# 2.0 Description of Alternatives Including the Proposed Action

## 2.1 Introduction

This chapter describes the Proposed Action as depicted by Rodeo Creek Gold Inc (RCG) in the Plan of Operations (PoO) Amendment (NVN-076802), Transition from Underground Exploration to Full-scale Mine Production, Hollister Mine Project and supporting plans (RCG 2012). Chapter 2.0 also presents the No Action Alternative and other alternatives that are analyzed in the environmental impact statement (EIS), as well as other potential alternatives that were considered but eliminated from detailed analysis. The Bureau of Land Management's (BLM's) preferred alternative is identified in Section 2.6.

### 2.1.1 Background

The proposed project is located within the Ivanhoe Mining District on the northern end of the Carlin Trend in northeastern Nevada. Exploration and mining activities have occurred in the Ivanhoe Mining District over the past 100 years to locate and extract mercury, molybdenum, uranium, silver, and gold. U.S. Steel Corporation, Galactic Resources/Touchstone Resources Corporation, Newmont Exploration Limited (Newmont), Hecla Ventures Corporation (Hecla), and Great Basin Gold Ltd all have been involved in gold exploration in the vicinity of the Hollister Site.

Newmont Mining Corporation's (Newmont) Ivanhoe Mine, was the largest of the mines, and operated in the district from 1990-1992. Surface mining activities at the Ivanhoe Mine resulted in a total of 268 acres of disturbance that included two open-pits (the East Pit and the West Pit) and heap leaching operations that continued until 1996. An estimated 116,000 ounces of gold were extracted from Newmont's Ivanhoe Mine operations. Newmont is continuing the reclamation and closure activities for the previous open pit mine, although much of the surface disturbance has been reclaimed.

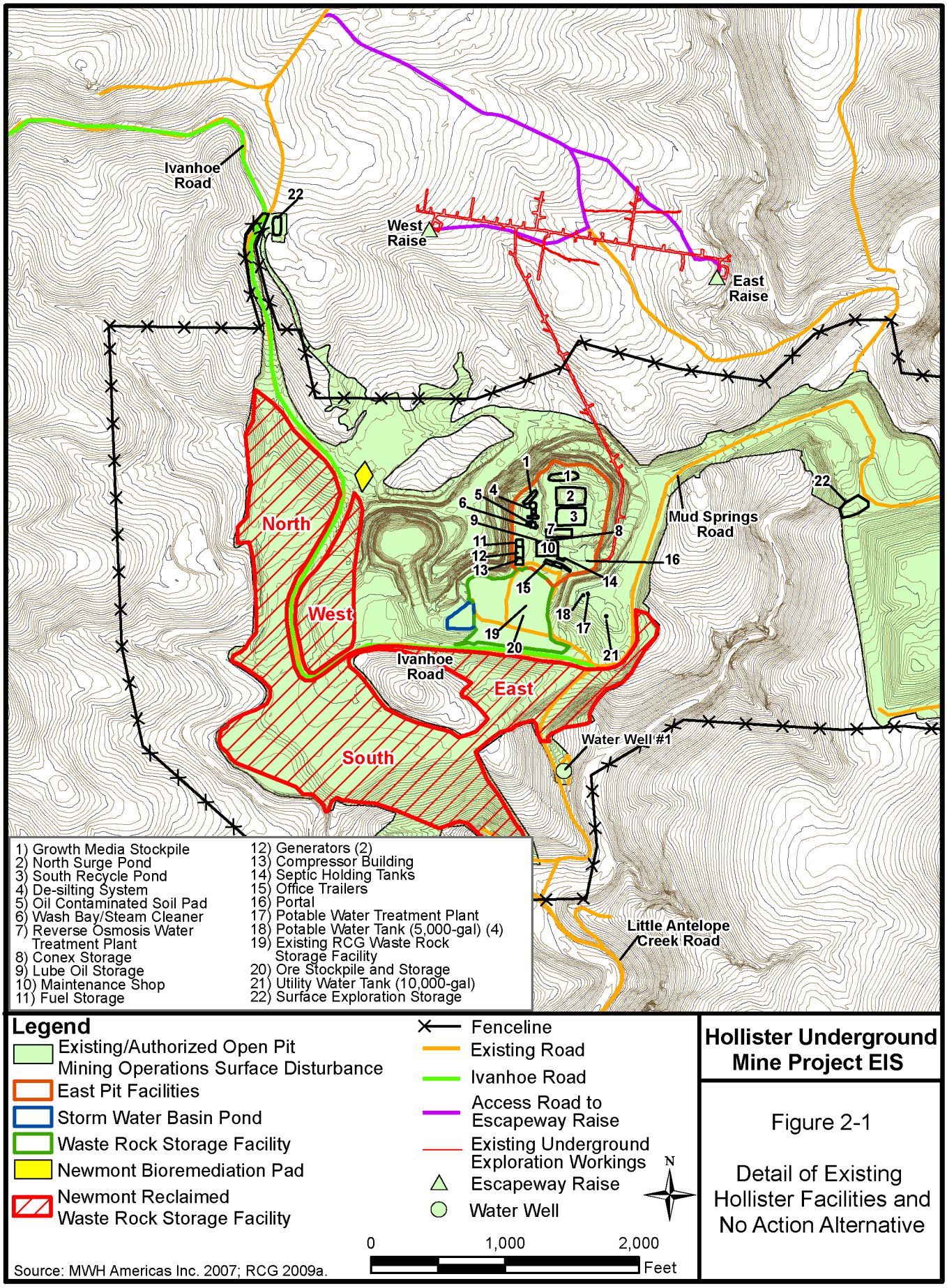
There are four Newmont reclaimed waste rock storage facilities (WRSFs) from previous surface mining activities. These four WRSFs (North, West, South, and East) have been reclaimed by Newmont and are shown in **Figure 2-1**. The North, West, South, and East reclaimed WRSFs cover approximately 15, 16, 6, and 26 acres, respectively (Shepherd Miller 1998).

A summary of the previous PoOs, Notices, and environmental assessments (EAs) for the Hollister Site is provided in **Table 1-2**. Surface exploration in the area also has occurred under numerous Notice-level projects.

## 2.2 Existing Hollister Operations

The Hollister Site is located approximately 20 miles southeast of the community of Midas (**Figure 1-1**) within the Little Antelope Creek drainage in the historic Ivanhoe Mining District. Primary existing facilities associated with underground exploration operations are shown in **Figure 2-1** and **Figure 2-2**, and are described below:

- Underground exploration facilities including the portal, decline, associated groundwater pumping system, water pipelines, and underground explosives storage;
- An existing lined WRSF and bulk sample stockpile area;
- Water handling and treatment facilities including associated pumps and piping, de-silting plant, reverse osmosis (RO) water treatment plant, water tanks, recycle pond, surge pond, Rapid Infiltration Basins (RIBs) and associated monitoring wells, storm water control basins, and diversion channels;

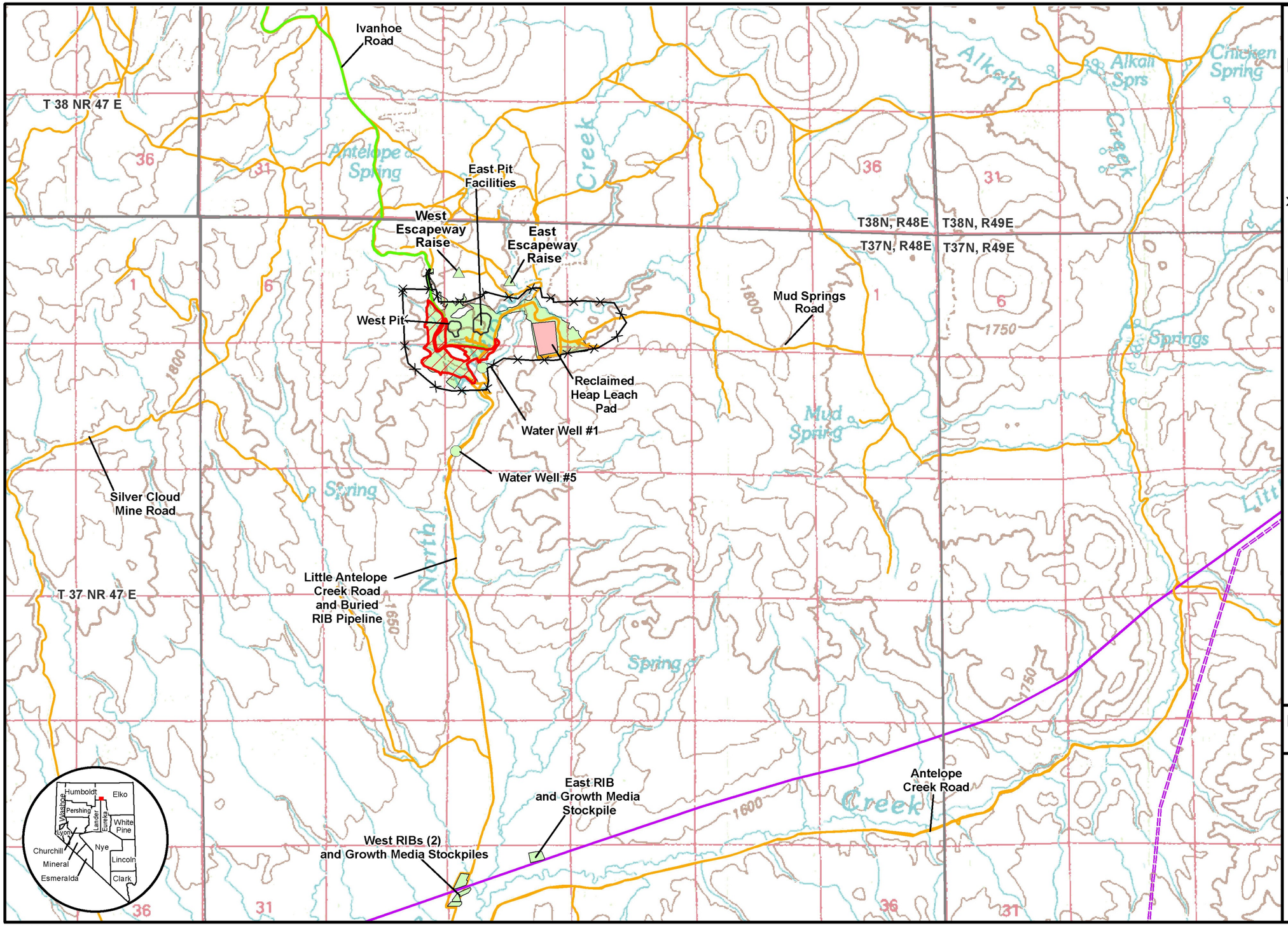



**Hollister Underground Mine Project EIS**

Figure 2-1

Detail of Existing Hollister Facilities and No Action Alternative

3/19/2012




## Legend

**Existing/Authorized Surface Disturbance or Facilities**

- Mining Disturbance
- Water Well
- Escapeway Raise
- Road
- Ivanhoe Road
- 345-kV Transmission Line
- 120-kV Transmission Line
- Fenceline
- Newmont Reclaimed Waste Rock Storage Facilities
- Reclaimed Heap Leach Pad

Source:BLM 2010a; RCG 2009a.

N

0 0.5 1 Miles

**Hollister Underground Mine Project EIS**

Figure 2-2

Overview of Existing Hollister Facilities and No Action Alternative

3/19/2012

- East and West raises for underground escapeways and ventilation and associated access roads;
- Ancillary support facilities including offices, maintenance facilities, diesel fuel storage, diesel generators, water well and potable water treatment plant, water tanks and associated pipelines, vehicle and equipment wash bay, access and haul roads, septic system, and equipment supplies storage areas; and
- Surface exploration drilling activities including the drill sites for exploration holes, monitoring wells, equipment and supply storage area, water wells, and roads.

### 2.2.1 Work Force

Approximately 160 people, consisting of both employees and independent contractors, perform the existing exploration and bulk sampling activities at the Hollister Site. Existing workers predominately live in the community of Winnemucca, although some live in Elko, Spring Creek, Carlin, and Battle Mountain. RCG provides bus, van, or other vehicle transportation to and from the Hollister Site for workers living in Winnemucca.

### 2.2.2 Access Roads

Ivanhoe Road (**Figure 2-2**), the primary access route to the site, is located in Township 37 North (T37N), Range 48 East (R48E), Section 5; T38N, R48E, Sections 29, 30, 32; and T38N, R47E, Section 1. The 9-mile segment of the Midas-Tuscarora Road, from the Midas Mine to the Ivanhoe Road turnoff and the 9-mile segment of the Ivanhoe Road to the Hollister Site is maintained by RCG in accordance with the agreement between RCG and Elko County for the Midas-Tuscarora Road (County road), and the terms and conditions for the right-of-way (ROW) for the Ivanhoe Road (aka BLM Road 1065). The maintenance measures would enhance safety, reduce the risk of ore haulage incidents, minimize sediment reaching local streams, and reduce dust generation from the road. Maintenance activities include grading ("blading"), snow removal, and use of a dust suppressant such as magnesium chloride, depending on the time of year and road conditions.

The existing Little Antelope Creek Road (**Figure 2-2**) is minimally maintained by RCG. The road is occasionally bladed to provide safe access to the RIBs but not to widen the road. The buried water pipeline from the Hollister Site to the RIBs is located in the center of the Little Antelope Creek Road.

Mud Springs Road, Silver Cloud Mine Road, and Antelope Creek Road also are occasionally used by vendors and employees for mine access (**Figure 2-2**). However, RCG does not perform maintenance on these roads or promote their use as access roads to the Hollister Site.

The access roads to the East and West raises would be minimally maintained on an as-needed basis.

### 2.2.3 Surface Exploration

Because the limits of the Hollister ore body are not fully defined, RCG conducts surface and underground exploration work on the Hollister mining claims to further delineate known ore zones and to target potential mineralized resource areas. Drilling is conducted to determine the grade of ore deposits or confirm that an area contains no economically recoverable gold. Surface exploration activities consist of surface geologic or geophysical surveys, access road construction or maintenance, drill site construction and drilling, and exploration or condemnation hole drilling programs (surface and underground).

Surface exploration currently is conducted on the previously approved areas identified as the Craig Notice, Hatter Notice, and Ivanhoe Surface Exploration PoO areas (**Table 2-1**). The exploration plan and notice areas are depicted on **Figure 2-3**.

**Table 2-1 Surface Exploration Plan and Notices**

| BLM Number Reference | Reference | Authorized Disturbance | | |
|---|---|---|---|---|
| | | Public Acres | Private Acres | Total Acres |
| NVN-075619 | Craig Notice | 5 | 0 | 5 |
| NVN-071201 | Hatter Notice | 5 | 0 | 5 |
| NVN-071014 | Ivanhoe Surface Exploration Plan of Operations | 18 [1] | 0 | 18 |
| **Total** | | **28** | **0** | **28** |

[1] Includes 3 acres of surface disturbance for water well #5 and associated water system facilities (i.e., pipeline, pump house, water tank, and roads).

Source: BLM 1993a.

The water well #5 water system (**Figure 2-3**) consists of water well #5, a water tank, buried pipeline, pump house, and associated roads. The surface disturbance associated with this water system is 3 acres. This system was transferred to RCG and has been utilized by RCG for exploration. This water system is currently permitted in the Ivanhoe Surface Exploration PoO.

