefore, the cumulative impacts from the Proposed Action would be similar to those discussed for the Proposed Action in **Section 3.13**, Socioeconomics.

4.11 CUMULATIVE IMPACTS ON VISUAL RESOURCE MANAGEMENT

The CESA for visual resources is a 3-mile buffer around the project area. This distance was selected because it falls within the foreground-middle ground distance zone of the BLM VRM system. The foreground-middle ground zone includes areas seen from highways, rivers, or other viewing locations, which are fewer than 3 to 5 miles away (BLM 1986a).

Past actions include the Luning Solar Plant on approximately 560 acres and the disturbance of 44.5 acres caused by mining and exploration by previous operators. Minor isolated mining prospects also are visible from short distances. Past and present recreation creating new roads and loss of vegetation from wildfires would also contribute to cumulative impacts on visual resources.

Mineral development and operations under the Proposed Action would result in impacts on the visual resources. Reclamation would reduce, but not eliminate, the visual contrasts created by mining. This would result in minor to moderate long-term impacts on visual resources, depending on the outcomes of reclamation. The Proposed Action, in combination with the past, present, and RFFAs, would result in cumulative impacts in the CESA; however, these impacts could be consistent with the VRM classification for the area, once it is designated.

4.12 MONITORING

Monitoring is outlined in the plan of operations (Welsh Hagen 2017). No additional monitoring has been identified.

CHAPTER 5

PERSONS, GROUPS, OR AGENCIES CONSULTED

On March 15, 2011, during the preparation of this EA, the BLM notified the public of the Proposed Action on the BLM Stillwater Field Office internet homepage. The process used to involve the public included a public scoping program conducted by the Stillwater Field Office.

Staff from the BLM and Environmental Management and Planning Solutions, Inc. (EMPSi), the contractor that prepared and reviewed this EA, are listed in **Table 5-1**.

Table 5-1
Resource Specialists

Name	Title
Bureau of Land Management	
Kenneth R. Collum	Stillwater Field Manager
Jason Wright	Archaeologist
Kenneth Depaoli	Geologist
Dave Schroeder	Environmental Compliance Specialist
Michelle Stropky	Hydrologist
Dan Erbes	State Office Hydrologist
Mark Mazza	Rangeland Management Specialist/Weed Coordinator
Melanie Hornsby	Outdoor Recreation Planner, Planning and Environmental Coordinator
Linda Appel, Mark Mazza/, and Stacy Sylvester	Rangeland Management Specialists
Melanie Cota	Wildlife Biologist
Keith Barker	Fire Ecologist
EMPSi	
Jennifer Thies	Project Manager, Recreation, Transportation, and Access Specialist
Laura Patten	Senior Environmental Planner
Gregory Kipp	Hydrologist and Geochemical Specialist
Daniel Robison	Senior Biologist

Table 5-1
Resource Specialists

Name	Title
Meredith Zaccherio	Senior Biologist
Kevin Doyle	Cultural Resources Specialist
Derek Holmgren	Soils, Noise, Visual, Land Use, Public Health and Safety Specialist
Amy Cordle	Air Quality Specialist
Jenna Jonker	GIS Database Specialist
Jacob Accola	GIS Database Specialist
Randolph Varney	Technical Editor
Cindy Schad	Word Processor

CHAPTER 6

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