#### 2.2.3.1 Surface Exploration Road Construction and Maintenance

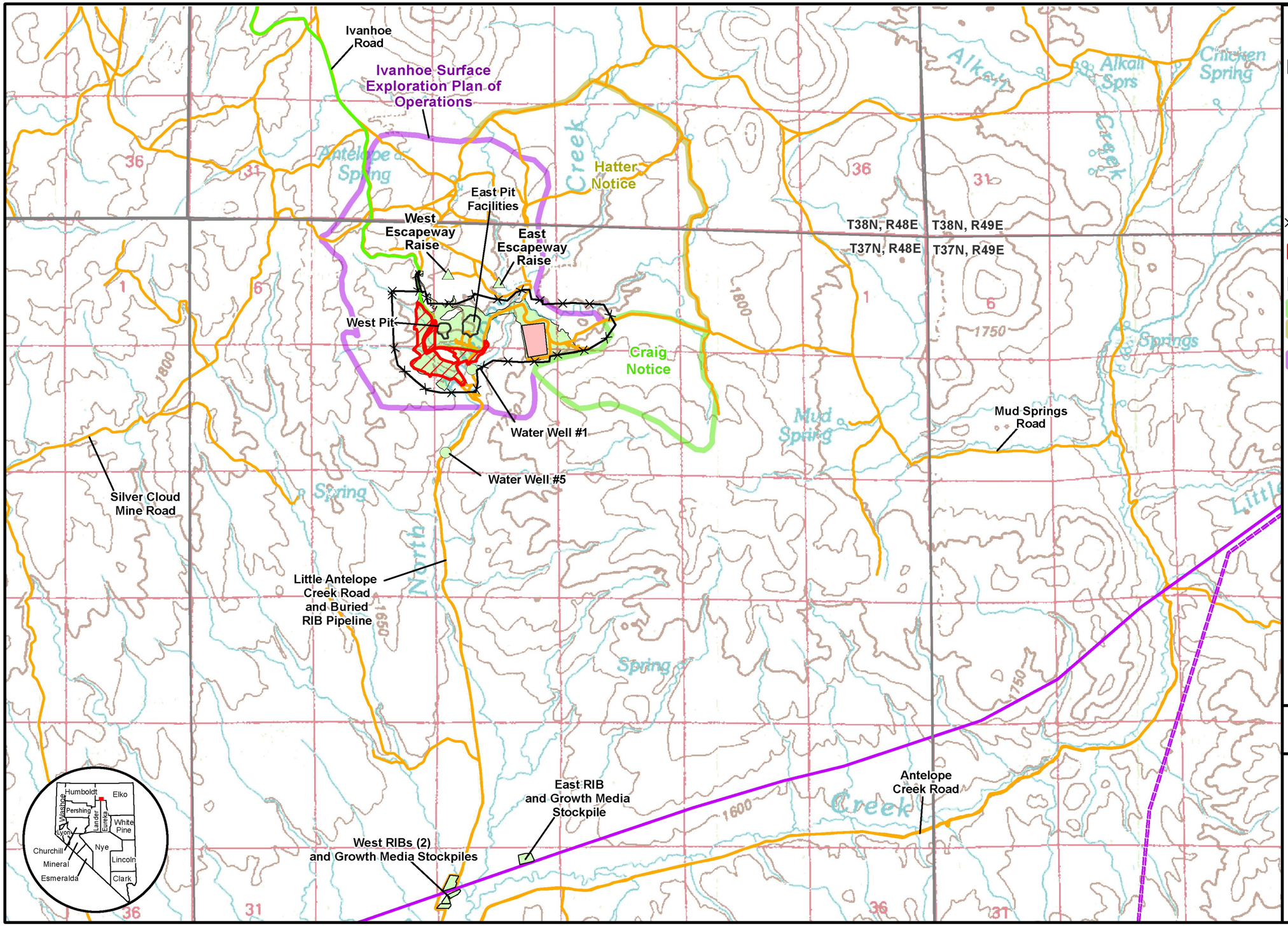
For exploration drilling, existing drill sites are used when possible. Existing “two-track” roads and overland (cross-country) travel are used wherever possible to access drill sites. New temporary access roads are constructed to include a maximum width of 20 feet, of which 12 feet is roadbed surface. Exploration roads are not routinely maintained, and the roads are included within the disturbance acreages. New access roads and road maintenance must be approved by the BLM. Maintenance activities, when necessary, consist of grading and/or gravelling and are conducted within the existing roadbed disturbance. Drainage crossings may be graveled to prevent deepening or widening. If necessary, a culvert would be placed in a drainage crossing temporarily to provide access and to minimize blading disturbance.

#### 2.2.3.2 Surface Exploration Drill Site Construction

Drill sites are approximately 50 feet by 85 feet (about 0.1 acre in size) and must be approved by the BLM. RCG erects a temporary perimeter fence around each drill site prior to mobilization of the drill rig. Each drill site may be utilized to drill one or more exploration holes. Blading drill sites is rare and must be authorized by the BLM.

#### 2.2.3.3 Surface Exploration Drilling

Approximately 30 to 40 surface drill sites with associated exploration drilling activities per year are permitted. New drill sites are established concurrently while previous drill sites are reclaimed. RCG is currently permitted for up to 25 acres of unreclaimed surface disturbance for exploration activities at any given time. Reclaimed areas released by BLM are not included in calculating the 25 acres. The three acres of surface disturbance associated with water well #5 are not included in surface exploration acreages. Permits allow up to four drill rigs on-site at any time, but RCG currently only uses one drill rig which has been voluntarily customized for use in this area. Drilling support equipment includes water trucks, crew trucks, tanks, pipe trucks or skids, portable toilets, light plants, and product storage pallets, all contained within the 50-foot by 85-foot permitted drill site.




## Legend

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- Fenceline
- Newmont Reclaimed Waste Rock Storage Facilities
- Reclaimed Heap Leach Pad
- Craig Notice Boundary
- Hatter Notice Boundary
- Ivanhoe Surface Exploration Plan of Operations Boundary

Source:BLM 2010a; RCG 2009a.

N

0 0.5 1 Miles

**Hollister Underground Mine Project EIS**

Figure 2-3

Exploration Plan and Notice Boundaries

2/27/2012

RCG has established a 150-foot by 150-foot (0.52-acre) storage area to support exploration drilling (**Figure 2-1**). The bulk of the material stored in this area consists of non-hazardous types of drilling additives such as bentonite clay, biodegradable detergents, viscosity modifiers, biodegradable polymers, and cement. Drill pipe, mobile equipment, and driller supply trailers also are kept at the storage area.

The average drill hole depth ranges from approximately 900 to 1,000 feet. Maximum depths reach 3,000 feet or more. In areas where the depth of the mineralized zones are known, RCG uses reverse-circulation drilling to access the area above the known mineralized zones before switching to core drilling. The depths of reverse-circulation drill holes average from 500 to 1,500 feet, but may reach beyond 1,500 feet.

Currently RCG recycles drill fluids back to the drill rig using portable sumps, or collects drill cuttings in straw bale catchment basins, thus meeting BLM standards to achieve zero discharge.

### 2.2.4 Underground Exploration and Bulk Sampling

#### 2.2.4.1 Underground Access and Development

RCG accesses the underground workings with a ramp (also called a decline or decline ramp). The ramp begins at the portal at an elevation of 5,500 feet above mean sea level (amsl) and travels underground at a grade of 12 percent to the underground workings at an elevation of 5,060 feet amsl (RCG 2011b). These ramps are designed to be 16 feet wide by 17 feet high and provide access to different elevations or levels within the mine. RCG establishes the main services (e.g., air, water, ventilation, ore/waste rock haulage, and water discharge) along the ramps.

Main haulage drifts are approximately 16 feet wide by 17 feet high. These drifts are essentially parallel to the strike of the vein or stope system and serve as haulage ways for ore, waste rock, equipment and supplies, and personnel.

Crosscuts typically branch from the main haulage drifts to access the veins (or stopes). Vertical or inclined sections into the crosscuts, called slots, are approximately 15 feet wide by 15 feet high. The slots target veins through non-mineralized rock. After removal, the non-mineralized rock is waste rock that is either transported to the surface and placed in a surface WRSF or used underground as stope (excavated area produced during extraction of ore-bearing rock) backfill material.

#### 2.2.4.2 Exploration and Development Drilling

Drilling is currently being accomplished with the use of jumbo, long hole, or jackleg drills, depending on the underground conditions. The holes are loaded with an ammonium nitrate fuel oil mixture or an emulsion blend and subsequently detonated. Blasting is performed under safety procedures required by the Mine Safety and Health Administration (MSHA).

#### 2.2.4.3 Ore Sampling

Bulk samples are extracted daily and assayed to determine gold and silver values. Bulk sampling tonnages vary based on the grade of ore. Currently, bulk samples range from 280 to 400 tons per day (tpd).

#### 2.2.4.4 Loading, Hauling, and Ore Storage

Ore removed from the underground operation is hauled to the surface by truck and temporarily stored on leveled areas (approximately 200 feet by 200 feet) on top of the existing RCG WRSF (an engineered and fully lined facility) (**Figure 2-1**).

#### 2.2.4.5 Underground Test Mining Techniques

The main factors that influence the selection of underground mining methods, which currently are still being tested, for the Hollister operation bulk sampling program include:

- Width of vein;
- General geometry of the deposit;
- Physical (rock mechanic) characteristics of the veins and wall rock;
- Equipment productivities;
- Ability to use waste rock or backfill in the mine stopes; and
- Economic viability.

The Hollister deposit is composed of relatively high-grade narrow veins. RCG engineers selected narrow vein test methods of underground mining (**Figure 2-4**) based on experience gained from actual bulk sampling and test mining at the Hollister operation in combination with rock mechanics analyses and detailed mine feasibility studies. The vein systems at the Hollister Site are steeply dipping and range in thickness from a few inches to over 10 feet, but they typically average between 2 and 4 feet in thickness. The vein systems at the Hollister Site generally begin at the unconformity between the Tertiary- and Ordovician-age formations that lie approximately 250 to 500 feet below the surface (RCG 2009a).

Exploration drilling and test mining at the Hollister operation occurs from approximately 500 to 2,000 feet below the surface. The primary access from the surface for personnel and equipment to the underground workings is via the existing decline that is approximately 16 feet wide and 17 feet high.

A typical Hollister stope (excavated area produced during extraction of ore-bearing rock), is approximately 300 feet in length. Stope mining width varies depending on vein width; a nominal 3- to 5-foot width is typical, but the stope width may increase to 10 feet depending upon actual vein width. An average vertical height for a typical stope is approximately 110 feet (RCG 2009a).

RCG has tested up to four narrow vein mining methods to extract the ore depending on the factors mentioned at the beginning of Section 2.2.4.5. These methods include:

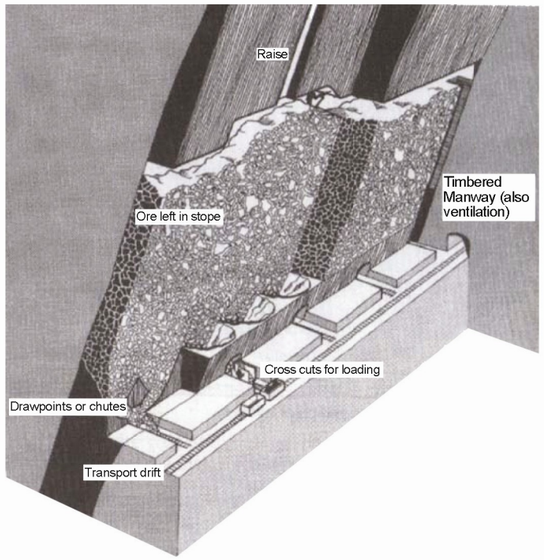
- Shrinkage stoping;
- Cut and fill stoping;
- Long hole stoping; and
- Thermal fragmentation.

<u>Shrinkage Stoping</u>

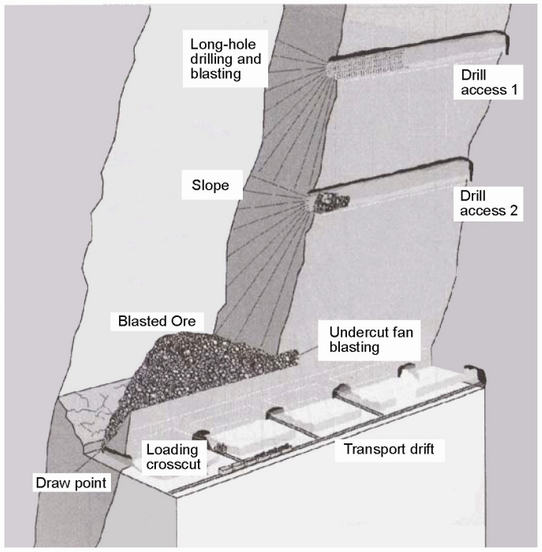
During shrinkage stoping, ore is excavated in horizontal slices, starting at the bottom of the stope and advancing upward (**Figure 2-4**). Part of the broken ore is left in the mined-out stope, and that broken ore serves as a “working platform” for mining the ore above and to support the stope walls. Shrinkage stoping is typically used in steeply dipping veins that exceed the angle of repose, with firm ore that has regular ore boundaries, or with a comparatively stable hanging wall and footwall.

Through blasting, rock increases its occupied space (swell factor). Therefore, blasted rock must be removed during mining to maintain suitable clearance between the back and the top of the blasted ore. When the stope has advanced to the upper border of the planned stope (top of the economic vein), mining is stopped, and the remaining ore is drawn down in the stope and recovered in the mineralized vein, also known as the drawpoint.

## Shrinkage Stoping with Cross-cut Loading

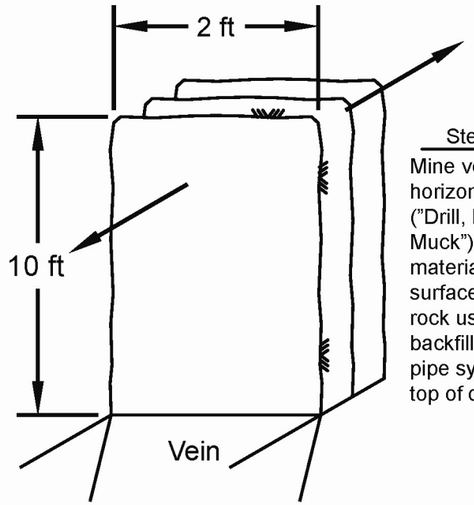



## Long-Hole Stoping

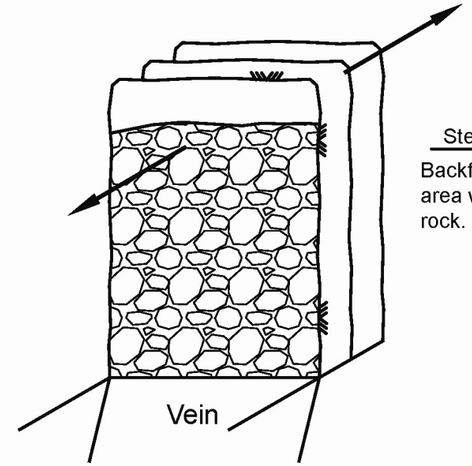



Images from "Underground Mining Methods - Engineering Fundamentals and International Case Studies", Edited by William A. Hustrulid and Richard L. Bullock 2001.

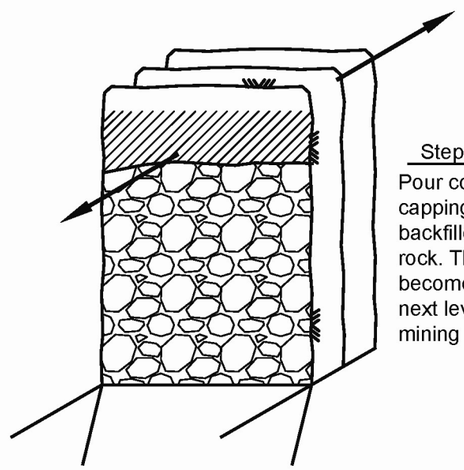
## Typical Cut & Fill Mining and Backfill Sequence



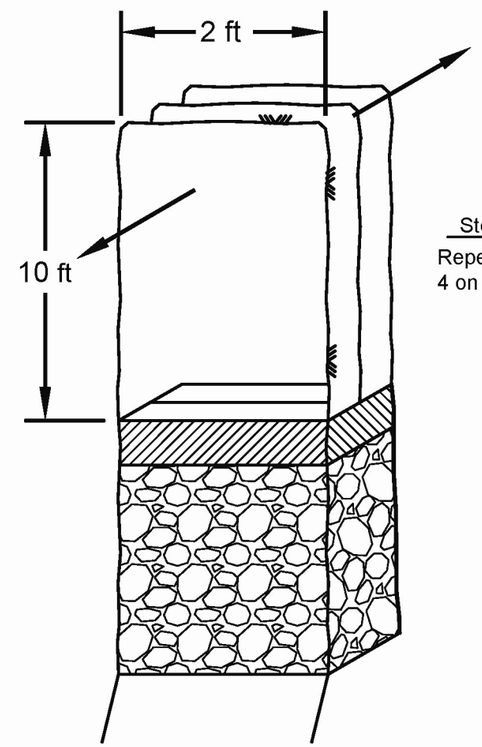

Step 1
Mine vein out in horizontal drift ("Drill, Blast & Muck"); ore material taken to surface. Waste rock used for backfill; install pipe system along top of drift.




Step 2
Backfill mined-out area with waste rock.



Step 3
Pour concrete capping on top of backfilled waste rock. This capping becomes floor for next level of mining in vein.




Step 4
Repeat steps 1, 2 3, & 4 on next (upper) lift.

**Hollister Underground Mine Project EIS**

Figure 2-4

Typical Narrow Vein Underground Mining Techniques

Note: All dimensions shown are approximate and not to scale.

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The development of shrinkage stoping involves the following steps: 1) haulage drift is driven parallel to the vein; 2) crosscuts are driven at right angles to the haulage drift to intersect the drawpoint; 3) an undercut or complete bottom slice of the stope is taken out at the sill (bottom of the stoping block); and if accessible 4) a raise from the undercut is excavated to the level above for ventilation and backfill.

The development of the bottom section of the stope can be simplified with finger raises deleted and replaced by crosscuts that are used for drawpoint loading of ore material. Drilling and blasting are conducted as overhead stoping, using air-leg rock drills, known as stopers. The rough pile of ore in the stope prevents the use of mechanized equipment.

Cut and Fill Stoping

This mining method uses waste rock as backfill material in the mined-out area (**Figure 2-4**). Actual mining occurs along the strike of the vein in a horizontal slice. After ore is drilled, blasted, and removed from the horizontal slice length of the stope, manways and mill holes are raised and waste rock material is backfilled into the mined-out area. A concrete cap is then poured on top of the backfilled rock. This concrete cap serves as the floor for the subsequent slice of the vein and provides a smooth working surface for mining equipment. Ore losses are minimized because the concrete floor eliminates the rocky voids that would occur if mining were conducted on a floor of backfilled waste rock.

A typical slice is 3 to 4 feet wide by 6 to 8 feet high. Horizontal mining in the vein occurs by drilling to a depth of approximately 6 to 8 feet in the current working back of stope. Drill holes are loaded with explosives and blasted. Once blasted, ore is removed by an air-operated slusher.

Long Hole Stoping

In this mining method, ore is recovered in open stopes that can be backfilled after the stope is mined (**Figure 2-4**). Between stopes, ore sections are set aside for pillars to support the hanging wall. Pillars are normally shaped as vertical beams across the ore body. Horizontal sections of ore, known as crown pillars, also are left to support mine workings above the producing stope.

Long hole stoping is used for mining veins with: 1) a steep dip, 2) stable rock in the hanging wall and footwall, 3) competent ore and non-mineralized rock, 4) regular ore boundaries, and 5) vein width is between 3 and 10 feet wide.

Drifts for long hole drilling are created inside the vein between main levels. These are strategically located because these are the points from which the long hole rigs drill the blast pattern. The drill pattern specifies where blast holes are to be collared and the depth and the angle of each hole, all of which must be set with precision to achieve a successful cut.

Drawpoints are excavated below the stope bottom for safe removal (mucking) of ore from long hole methods, which would be loaded into trucks for haulage to the surface.

Thermal Fragmentation

Two lateral drifts are driven approximately 50 feet apart through a mineralized block of ore to be mined. Thermal holes are drilled approximately 10 feet apart along the mineralized length of the block to be mined. Heat in excess of 1,800 degrees Fahrenheit (°F) is utilized in these thermal holes to fragment the ore. Blast holes are drilled then shot between the thermal holes. The blasted muck is then loaded into trucks and hauled to the surface.

### 2.2.5 Waste Rock Management

Waste rock removed during bulk sampling varies from 350 to 500 tpd and is transported and placed in the existing RCG WRSF. Any draindown water from material placed on the existing RCG WRSF is collected in the synthetically lined wet well sumps beneath the existing RCG WRSF. The collected

draindown water, if any, is then pumped and treated in the water treatment facilities (described in Section 2.2.6, Water Management) located in the East Pit. After treatment, clean water is routed via buried pipeline to the existing RIBs located near the confluence of Little Antelope Creek and Antelope Creek (**Figure 2-2**). Material used as backfill is occasionally stored temporarily in the underground workings.

The existing RCG WRSF, as currently permitted (**Figure 2-1**), has an approved design capacity of 612,000 cubic yards ($yd^3$) with a surface disturbance of 7.2 acres. Approximately 307,000 tons of waste rock has been placed in the WRSF. The available capacity of the existing RCG WRSF is approximately 786,800 tons with a permitted height of 120 feet. On average 612,000 $yd^3$ is equal to approximately 1,100,000 tons at 0.0662 tons per cubic foot density (RCG 2011b). This WRSF was permitted and approved without a stability analysis because it is located in the bottom of an existing open pit.

Because most of the rock placed within the WRSF is potentially acid generating (PAG), the facility is fully lined and managed in accordance with the approved Nevada Division of Environmental Protection (NDEP) Water Pollution Control Permit (WPCP) (WPCP #NEV-2003107) as follows:

1. The area beneath the WRSF was lined with a low permeability barrier and synthetically lined wet well sumps;
2. A layer of dolomite was placed on top of the layer of filter sand. Dolomite also is layered within the waste rock at intervals and at the mixing ratio of 1.2:1. This ratio was previously approved by the NDEP for the existing RCG WRSF at the Hollister Site. However, BLM requires that neutralizing agents be applied in a 3:1 buffering capacity ratio;
3. Any draindown water in the WRSF is collected and contained in wet well sumps and sent to water treatment facilities in the East Pit;
4. Any standing water in the wet well sump is sampled, collected, and treated in the Hollister RO plant or the de-silting facility as needed so that this water does not adversely affect Waters of the State; and
5. Treated water is discharged in accordance with NDEP WPCP Permit NEV-2003114 into the existing RIBs.

Past acid-base accounting (ABA) test results for the Hollister waste rock have consistently indicated that the estimated average total pyritic sulfur content of the Hollister waste rock would be 1.26 percent. Therefore, ABA calculations predict approximately 118 tons of calcium carbonate ($CaCO_3$) (1.26% of pyritic sulfur x 31.25 tons of $CaCO_3$ x 3 for a 3:1 ratio = 118.13 tons of $CaCO_3$) would be required to effectively neutralize 1,000 tons of waste rock from the Hollister Site.

Quarterly samples of waste rock are collected and subjected to meteoric water mobility procedure (MWMP) and ABA tests; HCT tests typically are conducted for initial characterization rather than on a routine, periodic basis. RCG also has established groundwater monitoring wells downgradient of the WRSF. RCG submits quarterly WPCP reports to the NDEP and the BLM that includes this information.

Waste rock characterization is performed utilizing ABA, MWMP, and humidity cell test (HCT) methods. Test protocols are summarized below (Walker and Associates 2003).

ABA testing is performed to identify rock types with potential for acid generation. ABA testing in 2003 followed the methods described in the British Columbia Research Initial Test. Waste rock samples were ground to minus 100 mesh, dried to 60 degrees Celsius (°C), and then used for the sulfur assays and titration tests. Total sulfur and sulfate were analyzed in the sulfur assays. The acid production potential of the sample, expressed as kilograms (kg) of $CaCO_3$ per ton of sample, is calculated on the basis of the sulfide content of the sample, which is the total sulfur minus the sulfur in sulfate form. In the titration test, 10 grams of ground waste rock sample is suspended in 100 milliliters (ml) of distilled water and stirred for

15 minutes during which time the natural pH of the sample is recorded. The sample is titrated to pH 3.5 with 1.0 Normal sulfuric acid. The total volume of acid added is recorded and converted to kg of $CaCO_3$ per ton of sample. This is the acid consuming ability of the material. An estimate of the potential for excess acid production is obtained by comparing the acid production potential and the acid consumption ability. A ratio smaller than one indicates the material may potentially be acid producing, while a number above two may suggest that acid generation is unlikely (Walker 2011; Walker and Associates 2003).

Kinetic testing was performed based on the British Columbia HCT for assessing the rates of acid generation from the different waste rock types. The HCT consisted of adding distilled water to 200 grams of waste rock ground to a particle size of less than 2 millimeters. The sample was spread evenly across the bottom of a column 30 centimeters (cm) in length and 11.5 cm in diameter. Each week, 200 ml of water was added to the sample and the drainage water was collected in a beaker; the pH was measured and plotted on a graph over time. Kinetic tests were run for a minimum of 10 weeks and a maximum of 20 weeks; samples that reach a steady state at 10 weeks were terminated (Walker and Associates 2003). Each week, sample solutions were analyzed for iron, pH, oxidation-reduction potential, and sulfate. Every 4 weeks, the sample solutions were analyzed for Nevada Profile I chemical constituents. The rates of sulfide oxidation and metals dissolution were determined from the results of the British Columbia HCT. The British Columbia HCT tests conducted in 2003 are not in conformance with current BLM Instruction Memorandum (IM) No. NV 2010-14 guidelines (BLM 2010b) due to the testing periods being shorter than currently required. However, at the Hollister Site, all waste rock is and would continue to be treated as PAG. The MWMP tests are used to evaluate the potential for dissolution and mobility of certain constituents from mine rock samples by meteoric water.

MWMP tests are conducted to assess release of chemical constituents from waste rock under expected meteorological conditions in northern Nevada. The procedure consists of a single-pass column leach over a 24-hour period using a crushed mine rock sample to extract fluid to a ratio of 1:1. The extraction fluid is Type II reagent grade water at a pH of 5.5. Extracts are analyzed for Nevada Profile I constituents. Test protocols follow NDEP–Bureau of Mining Regulation and Reclamation (BMRR) MWMP guidelines (Walker and Associates 2003).

Currently, waste rock characterization tests are conducted quarterly, pursuant to WPCP NEV2003107, which is in compliance with the BLM IM NV-2010-014 2010 requirements (RCG 2011b). The BLM IM NV-2010-014 procedures include the following analyses for waste rock:

- ABA testing including the NDEP Modified Sobek Procedure;
- Net acid/alkaline production (Acid Potential [AP], Neutralizing Potential [NP], and Net Neutralizing Potential [NNP]);
- MWMP following American Society for Testing and Materials (ASTM) E-2242-02 procedures that include analysis and report on metal mobility, attenuation, and accumulation potential;
- Humidity Cell/Column Leach tests following ASTM D5744-07 protocols with a minimum test period of 20 weeks (only initial testing; not conducted quarterly);
- NDEP – BMRR Profile II analysis with total recoverable metals; and
- Other additional tests may be required at the discretion of BLM and NDEP.

### 2.2.6 Water Management

The current mine water handling facilities and operations associated with exploration, as well as the proposed underground mining operations water management system, including how the water at the Hollister Site is used and discharged back into the environment, are illustrated in **Figure 2-5**. Water inflow into the underground workings currently is removed from the underground workings at a rate of approximately 400 gallons per minute (gpm) with capacity up to 700 gpm.

The current water management system (4.7 miles of pipeline, 3 RIBs, 2 tanks, and associated wells) is self-contained and designed to remove water from the underground workings. A grouting study conducted by Phillips Mining, Geotechnical and Grouting, Inc. (Phillips 2003) indicated that grouting in the decline would reduce the average steady state inflows more than 50 percent. Grouting is the method used to force cement into the bedrock fractures and the groundwater conduits to prevent or reduce water flow through the fractures into the decline.

Water inflow to the underground workings is routed to underground sumps through dedicated pipelines and then pumped from the underground workings to the surface. Upon reaching the surface, this water is gravity-fed in a pipeline to the existing East Pit water treatment facilities. After treatment, the water is discharged to the RIBs located near the confluence of Little Antelope Creek and Antelope Creek (**Figure 2-2**). The existing Hollister operation RIBs were designed for and have operated at a capacity of 700 gpm.

RCG uses between 100 and 150 gpm of the discharge water to support surface facilities and underground drilling activities. There are monitoring wells located at the RIBs and around the East Pit. The water streams in the water management facilities at the Hollister operations are illustrated in **Figure 2-5**. The facilities include storage, treatment/management, and discharge components. The storage component includes a mine service water tank and two evaporation ponds. The water is managed in the de-silting plant, the water treatment/RO facility, and the potable water plant. When present, water from the WRSF collection sump is pumped to the treatment plants and then to the RIBs. Depending on water quality, water obtained from the underground workings is treated and the water not utilized in operations is released to the RIBs. Fresh water is collected and stored in the potable water plant and tank before use in the office buildings, dry, and in-pit uses. Storm water is collected as runoff in a lined storm water pond and pumped to the recycle water pond for evaporation.

There are no additional water handling activities associated with exploration drilling in the Hatter or Craig Notice areas or the Ivanhoe Surface Exploration area.

### 2.2.7 Existing Hollister Operations Infrastructure

#### 2.2.7.1 Power and Fuel

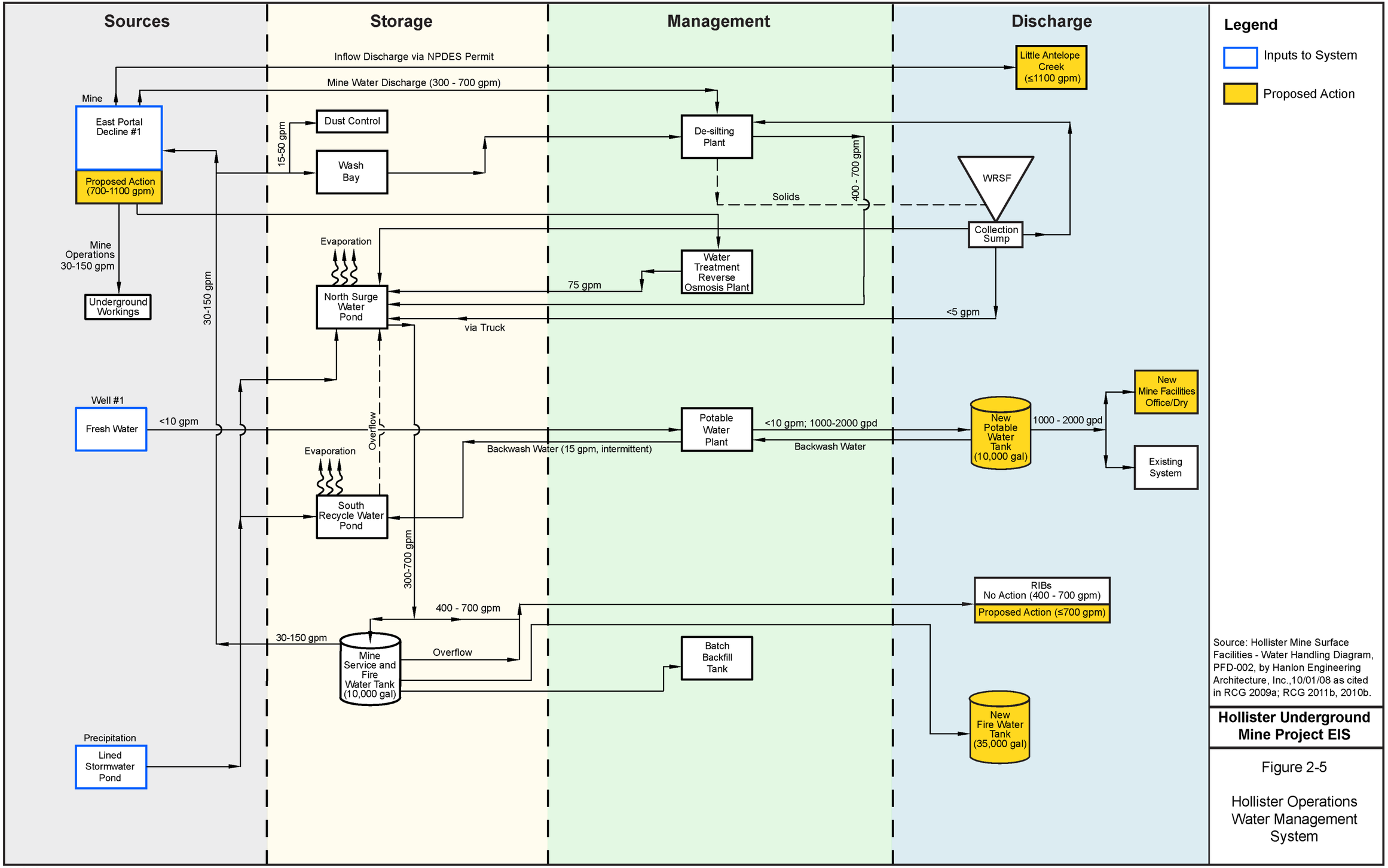
Two diesel generators at the Hollister Site provide electric power. Generator #1 produces approximately 2,922 horsepower (hp), and Generator #2 produces 2,333 hp (RCG 2011b). The two generators and accompanying fuel storage tanks are located on the southwest side of the East Pit (**Figure 2-1**). The generators supply the necessary power for all permitted Hollister operations.

On-site fuel storage includes aboveground gasoline and diesel tanks. A 5,000-gallon capacity gasoline tank fuels the light vehicles. Three 10,000-gallon tanks store diesel fuel for the diesel generators and underground mobile equipment.

#### 2.2.7.2 Water Supply

Potable water is currently used at a rate of approximately 3 gpm at the Hollister Site, and is extracted from water well #1. The existing potable water treatment facility (**Figure 2-1**) includes a green sand filter to treat iron and manganese with arsenic filtration through a media and chlorination.

Water well #5 is a backup water supply for water well #1 (**Figure 2-2**). RCG used water well #5 for past surface exploration activities.




Source: Hollister Mine Surface Facilities - Water Handling Diagram, PFD-002, by Hanlon Engineering Architecture, Inc.,10/01/08 as cited in RCG 2009a; RCG 2011b, 2010b.

**Hollister Underground Mine Project EIS**

Figure 2-5

Hollister Operations Water Management System

03/20/12

#### 2.2.7.3 Ancillary Surface Support Facilities

Existing ancillary facilities located at the Hollister Site are used to support the bulk sampling activities. These existing facilities include offices, men's and women's dry facilities, maintenance facilities, monitoring wells, potable water treatment plant, air compressors, fuel stations, diesel and gas storage facilities, haul roads, communications equipment, and other facilities (**Figure 2-1**).

#### 2.2.7.4 Sanitary and Solid Waste Disposal

The East Pit area septic system tanks are emptied on a weekly basis. Sewage is hauled by a contractor to an approved sewage disposal site. All other non-toxic, non-hazardous solid waste materials generated at the Hollister Site are removed from the site and disposed of in the Humboldt County Regional Landfill in Winnemucca.

#### 2.2.7.5 Site Security, Signs, and Fencing

RCG provides security at the Hollister Site that includes patrols, access control, and asset protection. Signs are in place to direct traffic to the Hollister Site.

RCG maintains the existing four-strand (three top wires barbed and one bottom wire smooth) perimeter fence with gates as shown in **Figure 2-2**. Other existing fences include a wildlife fence around the water management ponds and the evaporation pond in the East Pit, a fence around the RIBs, and temporary fences used around exploration drill sites.

### 2.2.8 Hazardous Materials and Hazardous Waste Management

Procedures for hazardous material transportation, storage, waste management, spill prevention, and emergency response programs currently are in place and implemented for the existing exploration and underground testing program, as described in the Hollister Development Block EA (BLM 2004a) and other cited RCG plans. A summary of the regulatory requirements on which these procedures and programs are based is provided below.

#### 2.2.8.1 Hazardous Materials

The chemicals and fuel used and stored at the Hollister Site are provided in **Table 2-2**. Hazardous materials storage information is updated on an annual basis at the Hollister Site as required by the Hollister Fire Marshal Hazardous Materials Permit. RCG reports chemical use volumes under the U.S. Environmental Protection Agency (USEPA) Toxic Release Inventory (TRI). Explosives are stored underground.

**Table 2-2 Chemicals Currently Used at Hollister Site**

| Chemical Name | Common Name/Other Name | Quantity | Location | Area Used | Rate of Use Per Year | Shipment Quantities |
|---|---|---|---|---|---|---|
| Acetylene | Acetylene | 900 cu ft | Maintenance Shop | Maintenance Shop | variable | 10 cyl |
| Alum | Alum | 1,600 gal | Water Treatment/ Desilting Plant | Water Treatment/ Desilting Plant | 3,200 gal | 400 gal |
| Amino Trimethylene | Delvo Stabilizer | 110 gal | Surface | UG Bulk Sampling | variable | variable |
| Ammonium Nitrate | Unigel | * | Explosive Magazine | Bulk Sampling | * | * |
| Ammonium Nitrate | Magnasplit | * | UG Explosive Magazine | Bulk Sampling | * | * |

**Table 2-2 Chemicals Currently Used at Hollister Site**

| Chemical Name | Common Name/Other Name | Quantity | Location | Area Used | Rate of Use Per Year | Shipment Quantities |
|---|---|---|---|---|---|---|
| Ammonium Nitrate | Magnafrac | * | UG Explosive Magazine | Bulk Sampling | * | * |
| Ammonium Nitrate/Fuel Oil | ANFO | * | UG Explosive Magazine | Bulk Sampling | * | * |
| Anionic Polyacrylamide | Poly-plus 2000 | 80 gal | Laydown Area at Main Gate | Surface & UG Drilling | 10,920 gal | 160 gal, two pallets |
| Calcium Hydroxide | Hydrated Lime | 47,000 lbs | Water Treatment/ Desilting Plant | Water Treatment/ Desilting Plant | 20,000 lbs | 20,000 lbs |
| Chemco #1 | Cleaner Degreaser | 55 gal | Maintenance Shop | Mobile Equip. | 55 gal | 55 gal |
| Choline Chloride | Kla Gard | 490 gal | Laydown Area at Main Gate | Surface & UG Drilling | 21,840 gal | 240 gal, two pallets |
| Copolymer of Sodium Acrylate | Insta-vis | 250 gal | Laydown Area at Main Gate | Surface & UG Drilling | 10,920 gal | 160 gal, one pallet |
| Copolymer of Sodium Acrylate | Insta-pac | 200 gal | Laydown Area at Main Gate | Surface Drilling | 10,920 gal | 160 gal, one pallet |
| CS-141 | Concrete Stripper | 55 gal | Surface Containment Area | Bulk Sampling | 55 gal | 55 gal |
| Ethylene Glycol | Anti-freeze | 220 gal | Maintenance Shop | Mobile Equipment | 3,600 gal | 300 gal/mo |
| Flocculent | Flocculent | 800 gal | Water Treatment/ Desilting Plant | Water Treatment/ Desilting Plant | 7,300 gal | 800 gal |
| Hydrochloric Acid | Hydrochloric Acid | 300 gal | Water Treatment/ Desilting Plant | Water Treatment/ Desilting Plant | 800 gal | 400 gal |
| Hydrogen Sulfate (20%) | Sulfuric Acid | 1,650 gal | Water Treatment/ Desilting Plant | Water Treatment/ Desilting Plant | 38,400 gal | 4,000 gal |
| Mineral Oil | Rod Coat B 700 | 70 gal | Laydown Area at Main Gate | Surface Drilling | 5,460 gal | 240 gal, two pallets |
| Oxygen | Oxygen | 2,490 cu ft | Maintenance Shop | Maintenance Shop | variable | 6 cyl |
| Pentaerythritol | Cordex Detonation Cord | * | UG Explosive Magazine | Test Mining | * | * |
| Pentaerythritol Tetranitrate | Non-electric Detonator | * | UG Explosive Magazine | Test Mining | * | * |
| Petroleum Hydrocarbon Mixture | Gasoline | 5,000 gal | Fuel Storage Area (surface) | Surface Mobile Equipment | 7,100 gal | 4,000 gal |
| Petroleum Hydrocarbon Mixture | Diesel | 30,000 gal | Fuel Storage Area (surface) | Surface & UG Equipment | 510,000 gal | 7,400 gal |
| Petroleum Naphtha | Solvent/ Degreaser | 55 gal | Maintenance Shop | Maintenance Shop | 500 gal | 55 gal |
| Propane | Odorized LPG | 575 gal | Office Complex | Office Complex | 500 gal | 200 gal |

**Table 2-2 Chemicals Currently Used at Hollister Site**

| Chemical Name | Common Name/Other Name | Quantity | Location | Area Used | Rate of Use Per Year | Shipment Quantities |
|---|---|---|---|---|---|---|
| Sodium Hydroxide | Caustic Soda | 2,400 gal | Water Treatment Plant | Water Treatment Plant | 800 gal | 800 gal |
| Sodium Hypochlorate | Same | 55 gal | Water Treatment Plant | Water Treatment Plant | 55 gal | 55 gal |
| Vegetable Oil | Rod Ease | 475 gal | Laydown Area at Main Gate | Surface & UG Drilling | 21,840 gal | 240 gal, two pallets |

*Note: U.S. Office of Homeland Security regulations do not allow mine operators to report explosive quantities.

cu ft = cubic feet
cyl = cylinder
gal = gallon
lbs = pounds
LPG = liquidfied petroleum gas
mo = month
UG = underground
Source: RCG 2009a.

### 2.2.8.2 Spill Prevention and Response

RCG maintains a Spill Prevention, Control, and Countermeasures (SPCC) Plan for the Hollister Site (RCG 2008a). The plan describes: 1) the prevention, response, containment, and safe cleanup of any spills or discharges of substances that potentially may degrade the environment; 2) the systems and procedures to prevent and contain spills of petroleum fuels, lubrication oil, and used oil; and 3) the spill discovery, notification, and general cleanup procedures.

RCG is responsible for clean-up of releases of hazardous substances or oil associated with bulk sampling activities in accordance with the National Oil and Hazardous Substances Contingency Plan (40 Code of Federal Regulations [CFR] 300). If a release were to occur, RCG would notify the BLM Authorized Officer (AO), the NDEP, and the National Response Center of all reportable quantities of hazardous substances or oil released on public land, as required. Spills would be cleaned up in accordance with local, state, and federal regulations.

### 2.2.8.3 Hazardous Waste Management

The Resource Conservation and Recovery Act (RCRA) hazardous wastes generated at the Hollister Site are “universal wastes,” which generally include florescent bulbs and lights, as well as NiCad and lithium batteries. The Hollister operation is a Conditionally Exempt Small Quantity Generator (defined by federal regulations as a facility generating less than 200 pounds of hazardous waste per month). Materials that are not spent or consumed (e.g., petroleum oils, antifreeze, etc.) are recycled to the extent possible or disposed of off-site in an approved depository in accordance with RCG’s Solid and Hazardous Waste Management Plan (RCG 2010a) and all applicable federal and state regulations.

### 2.2.9 Safety and Fire Protection

RCG’s existing fire protection plan procedures are in accordance with MSHA and applicable state and county fire code regulations. Adequate fire protection equipment is maintained on site during operations.

### 2.2.10 Reclamation of Existing Facilities

Existing permits call for reclamation and revegetation of disturbed areas to reduce the potential for wind and water erosion. Following initial construction, cut and fill embankments and growth media stockpiles were seeded. Concurrent reclamation of surface exploration activities would be conducted to the extent possible to accelerate revegetation of disturbed areas.

All mineral exploration and development drill holes and monitoring or observation wells would be properly plugged and abandoned following completion of their functions to prevent contamination of groundwater resources.

All disturbed surfaces would be revegetated to control runoff, reduce erosion, reduce visual impacts, and provide forage for wildlife and livestock. Compacted surfaces would be ripped to loosen the soil. Accessible surfaces not composed of soil would then be covered with growth media. Seedbed preparation would be performed immediately prior to seeding to allow seed placement prior to soil re-compaction. Seedbed preparation and seeding generally would take place in the fall after grading and topsoiling of reclaimed areas.

The reclamation seed mixture and application rate has been developed based on BLM requirements and is developed from the plant species listed in **Table 2-3**. The species used would be dependent on availability and cost, and would be applied at a rate of approximately 11 to 15 pounds pure live seed (PLS) per acre. Modifications in the seed mixture, application rates, cultivation methods, and techniques could occur based on success of concurrent reclamation. Changes and/or adjustments to seed mixtures and application rates would be developed through consultation with, and approval by, the BLM and NDEP. Seedlings may be substituted for seeds. The seed mix selected would represent a reclaimed desired plant community, and the mix would be appropriate for each ecological site in the project area. This mixture would provide forage and cover species similar to the pre-disturbance conditions, facilitating the post-mining land uses of livestock grazing and wildlife habitat. In addition, the seed mix has been determined based on the species' effectiveness in providing erosion protection, the ability to grow within the constraints of the low annual precipitation experienced in the region, and its suitability for the site aspect, elevation, and soil type.

Compacted roads would be ripped to a depth of 6 inches to 2 feet. Any road or drill site not requiring re-contouring or ripping would be scarified to a depth of 6 inches or less, then seeded and harrowed to provide soil cover for the seeds. Because of the cultural resource sensitivity of the area, prior to ripping any road outside of the immediate disturbance areas (WRSF, pit, main access roads, etc.), RCG would consult with BLM to verify that ripping is an acceptable activity.

**Table 2-3 Reclamation Plant List**

| Common Name | Species Name |
|---|---|
| **Grasses** | |
| Bluebunch wheatgrass | *Pseudoroegneria spicatum* |
| Thickspike wheatgrass | *Elymus lanceolatus* |
| Western wheatgrass | *Pascopyrum smithii* |
| Crested wheatgrass | *Agropyron cristatum* |
| Slender wheatgrass | *Elymus trachycaulus* |
| Sandberg bluegrass | *Poa sandbergii* |
| Canby bluegrass | *Poa canbyi* |
| Big bluegrass | *Poa ampla* |

**Table 2-3 Reclamation Plant List**

| Common Name | Species Name |
|---|---|
| Great Basin wild rye | *Leymus cinereus* |
| Indian ricegrass | *Oryzopsis hymenoides* |
| Webber ricegrass | *Oryzopsis webberi* |
| Idaho fescue | *Festuca idahoensis* |
| Sheep fescue | *Festuca ovina* |
| Green needlegrass | *Stipa viridula* |
| Bottlebrush squirreltail | *Elymus elymoides* |
| Sand dropseed | *Sporobolus cryptandrus* |
| Alkali sacaton | *Sporobolus airoides* |
| ***Forbs*** | |
| Cicer milkvetch | *Astragalus cicer* |
| Northern sweetvetch | *Hedysarum boreale* |
| Buckwheat | *Eriogonum* spp. |
| Common sainfoin | *Onobrychis viciaefolia* |
| Annual ryegrass | *Lolium perenne* spp. *multiflorum* |
| Western yarrow | *Achillea millefolium* |
| Blue flax | *Linum lewisii* |
| Small burnet | *Sanguisorba minor* |
| Gooseberry leaf globemallow | *Sphaeralcea grossulariaefolia* |
| Scarlet globemallow | *Sphaeralcea coccinea* |
| Desert globemallow | *Sphaeralcea ambigua* |
| Arrowleaf balsamroot | *Balsamhoriza saggitata* |
| Palmer penstemon | *Penstemon palmeri* |
| White sweetclover | *Melilotus alba* |
| Alfalfa | *Medicago sativa* |
| **Shrubs** | |
| Wyoming big sagebrush | *Artemisia tridentata* ssp. *wyomingensis* |
| Big sagebrush | *Artemisia tridentata* |
| Black sagebrush | *Artemisia nova* |
| Antelope bitterbrush | *Purshia tridentata* |
| Serviceberry | *Amelanchier (ainifolia) utahensis* |
| Winterfat | *Ceratoides lanata* |
| Chokecherry | *Prunus virginiana* |

**Table 2-3 Reclamation Plant List**

| Common Name | Species Name |
|---|---|
| Snowbrush | *Ceanothus* spp. |
| Fourwing saltbush | *Atriplex canescens* |
| Prostrate kochia | *Kochia prostrate* |
| Rubber rabbitbrush | *Chrysothamnus nauseosus* |
| Currant | *Ribes* spp. |
| Wood rose | *Rosa woodsii* |
| Snowberry | *Symphoricarpos* spp. |

Source: BLM 2004a.

#### 2.2.10.1 Drill Hole and Water Well Abandonment

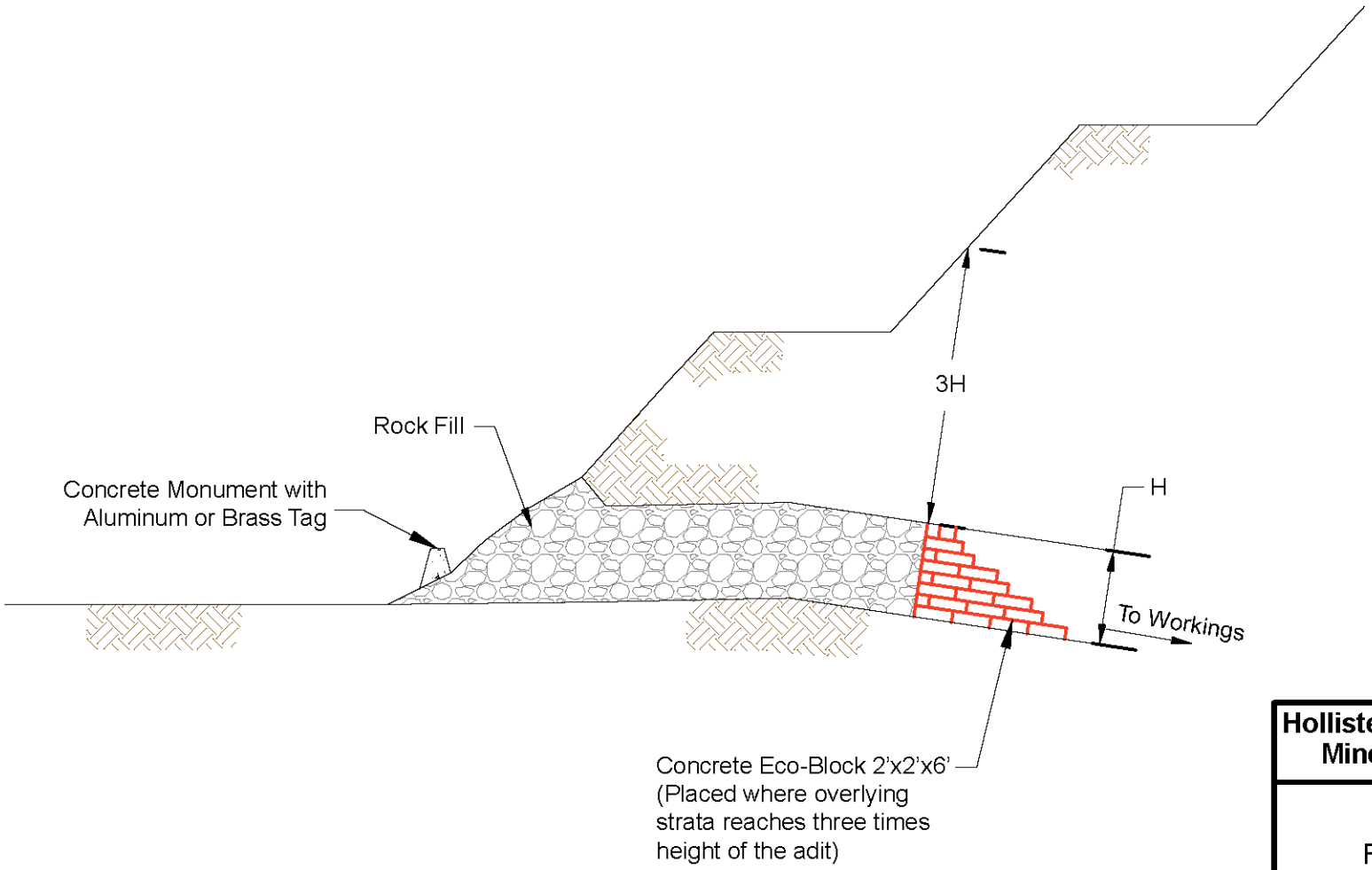
RCG would abandon and plug existing exploration drill holes, water wells, and water monitoring wells in accordance with the Nevada Administrative Code (NAC) 534 regulations. As appropriate to prevent possible contamination between different water zones in the drill holes, RCG would seal water-bearing zones to comply with requirements of the Nevada Division of Water Resources (NDWR). In addition, each drill hole, water well, and monitoring well collar would be plugged or sealed to prevent surface water or foreign objects from entering the drill hole.

#### 2.2.10.2 Closure of Underground Operations

Underground facilities would be closed in phases starting at the lowest point of the underground facilities/structure working up to the surface. The closure procedures are summarized below.

In general, removal of water management equipment would consist of the following steps in accordance with applicable rules and regulations. Water monitoring and production well holes and core holes would be cemented. Underground and surface piping, pumps, tanks and pumping equipment would be removed and salvaged or disposed of in an approved waste disposal facility. Piping that cannot be salvaged for reuse would be dismantled as required for backfill placement and left underground. Fans, motors, pumps, compressors, power supply, electrical distribution equipment, ventilation curtains and ducts, and other equipment would be removed and salvaged for use at another facility or disposed of in an approved waste disposal facility. Non-reactive equipment (e.g., high-density polyethylene [HDPE] pipe) may be left underground. All remaining fuels, lubricants, and explosives would be removed from the underground workings and disposed of as described in Section 2.2.10.5, Demolition and Disposition of Buildings and Ancillary Facilities.

To prevent access to underground workings, the Hollister Site portal, production shaft, and escape raises would be closed and sealed upon permanent cessation of exploration operations in a manner similar to the detail shown in **Figures 2-6** and **2-7**. A concrete, cemented cinder block or similarly constructed bulkhead would be installed inside the portal. The portal area would be backfilled with waste rock material, extending from the portal bulkhead to outside the actual portal. A permanent informational plaque would be erected at the portal to identify the site.




**Hollister Underground Mine Project EIS**

Figure 2-6

Mine Portal
Closure Cross-section

Source: RCG 2009a.

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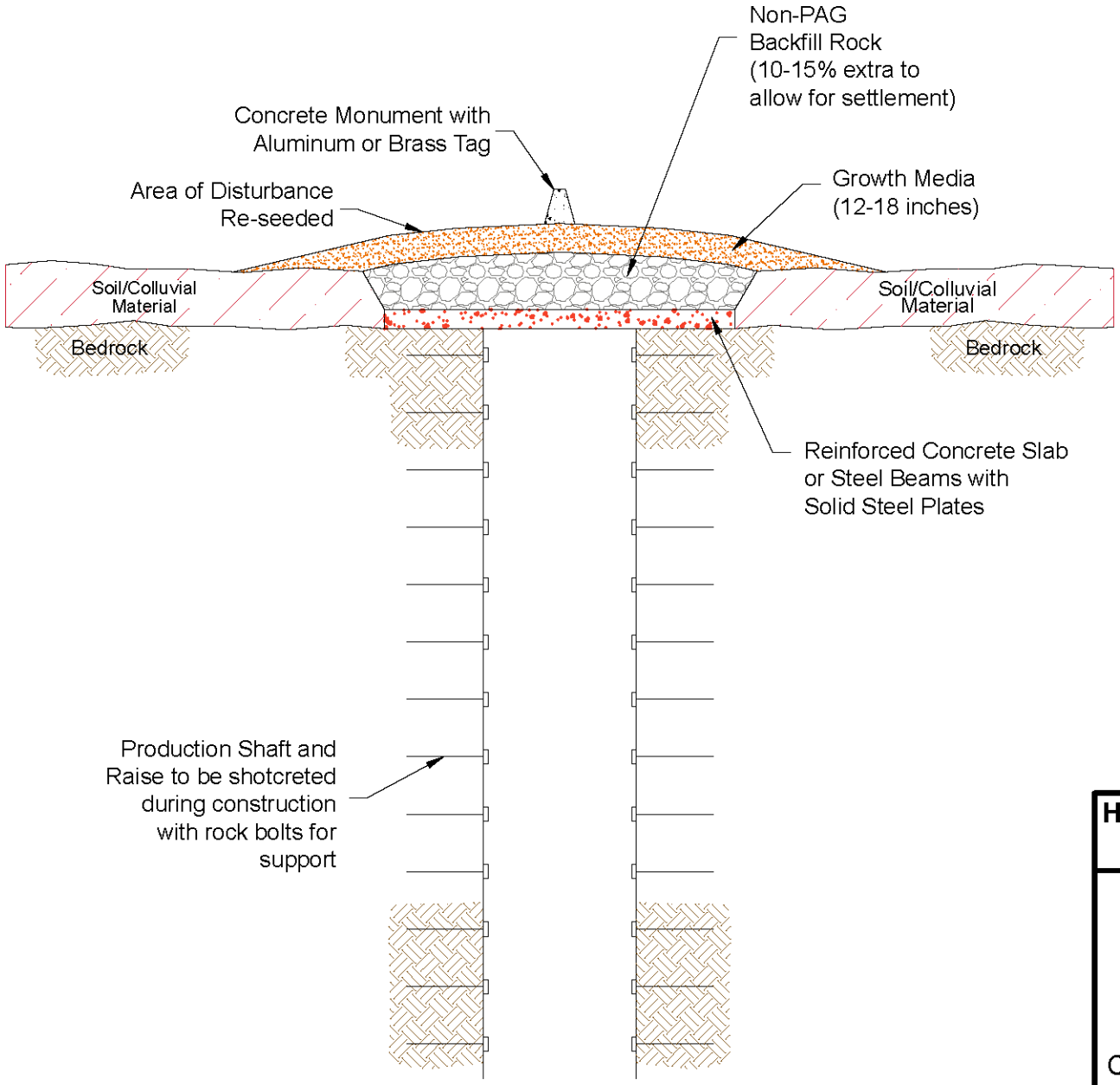



**Hollister Underground Mine Project EIS**

Figure 2-7

Escapeway Raise and Shaft Closure Cross-section

Source: RCG 2009a.

The production shaft and escape raises would be closed and sealed with engineered concrete plugs, consisting of reinforced concrete slabs placed on firm ground over the opening and anchored into solid bedrock. The production shaft and escape raises would be sealed and reclaimed as follows: 1) an I-beam would be placed over the raise opening; 2) a 0.5-inch-thick steel plating would be welded to framework; 3) a concrete plug (6 inches thick) would be poured on top of the steel plate and reinforced with rebar; 4) 4 to 5 feet of non-PAG rock would be placed on top of the concrete and graded to provide for drainage away from the covered opening; and 5) 12 to 18 inches of growth media would be placed on top of the non-PAG rock, and the site would be seeded with a seed mixture developed from **Table 2-3**. These concrete plug structures would be constructed for permanence and to sustain the expected weight of the rock material that would be placed on top of the structure.

#### 2.2.10.3 Reclamation of Existing RCG Waste Rock Storage Facility

The reclamation goals for the existing RCG WRSF include stabilizing slopes, ensuring mass stability, shaping the edges to minimize visual impacts, revegetating surfaces, and erosion control. Reclamation of the WRSF would entail the following:

1. Lime or dolomite amendments to the PAG material in a ratio approved by BLM;
2. Use of an appropriate soil evapotranspiration (ET) cover of 36 inches of non-PAG cover material over the PAG waste rock material to reduce or eliminate infiltration of water and oxygen;
3. Use of 6 to 12 inches of cover consisting of growth media would be placed over the 36 inches of ET cover material; and
4. Shaping the entire area to a geomorphically stable configuration to ensure that no ponding occurs on, behind, or around the WRSF.

The total amount of cover material would be 42 to 48 inches, thus providing an adequate barrier between the PAG waste rock material and water or oxygen infiltration.

As areas of the WRSF reach their ultimate configuration and become inactive, the waste rock facility face would be regraded. After regrading, the surface and sides of the WRSF would be covered with growth media as described above, and seeded with a seed mixture developed from **Table 2-3** to meet post-mining land use objectives. Toe and transition crest areas would maintain positive drainage off the WRSF with grades of 2 percent or greater. To minimize erosion until vegetation has re-established, silt fences, sediment traps, or other appropriate Best Management Practices (BMPs) would be implemented.

#### 2.2.10.4 Reclamation of Roads, Parking Lots, Washbay, and Other Compacted Areas

Compacted areas such as roads, parking lots, and the East Pit facilities area would be ripped or disked or otherwise left in a roughened condition prior to growth media material replacement and revegetation. Typically, a motor grader, with a scarifier unit, would be used to rip the compacted areas. Given the cultural sensitivity of the area, RCG would consult with, and get approval from, the BLM prior to ripping any road outside of the areas disturbed by the past surface mining operations.

Upon permanent closure, the Ivanhoe and Little Antelope Creek roads would remain but would no longer be maintained by RCG and could revert to two-track roads. Mile markers, fences, and signs would be removed.

#### 2.2.10.5 Demolition and Disposition of Buildings and Ancillary Facilities

During final mine closure, salvageable equipment, instrumentation, and personal property would first be removed from the site prior to actual removal of structures and facilities. The temporary trailers and structures would be dismantled, and materials would be salvaged or disposed of in a permitted landfill off

site. After demolition and salvage operations have been completed, the associated disturbance areas would be regraded, scarified, and covered with growth media and revegetated.

Unless ongoing post-mining use is authorized by BLM at the close of reclamation, project site structures and other facilities would be demolished and/or dismantled and removed from the site at the time of permanent closure. This would include office and maintenance structures, the compressor facility, water and fuel storage tanks, generators, temporary trailers, and ancillary and storage facilities.

With facility closure, the sewage system and associated tanks would be decommissioned. Sewage remaining in the septic tanks would be pumped out by a licensed contractor and hauled to an approved site for disposal. Exposed components of the sewage system would be dismantled and buried at a minimum depth of 5 feet in the existing RCG WRSF or removed and disposed of in an approved site. Decommissioned buried pipelines and septic tanks would be removed and disposed of in an appropriate landfill.

Upon permanent mine closure, pumping of water from the underground operation would cease, and water would be allowed to fill the workings. Given that the pre-exploration groundwater potentiometric surface was beneath the portal level, post-mining groundwater levels would not reach the portal; thus, there would be no discharge of groundwater to the surface. Section 3.5, Groundwater Resources and Geochemistry, describes predicted post-mining groundwater levels and groundwater chemistry.

#### 2.2.10.6 Reclamation of Storm Water and Surge Ponds

All equipment and surface piping associated with the storm water, RIBs, and surge ponds would be removed. The pond liners would be folded into the pond bottom and overlain with concrete from building foundations to prevent liners from floating to the surface. Any sludge remaining in the ponds would be sampled, analyzed, and disposed of appropriately. The ponds would be backfilled and regraded to prevent ponding of water. Growth media would be redistributed prior to seeding.

The RIBs near Little Antelope Creek would be reclaimed. Reclamation activities would include backfilling the RIBs with the existing stockpiled material, grading the area to blend with the surrounding topography, placing 12 inches of growth media, and then revegetation with a seed mixture developed from **Table 2-3**. The buried pipeline between the mine and the RIBs would be plugged and abandoned in place. Any above-surface pipelines and valve boxes would be removed and properly disposed of on or off site.

#### 2.2.10.7 Reclamation and Closure Monitoring

Following site closure, berm and sign maintenance, site inspections, and any other necessary monitoring for the period of reclamation responsibility would be conducted. NDEP can require monitoring for up to 30 years and the BLM has no limitations on duration of monitoring requirements per the current regulations.

Post-mining groundwater quality would be monitored according to the requirements established by NDEP-BMRR, and included in the WPCP. Monitoring would consist of quarterly groundwater and surface water sampling, analysis, and reporting to BMRR. After the post-reclamation monitoring period is complete, monitoring wells constructed during the project would be closed and abandoned in accordance with NDWR regulations.

Revegetation monitoring would be conducted for a minimum of 3 years following implementation and completion of revegetation activities, or until revegetation successes have been achieved. Revegetation monitoring would occur based on seasonal growth patterns, precipitation, and weather conditions (RCG 2008b).

## 2.3 Third-party Processing Facilities

RCG does not process the bulk samples of ore from the Hollister Site, but rather ore is processed off-site by third-parties. While the ore processing itself is not part of the existing Hollister operations or the Proposed Action, this EIS describes certain relevant aspects of the existing mills at Esmeralda and Midas.

Previous open-pit mining operators processed ore on-site using cyanide heap leach methods. Because there are no milling and processing facilities at the Hollister Site, RCG ships bulk sample ore offsite for processing at area mills operated by third parties. RCG entered into agreements for processing bulk samples of ore at facilities owned by Queenstake Resources USA, Inc., Newmont, and Antler Peak Gold Inc (APGI). APGI is a subsidiary of Great Basin Gold Ltd (GBG) (the parent company of RCG). RCG has most recently entered into arrangements for ore processing with APGI at the Esmeralda Mill in Mineral County, and with Newmont at the Midas Mill in Elko County. The Midas Mill is located at the Midas Mine, also known as the Ken Snyder Mine.

### 2.3.1 Transport of Ore Bulk Samples

Bulk samples of ore have been transported to the Esmeralda Mill or Midas Mill for processing by third-parties. The ore is hauled to the Esmeralda Mill in trucks with an approximate capacity of 38 tons. Trucks and trailers are highway-legal with side-dumping tubs. An estimated 12 truck trips are made per day, 5 days per week, from the Hollister Site. Ore is occasionally hauled in campaigns (3 to 15 trucks traveling together) to account for adverse weather that temporarily increases the roundtrips per day but lowers the number of ore haulage days per month and increases highway and truck driver safety. The current ore haulage requires two, 10-hour shifts per day, 5 days per week.

Ore is hauled a distance of approximately 297 miles along the route shown in **Figure 2-8**, from the Hollister Site to the Esmeralda Mill. Ore is transported in trucks from the Hollister Site for a distance of 9 miles north on the Ivanhoe Road and then west approximately 31 miles on the Midas-Tuscarora Road. The ore trucks travel southwest on Nevada State Route (SR) 789 for 16 miles and 111 miles southwest on Interstate 80 (I-80) to the junction of United States Highway 95 (U.S. 95). The trucks travel south on U.S. 95 for 104 miles and then at the Town of Hawthorne proceed south on SR 359 for 4 miles to the junction of the Lucky Boy Pass Road. The ore trucks travel along the Lucky Boy Pass Road a distance of approximately 22 miles to the Esmeralda Mill.

Alternatively, ore has been hauled to the Midas Mill at a distance of 20 miles from the Hollister Site via the Ivanhoe Road for 9 miles, then west on the Midas-Tuscarora Road for approximately 9 miles, and approximately 2 miles on a gravel road to the Midas Mill located about 2 miles southeast of the Town of Midas (**Figure 2-8**).

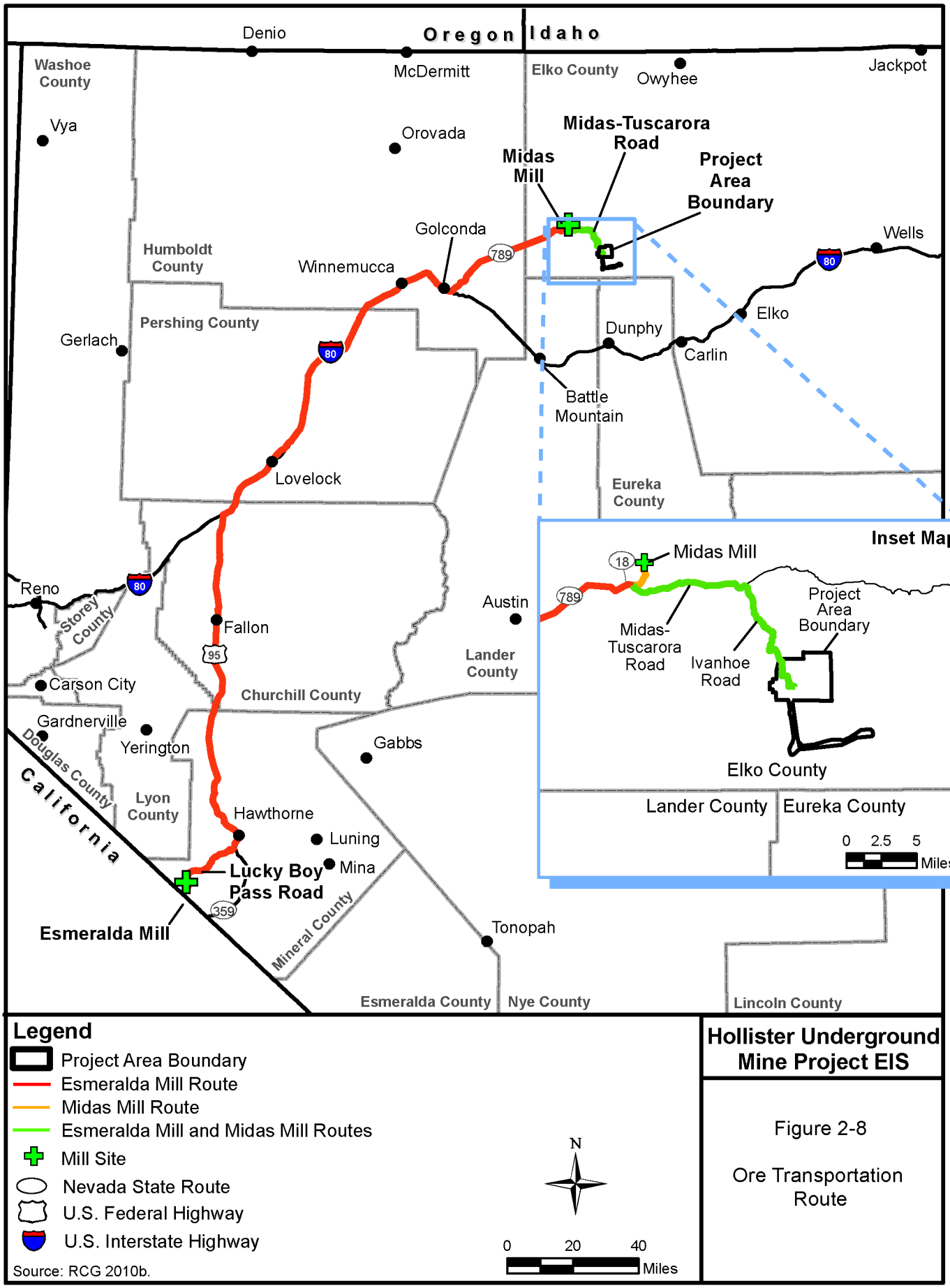
### 2.3.2 Processing Bulk Samples of Ore

As described above, bulk samples of ore have been sent to the Esmeralda and/or Midas mills. Ore processed at each mill varies and is managed according to grade and metallurgy.

#### 2.3.2.1 Existing Esmeralda Mill Facilities

APGI owns the Esmeralda Mine and Mill in Mineral County, Nevada, and has refurbished the mill facilities to accept and process ore from third-parties (**Figure 2-9**). The Esmeralda Mill is located on both private lands owned and controlled by APGI and federal land administered by the U.S. Forest Service (USFS).

The Esmeralda Mill includes administrative buildings; a warehouse and ancillary portable storage containers; a milling facility (ore pad with ore stockpile, crushing system, and mill building); tailings facility; and a Class III landfill (APGI 2009). Approximately 45 employees currently work at the Esmeralda Mill.



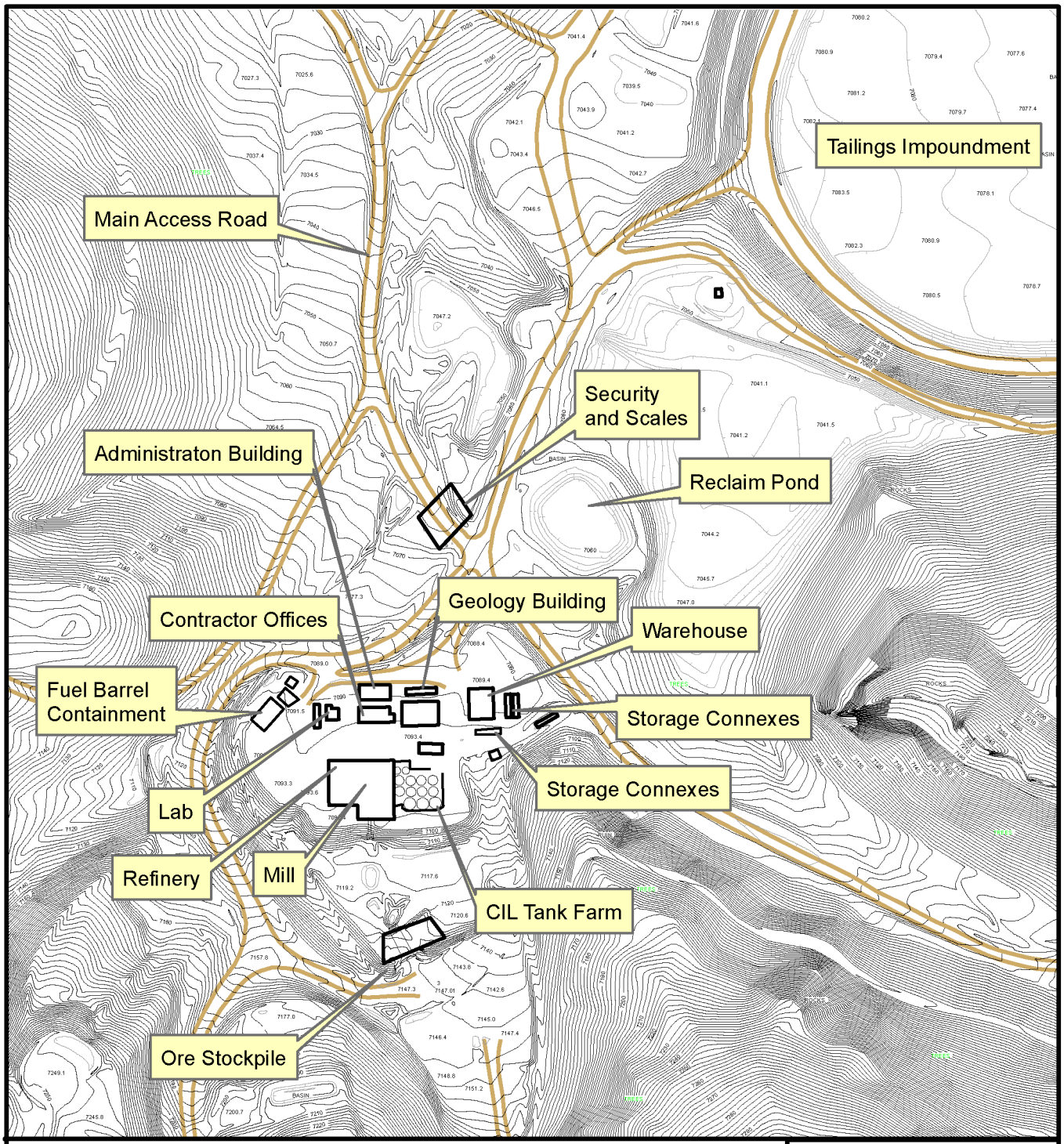

Source: RCG 2010b.

**Hollister Underground Mine Project EIS**

Figure 2-8

Ore Transportation Route

3/20/2012




**Legend**

Dirt Road

N

0 500 1,000 Feet

Note: Contour interval is 2 feet.
Source: RCG 2011b; 2010b.

**Hollister Underground Mine Project EIS**

Figure 2-9

Esmeralda Mill Facilities Overview

3/23/2012

The Esmeralda Mill is operated by APGI under permits approved by the USFS and NDEP, and occupies approximately 43.5 acres (7.8 acres of federal land, 35.7 acres of private land) for the tailings impoundment and reclaim pond, the mill area, the office, and ancillary buildings (USFS 1997). The chemicals and fuel used and stored at Esmeralda Mill are identified in **Table 2-4** (RCG 2010b).

Ore Processing at Esmeralda Mill

The Esmeralda Mill is permitted to process up to 127,700 tons of gold- and silver-bearing ore annually. High grade metallic ore initially is stockpiled in the ore storage area. A front-end loader feeds the ore into a grizzly, which in turn feeds the primary crusher. Undersized material bypasses the primary crusher, and oversized material is reduced to 6 inches minus. The ore stream is collected and conveyed to the secondary crusher for reduction to 5/8 inch minus. Following secondary crushing, the ore is stored in a fine ore stockpile (APGI 2009).

The ore is reclaimed from the fine ore stockpile via underground slot feeds and a conveyor system. Lime is added to the ore for pH adjustment prior to the ore entering the grinding circuit. The grinding circuit consists of a semi-autogeneous mill followed by final grinding through two conventional ball mills. Gold and silver values are recovered from the ground ore utilizing conventional carbon-in-leach (CIL) technology with sodium cyanide the primary lixiviant for metal dissolution. After the gold and silver are dissolved and subsequently adsorbed (loaded) onto activated carbon, the metals are stripped (removed under high pressure and temperature) from the carbon in the form of a high grade pregnant solution. This solution is then further processed and precious metal precipitate is collected. Concentrate from the processing is then smelted to produce gold and silver doré. The doré bars are then shipped to a refinery (APGI 2009).

APGI applied for and, on October 21, 2010, was issued, a Mercury Operating Permit to Construct Phase 2. The permit allows for the construction of mercury control systems. Construction must be initiated within 18 months of approval and completed within 24 months of approval.

Esmeralda Mill Tailings Facility

Tailings slurry is pumped from the mill to the tailings impoundment through 1,700 feet of buried 4-inch-diameter, HDPE pipe coupled with high pressure flange fittings. The tailings slurry is discharged on a planned rotational basis along the perimeter of the tailings impoundment, thereby creating a relatively uniform tailings surface, both in terms of elevation and deposition. This method results in a stronger and more impermeable dam face and allows for easier water recycling. This practice also minimizes potential seepage by sealing off the inner embankment slope of the impoundment with settled tailings. Seepage water is piped from the internal drain to the seepage collection facility and then recycled back into the tailings facility (APGI 2009).

The seepage containment facility south of the access ramp is an HDPE-lined pond that provides secondary containment to an HDPE storage tank that is the primary collection receptacle. The tank is equipped with a submersible pump to move solution to the tailings facility. Water is piped from the internal drain to the seepage collection facility and then to the tailings facility (APGI 2009).

Excess water from the tailings impoundment is pumped to the reclaim pond, via a buried 4-inch-diameter HDPE pipe that parallels the tailings discharge line. A drainage net between the two liners provides leak detection (APGI 2009). Tailings material is treated in a cyanide destruction circuit located at the mill prior to being pumped to the tailings impoundment. A perimeter fence prevents access by wildlife.

A perimeter road and storm water diversion channel were constructed around the tailings impoundment. As required by the State of Nevada regulations governing facility design, the tailings impoundment was designed for a 100-year, 24-hour storm event (APGI 2009).

**Table 2-4 Chemicals Currently Used at Esmeralda Mill**

| Chemical Name | Common Name/Other Name | Quantity | Location Stored on Site | Area Used | Rate of Use Per Year | Shipment Quantities |
|---|---|---|---|---|---|---|
| Caustic Soda Pellets | Caustic Soda | 4,000 lbs | Mill Building | CIL Tank Farm | 8,000 lbs | 4,000 lbs |
| Cyanide Solution (20 to 30%) | Same | 10,000 gal | Esmeralda Mill Site Storage Tank | CIL Tank Farm | 40,000 gal | 10,000 gal per quarter |
| Hydrogen Peroxide (40 to 60%) | Same | 8 x 400 gal totes | CIL Tank Farm | CIL Tank Farm | 12,800 gal | 8 x 400 gal totes every 3 months |
| Lead Nitrate | Same | 15,000 lbs | Mill Building | CIL Tank Farm | 35,000 lbs | 15,000 lbs |
| Propane | Odorized LPG | 5,000 gal | Mill Building, Office Complex | Mill/Office Building Complex | 180,000 gals | 15,000 gal per month |
| Zinc | Zinc Dust | 800 lbs | Mill Building, Warehouse | Mill Building | 10,000 lbs | 800 lbs |

lbs = pounds.

gal = gallons.

Source: RCG 2010b.

#### 2.3.2.2 Existing Midas Mill Facility

The Midas Mill (**Figure 2-10**) is located entirely on private land in western Elko County, approximately 1.5 miles southeast of the Town of Midas, Nevada.

NDEP-BMRR approved processing of ore from the Hollister Site at the Midas Mill. The recent contractual arrangement with the Midas Mill has been an ore purchase agreement where title to the ore passes to Newmont prior to processing. The Hollister ore is stored on a containment pad located adjacent to the Midas Mill prior to processing in batches. Hollister ore is not blended with other ore for processing. It is estimated that approximately 10,000 tons of Hollister ore could be processed on a monthly basis under existing permits. All procedures, facilities, and chemicals used at the Midas Mill meet NDEP permit requirements (Newmont 2007).

Ore Processing at Midas Mill

The mill process building and perimeter areas contain crushing, grinding, gravity separation, cyanide leaching, Merrill-Crowe gold recovery, retorting, and precious metal refining facilities. The mill is equipped with sumps and evacuation pumps to return solution to process components and to the tailings impoundment. Permitted annual throughput is 450,000 tons per year (tpy) (NDEP 2008a). The Midas Mill employs 30 employees (Newmont 2007).

The mill processing includes crushing the ore in a two-stage crushing plant in a closed circuit to 3/8-inch size at a throughput rate of 108 tons per hour (tph). The ore is then fed by conveyor to a single-stage ball mill for grinding before being routed to cyclones. Slurry solids are then washed from the gold-bearing solution. The rinse water from this process becomes the gold- and silver-bearing pregnant solution. Gold and silver are recovered from the pregnant solution in a conventional Merrill-Crowe plant that produces a precious metals-bearing precipitate filter cake. The concentrates are then treated in a propane-fired pressure retort to volatilize the mercury. Mercury is recovered by condensing the mercury vapor, collecting it as a liquid, and capturing it in a carbon column. The retort product is then fed to the refinery where it is loaded into a propane-fired melting furnace to produce a molten gold/silver doré. The doré bullion is shipped off-site for smelting.

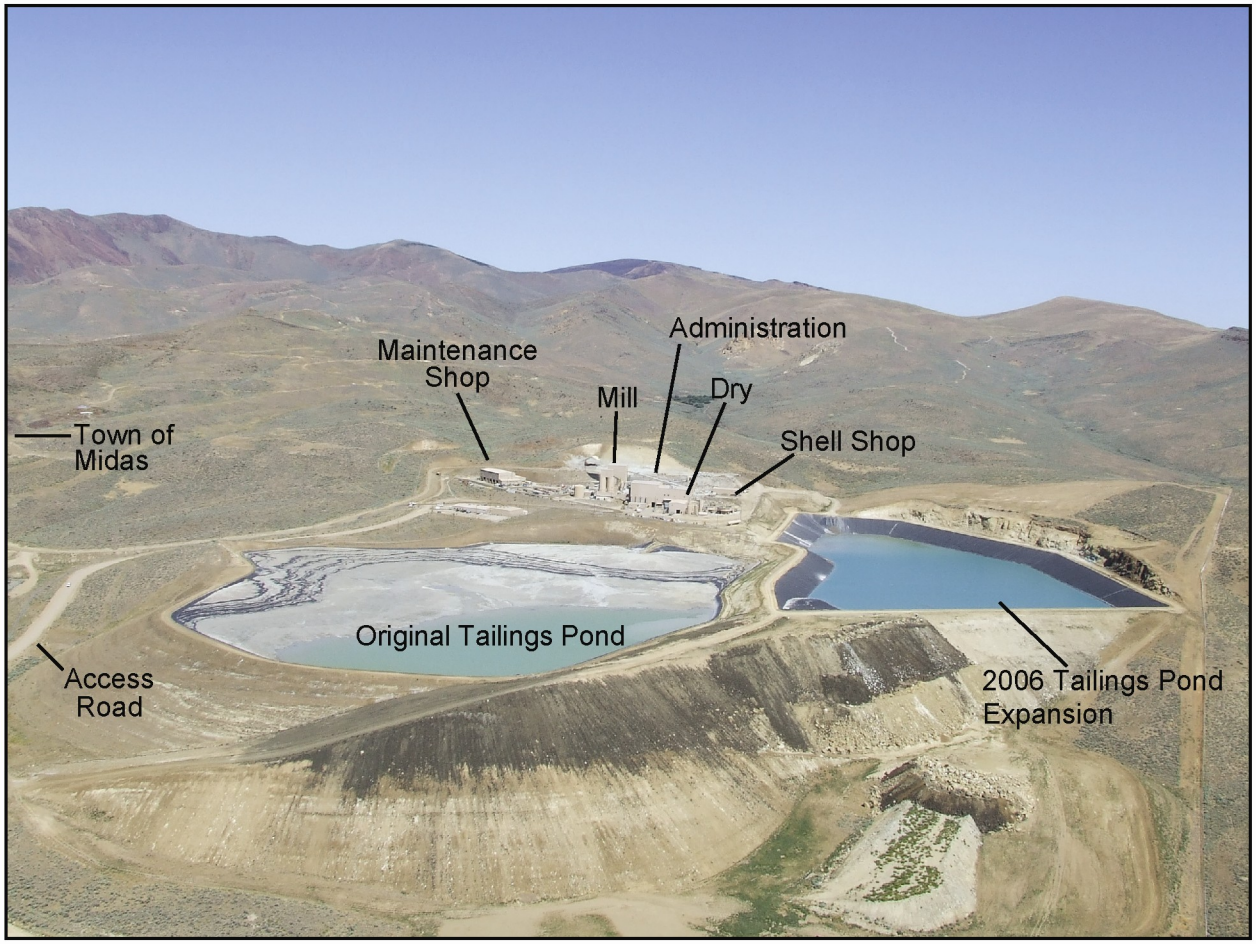
Midas Tailings Facility

The tailings impoundment is located south and downgradient of the mill process building (**Figure 2-10**). Both the surface of the impoundment basin and the upstream face of the embankment are lined with textured 80-mil HDPE. The impoundment storage capacity at final buildout would be approximately 5.67 million tons (Newmont 2007).

Tailings material is distributed from a single-point discharge pipeline that can be moved to promote drying and consolidation of the tailings fines. An underdrain collection system was constructed with a network of 6-inch-diameter corrugated polyethylene collector pipes placed on the HDPE liner, wrapped with 16-ounce geotextile, and covered with a minimum 12-inch layer of drain rock. The underdrain solution is pumped for secondary containment before being reclaimed for use in the mill (Newmont 2007).

Tailings solution is recycled from the impoundment to the mill. The tailings impoundment is designed to store the incident precipitation from a 100-year, 24-hour storm event, plus operational volumes, with 3 feet of freeboard. A runoff diversion channel on the upgradient perimeter of the tailings impoundment is designed to divert surface runoff from a 100-year, 24-hour storm event to an adjacent catchment basin (Newmont 2007).

The tailings material is treated in a cyanide destruction circuit located at the mill; a layer of bird balls and a propane cannon provide wildlife protection at the supernatant pools and the underdrain solution collection pond. A fence encompasses both the tailings impoundment and the underdrain solution collection pond (Newmont 2007).




**Hollister Underground Mine Project EIS**

Figure 2-10

Midas Mill Facilities Overview

Source: BLM 2010c (photo date unknown); RCG 2010b.

## 2.4 Proposed Action

### 2.4.1 Project Overview

RCG is proposing an expansion of its existing surface and underground exploration activities at the Hollister Site and the transition to full-scale underground mine production and associated support facilities. An amendment to the PoO (NVN-076802) for the proposed project was submitted to the BLM in March 2008 in compliance with BLM regulations (43 CFR Subpart 3809) and NDEP regulations governing the reclamation of mined lands (NAC 519A.010-635). A revised PoO amendment was submitted to the BLM based on comments RCG received. The PoO amendment is available at the BLM office.

The Proposed Action (also called proposed project or the Hollister Underground Mine Project) would contain the following major components (**Figures 2-11** and **2-12**):

- Continued and expanded surface and underground exploration activities;
- Transition from underground exploration and bulk sampling activities to full-scale production of gold and silver (underground mining operation);
- Installation of the Hatter production shaft, raise, or ramp (collectively referred to as the HPS), as the geology of the area dictates;
- Continued maintenance of the existing Ivanhoe access road and Little Antelope Creek Road;
- Construction of road(s) within the existing mining disturbance areas and to the Hatter production shaft;
- Construction of a new 11.6-mile-long electric power transmission and distribution line (collectively referred to as 'transmission line') and substation, including access routes;
- Mine water management including installation of a National Pollutant Discharge Elimination System (NPDES) permitted outfall for discharge to Little Antelope Creek and surface monitoring and underground wells, as needed;
- Continued waste rock disposal in the existing permitted and lined WRSF, in underground mined-out areas as backfill, and in a new WRSF located on previously disturbed and unreclaimed land in an existing open pit;
- Construction of ancillary support facilities; and
- Continued and increased transport of ore by truck to off-site existing third-party owned mineral processing facilities located on private land at the Esmeralda Mill in Mineral County, Nevada, and/or the Midas Mill in Elko County, Nevada.

Descriptions of Proposed Action facilities in Section 2.4 pertain only to the Hollister Underground Mine, unless specifically noted as the Esmeralda or Midas mills. The proposed project facilities are shown in **Figures 2-11** and **2-12**.

The project area is defined as the approximately 10,168-acre region within the black line designating the project area boundary depicted on **Figure 2-11**. The Proposed Action would result in a total of approximately 117 acres of proposed surface disturbance for mining, transmission line construction, and exploration activities in addition to the previously authorized 105 acres of surface disturbance. A total of 92 acres of surface disturbance would occur within the project area for the Proposed Action, of which 51.5 acres are new disturbance, 32.4 acres are located on reclaimed lands disturbed by previous mining activities, and 8.1 acres of previously disturbed but not reclaimed lands (**Table 2-5**). Approximately 34.7 of the 92 acres of proposed disturbance would be for construction of the transmission line and associated components. The Proposed Action also includes an additional 25 acres of new disturbance from surface exploration activities for a total of up to 50 acres of surface exploration disturbance (**Table 2-6**).

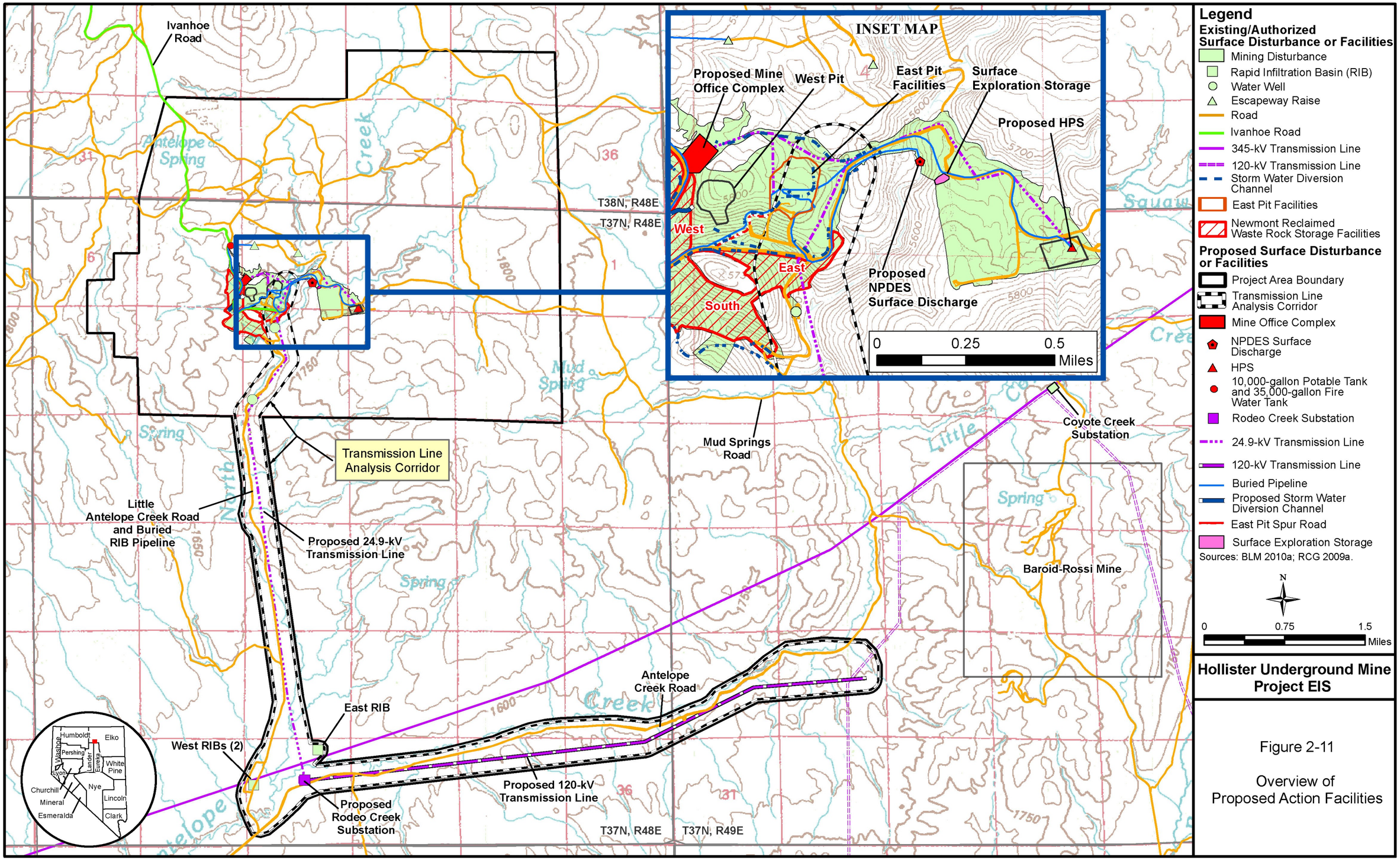
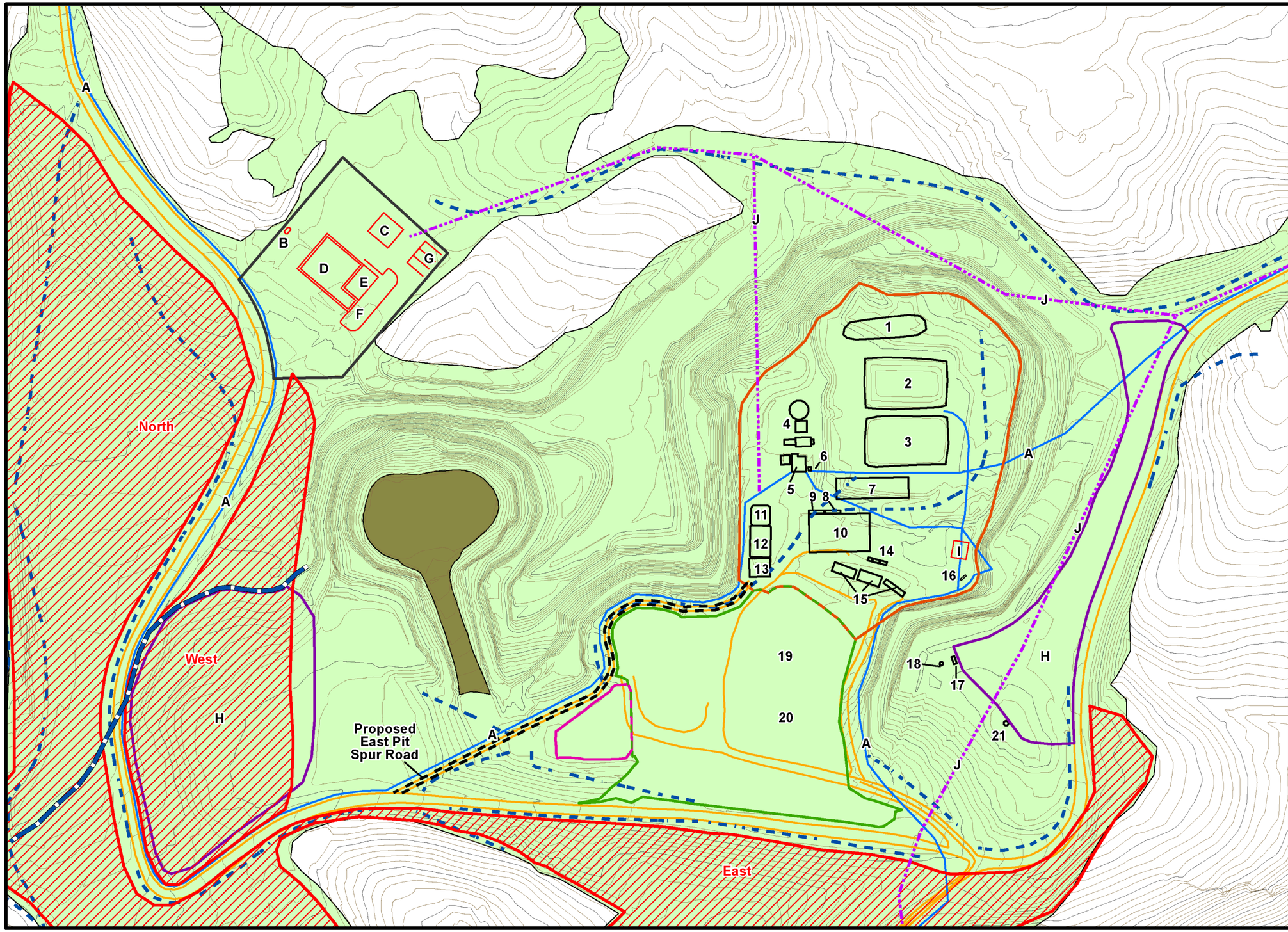



Figure 2-11

Overview of Proposed Action Facilities

3/19/2012




## Legend

**Existing/Authorized Surface Disturbance or Facilities**

- Mining Disturbance
- Road
- East Pit Facilities
- Storm Water Basin Pond
- Waste Rock Storage Facility
- Storm Water Diversion Channel
- Newmont Reclaimed Waste Rock Storage Facility

1) Growth Media Stockpile
2) North Surge Pond
3) South Recycle Pond
4) De-silting System
5) Oil Contaminated Soil Pad
6) Wash Bay/Steam Cleaner
7) Reverse Osmosis Water Treatment Plant
8) Connex Storage
9) Lube Oil Storage
10) Maintenance Shop
11) Fuel Storage
12) Generators (2)
13) Compressor Building
14) Septic Holding Tanks
15) Office Trailers
16) Portal
17) Potable Water Treatment Plant
18) Potable Water Tank (5,000-gal) (4)
19) RCG Existing Waste Rock Storage Facility
20) Ore Stockpile and Storage
21) Utility Water Tank (10,000-gal)

**Proposed Surface Disturbance or Facilities**

- West Pit Waste Rock Storage Facility
- Laydown Area
- Buried Pipelines
- Proposed Storm Water Diversion Channel
- 24.9-kV Transmission Line
- East Pit Spur Road

A) Buried Water Pipelines
B) Propane Tank
C) Mine Rescue Building
D) Mine Office Complex
E) Fenced Outside Storage Area
F) Outside Storage Area
G) Septic Tank and Leach Field
H) Laydown Area
I) Batch Plant
J) Powerline

Note: Contour interval 5 feet.
Source: MWH Americas Inc. 2007; RCG 2009a.

N

0 200 400 Feet

**Hollister Underground Mine Project EIS**

Figure 2-12

Detail of Proposed Action Facilities

3/20/2012

**Table 2-5 Currently Authorized and Proposed Action Disturbance**

| Component | No Action Alternative Authorized Disturbance | | | Proposed Action Disturbance | | | Total Disturbance |
|---|---|---|---|---|---|---|---|
| | Public Acres | Private Acres | Total Existing Acres | Public Acres | Private Acres | Total Proposed Acres | |
| **Mining Facilities** | | | | | | | |
| Existing RCG WRSF and Ore Stockpile Storage | 7.2 | - | 7.2 | - | - | - | 7.2 |
| West Pit WRSF | - | - | - | 8.0 | - | 8.0 | 8.0 |
| Hatter Production Shaft | - | - | - | 5.0 | - | 5.0 | 5.0 |
| East Raise | 0.4 | - | 0.4 | - | - | - | 0.4 |
| West Raise | 0.4 | - | 0.4 | - | - | - | 0.4 |
| Laydown Areas | 10.0 | - | 10.0 | 10.0 | - | 10.0 | 20.0 |
| **Mining Facilities Disturbance Totals[1]** | **18.0** | **-** | **18.0** | **23.0** | **-** | **23.0** | **41.0** |
| **Transmission Line and Associated Components** | | | | | | | |
| Rodeo Creek Substation[2] | - | - | - | - | 2.0 | 2.0 | 2.0 |
| East Pit Switchgear Facility | | | | 0.1 | - | 0.1 | 0.1 |
| Transmission Line Pads: 24.9-kilovolt (kV)[3] | - | - | - | 0.1 | 0.1 | 0.2 | 0.2 |
| Transmission Line Pads: 120-kV[4] | - | - | - | 0.1 | 0.1 | 0.2 | 0.2 |
| Temporary Access Roads: 24.9-kV[5] | - | - | - | 13.7 | 1.5 | 15.2 | 15.2 |
| Temporary Access Roads: 120-kV[5] | - | - | - | 7.9 | 7.1 | 15.0 | 15.0 |
| Laydown Areas: 24.9-kV | - | - | - | 1.0 | - | 1.0 | 1.0 |
| Laydown Areas: 120-kV | - | - | - | 1.0 | - | 1.0 | 1.0 |
| **Transmission Line and Associated Components Disturbance Totals[6]** | **-** | **-** | **-** | **23.9** | **10.8** | **34.7** | **34.7** |
| **Water Management Facilities** | | | | | | | |
| Water Management Ponds[7] | 2.0 | - | 2.0 | - | - | - | 2.0 |
| Water Tanks/Treatment[8] | 2.0 | - | 2.0 | - | - | - | 2.0 |
| New Water Tanks | - | - | - | 0.3 | - | 0.3 | 0.3 |
| Water Well #1 | 0.5 | - | 0.5 | - | - | - | 0.5 |
| Rapid Infiltration Basins | 3.0 | 5.0 | 8.0 | - | - | - | 8.0 |

**Table 2-5 Currently Authorized and Proposed Action Disturbance**

| Component | No Action Alternative Authorized Disturbance | | | Proposed Action Disturbance | | | Total Disturbance |
|---|---|---|---|---|---|---|---|
| | Public Acres | Private Acres | Total Existing Acres | Public Acres | Private Acres | Total Proposed Acres | |
| RIB Monitoring Wells | 6.5 | 0.1 | 6.6 | - | - | - | 6.6 |
| Proposed Buried Pipelines[9] | - | - | - | 20.4 | - | 20.4 | 20.4 |
| Proposed NPDES Discharge Outfall | - | - | - | 0.5 | - | 0.5 | 0.5 |
| Proposed Storm Water Diversion Channel[10] | - | - | - | 0.4 | - | 0.4 | 0.4 |
| Monitoring Wells for Mine Site | 2.0 | - | 2.0 | 1.0 | - | 1.0 | 3.0 |
| Overburden Stockpile for RIBs | 6.0 | 1.8 | 7.8 | - | - | - | 7.8 |
| Growth Media Stockpiles for RIBs | 0.5 | 1.5 | 2.0 | - | - | - | 2.0 |
| **Water Management Facilities Disturbance Totals** | **22.5** | **8.4** | **30.9** | **22.6** | **-** | **22.6** | **53.5** |
| **Roads** | | | | | | | |
| Misc. Roads and Parking | 3.1 | - | 3.1 | - | - | - | 3.1 |
| East Pit Spur Road (1,215-foot length) | - | - | - | 0.7 | - | 0.7 | 0.7 |
| Little Antelope Creek Road | 6.0 | 1.1 | 7.1 | - | - | - | 7.1 |
| Access Road Upgrade to HPS [11] | | | | 6.0 | | 6.0 | 6.0 |
| Miscellaneous[12] | 6.7 | - | 6.7 | 1.0 | - | 1.0 | 7.7 |
| **Roads Disturbance Totals** | **15.8** | **1.1** | **16.9** | **7.7** | **-** | **7.7** | **24.6** |
| **Ancillary Facilities** | | | | | | | |
| De-silting Facilities | 0.4 | - | 0.4 | - | - | - | 0.4 |
| Wash Bay | 0.1 | - | 0.1 | - | - | - | 0.1 |
| Explosives Yard[13] | 0.0 | - | 0.0 | - | - | - | 0.0 |
| East Pit Offices[14] | 1.0 | - | 1.0 | - | - | - | 1.0 |
| Mine Office Complex | - | - | - | 4.0 | - | 4.0 | 4.0 |
| Misc. East Pit Facilities[15] | 10.1 | - | 10.1 | - | - | - | 10.1 |

**Table 2-5 Currently Authorized and Proposed Action Disturbance**

| Component | No Action Alternative Authorized Disturbance | | | Proposed Action Disturbance | | | Total Disturbance |
|---|---|---|---|---|---|---|---|
| | Public Acres | Private Acres | Total Existing Acres | Public Acres | Private Acres | Total Proposed Acres | |
| **Ancillary Facilities Disturbance Totals** | **11.6** | **-** | **11.6** | **4.0** | **-** | **4.0** | **15.6** |
| **Total[16]** | **67.9** | **9.5** | **77.4** | **81.2** | **10.8** | **92.0** | **169.4** |

[1] The proposed disturbance associated with mining facilities would all be on existing disturbance.

[2] Includes temporary laydown area that would be reclaimed after facility construction.

[3] Transmission line pad acreage estimates for 24.9-kV transmission line were less than 0.1 acre, but were rounded up to better buffer disturbances.

[4] Transmission line pad acreage estimates for 120-kV transmission line were less than 0.1 acre, but were rounded up to better buffer disturbances.

[5] Transmission line temporary access roads assume 20-foot width, following the transmission line directly with spur roads at a maximum of one every mile for access to transmission line where topography or existing road would be difficult to access.

[6] The proposed disturbance associated with the transmission line would be mostly on previously undisturbed land.

[7] North surge pond, south recycle pond, and storm water basin pond.

[8] Septic holding tank, potable water tank, utility water tank, RO water treatment plant, de-silting system, and potable water treatment plant.

[9] Includes a 20-foot-wide temporary disturbance from: 1) the West Raise to the RIBs (15.9 acres), 2) the water treatment facility to the HPS (2.5 acres), and 3) from underground groundwater pumping to the NPDES discharge outfall via water treatment plant (2.0 acres).

[10] Assumes a 15-foot-wide permanent disturbance for the diversion channel.

[11] Assumes a 18-foot running width with 5-foot shoulders and 1.0 acre extra for turnouts.

[12] Includes service roads, main gate, guard shack, storage areas, diversion channels, and other authorized disturbance.

[13] Explosives storage was moved underground.

[14] Includes connex storage, lube/oil storage, maintenance shop, office trailer, foreman trailer, and shifter trailer.

[15] Walkways among East Pit facilities, laydowns, storage, parking, etc.

[16] Of the total 92 acres of disturbance associated with the Proposed Action, 32.4 acres would be on reclaimed lands disturbed by previous mine and mineral exploration activities, 51.5 acres would be on new disturbance, and 8.1 acres would be on existing disturbed and non-reclaimed land.

Source: BLM 2011a, 2010c; RCG 2010b, 2009a.

Approximately 106 acres would involve lands administered by the BLM, and approximately 11 acres are owned by private parties (**Figure 1-2**). Total surface disturbance at the Hollister Site for previously authorized and proposed actions would be approximately 222 acres.

**Table 2-6 Surface Exploration Disturbance for Existing Authorized Actions and the Proposed Action**

| Component | Disturbance from Existing Authorized Actions | | | Disturbance from Proposed Action | | | Total Disturbance |
|---|---|---|---|---|---|---|---|
| | Public Land (acres) | Private Land (acres) | Total Existing Disturbance (acres)[1] | Public Land (acres) | Private Land (acres) | Total Proposed Disturbance (acres) | |
| Exploration including roads and drill sites | 28[1] | 0 | 28 | 25 | 0 | 25 | 53 |

[1] Includes 3 acres for water well #5 and associated water system facilities (i.e., pipeline, pump house, water tank, and roads).

Note: The proposed disturbance associated with surface exploration may be mostly on previously undisturbed land.

Source: Ivanhoe Surface Exploration Plan of Operations NVN-071014 (BLM 1993a).

The designated analysis corridor includes the transmission line route, a segment of Little Antelope Creek, the RIB area, and Little Antelope Creek Road. The analysis corridor contains 1,121 federally owned and 867 privately owned acres. **Tables 2-5** and **2-6** present a summary of surface disturbance associated with the proposed project and authorized disturbance for currently permitted activities (i.e., the No Action Alternative).

The transition to full-scale mine production, described in Section 2.4.3.2, Ore Production, would require minor additions to the existing project infrastructure. Most of the existing on-site surface infrastructure described in Section 2.2, Existing Hollister Operations, used to facilitate the underground exploration activities would remain in place for the Proposed Action. Most of the existing infrastructure required for the Proposed Action is located within disturbance created by open-pit mining operations namely, the East Pit, undertaken in the early 1990s by previous operators. Most of the new and upgraded surface infrastructure would be placed on previously disturbed and reclaimed areas outside of the East Pit.

RCG is currently authorized to disturb approximately 80 acres (70.9 acres of public land and 9.5 acres of private land) associated with the facilities located in the East Pit, including the existing RCG WRSF, roads, growth media stockpiles, cement batch plant, offices, dry facilities, some water treatment facilities, portal, and the water well #5 associated water system. Some of the existing water treatment facilities are located outside of the East Pit, such as water wells, water tanks, and RIBs (**Figures 2-1** and **2-2**).

#### 2.4.1.1 Project Area Description

The project area (**Figures 2-11** and **2-12**) includes all the areas for the three general categories of activities under the Proposed Action. These activities are: transition to full-scale underground mining, construction of a transmission line, and surface exploration. The project area is the region within the project area boundary black line (**Figure 2-11**).

The proposed milling operations would be conducted at the Esmeralda Mill in Mineral County, and/or the Midas Mill in Elko County.

#### 2.4.1.2 Schedule and Work Force

Pending authorization of required permits and approvals, construction and operation of the proposed project is anticipated to be initiated in 2012. The mine would be active year-round for approximately 20 years. Concurrent reclamation would be conducted during this period as areas are no longer utilized. Up to an additional 3 years would be required for final reclamation and site closure.

Currently, approximately 160 people work at the Hollister Site. It is anticipated that the Proposed Action would require up to 60 additional workers for full production and construction of facilities and other site preparation activities. Approximately 45 of the additional 60 workers would be temporary hires to construct new facilities; 15 workers would be permanent new hires to support full-scale mine production. The majority of the work force has been hired from the local communities. It is anticipated that the proposed project would provide employment opportunities for the 20-year mine life, plus the reclamation period.

### 2.4.2 Access Roads

#### 2.4.2.1 Project Area Access Road – Ivanhoe Road

Under the Proposed Action, the 9-mile Ivanhoe Road to the Hollister Site would continue to be maintained as needed to enhance safety, reduce the risk of accidents, minimize sediment in drainages, and reduce dust generation from the road. Maintenance activities would be in accordance with the terms and conditions of the ROW, including grading (blading), snow removal, and use of dust suppressants, depending on the time of year and road conditions. In the vicinity of the mine and new office complex areas, a turnout from the Ivanhoe Road would be required to access the truck scales.

#### 2.4.2.2 RIBs and Transmission Line Access – Little Antelope Creek Road

The existing Little Antelope Creek Road would be maintained as in the past. Blading would not widen the road; its purpose would be to maintain safe access to the RIBs and transmission line under the Proposed Action. The buried water pipeline from the mine site to the RIBs, is located in the center of the Little Antelope Creek Road. Gravel would be placed on the Little Antelope Creek Road as needed.

#### 2.4.2.3 East Pit Access – Spur Road Within East Pit

RCG would continue to access the East Pit via the existing Ivanhoe Road, but a second short spur road, with a length of approximately 1,215 feet and a width of approximately 30 feet, would be constructed on the west side of the East Pit to provide for “loop” traffic into the pit area (**Figure 2-12**). It would be constructed in an area above the existing storm water pond, and it would connect to the top of the existing RCG WRSF. This road would allow RCG to maintain right-hand traffic with a safer and more efficient traffic flow for ore and supply trucks entering and exiting the East Pit.

Prior to construction of this 0.2 mile stretch of road known as the East Pit spur, RCG would investigate the nature and extent of the underlying material to determine if it is natural ground, waste rock, or low grade ore and the PAG nature of the material. If the waste rock or low grade ore in this area is determined to be PAG, one of the following preventative measures (or a combination of the two measures) would be used to construct this spur road to prevent acid generation:

1. The waste rock or ore material would be excavated to a depth of 3 feet and non-PAG rock would be used to fill the area of excavation for the spur road. The excavated material would be placed in the existing RCG WRSF.
2. Three feet of non-PAG material would be used as fill to construct the East Pit spur road. Regardless of the construction technique selected, RCG would place a gravel overlay on a crowned running surface of the road and route any drainage off the road and into the existing storm water pond via diversion channels. Gravel and clean fill material would be hauled from an existing gravel pit located on private property near the Town of Midas.

#### 2.4.2.4 East and West Raise Access Roads

Minimal maintenance such as blading and or graveling on an as-needed basis would be done on the East and West Raise access roads.

#### 2.4.2.5 Surface Exploration Access

Access to the project area for surface exploration would utilize the Ivanhoe Road described above. Within the project area surface exploration access would utilize existing roads and two-track roads and may include overland travel where possible. Any new constructed access roads must be approved by BLM.

### 2.4.3 Underground Mining Operations

Underground mining operations would consist of the facilities in the East Pit at an approximate elevation of 5,550 feet amsl, or 170 feet below the natural ground surface; the existing and new WRSFs; transmission line additions; laydown areas; access roads; Hatter production shaft, ramp, or raise; water treatment facilities; and other ancillary facilities (**Figure 2-12**). The total surface disturbance footprint to support the Proposed Action is comprised of 8.1 acres of existing, non-reclaimed land, 32.4 acres of new disturbance on previously reclaimed mining disturbance, and 51.5 acres of new disturbance (**Table 2-5**).

Under the Proposed Action, bulk sampling and testing operations would transition to full-scale underground mine production. Narrow vein mining methods (**Figure 2-4**) are proposed to extract the ore, as described in Section 2.2.4.5, Underground Test Mining Techniques.

Under the Proposed Action, RCG would use the same type of equipment that has been utilized at the site for bulk sampling activities. Some current equipment would be replaced during the life of the mine as equipment reaches the end of its useful life, and the equipment may be modified during the mine life depending on site-specific conditions and needs, and, depending on mining methods, more of the same type of equipment may be required.

#### 2.4.3.1 Hatter Production Shaft, Raise, or Access Ramp

Under the Proposed Action, a new vertical production shaft (**Figure 2-13**) or alternatively a raise (**Figure 2-14**) or access ramp, would be constructed to a depth of approximately 2,000 feet below the surface (RCG 2012) (the HPS). This facility would be constructed to minimize underground truck haulage and to provide for future ore and waste rock haulage from the mine. The decision whether to sink a shaft or drive a ramp or raise would be made based on the geology, location of the ore body, and engineering requirements. For the purposes of this EIS, the proposed shaft was quantitatively assessed for potential impacts because it is taller and would cause the most visual impact and greatest surface disturbance. Alternatively the construction of either a raise or ramp would be less visible and would create less surface disturbance. Initial indications are that the shaft, raise, or ramp would be located near an old topsoil stockpile and old drillsite ("drillsite MT") in a previously disturbed area. However, depending on future delineation of the ore body, it may be necessary to move this proposed location for better alignment with the ore body. A shaft would be approximately 2,000 feet deep and rectangular in cross section (approximately 8 feet by 24 feet). The topsoil currently stored in the proposed shaft location (**Figure 2-11**) would be stripped and stored near the proposed shaft on existing disturbance. All activities and facilities associated with the proposed shaft would be contained within a 5-acre area.

The shaft, raise, or ramp would be placed using conventional drill and blast techniques, with the waste rock excavated during construction hauled and placed in the existing RCG WRSF or the West Pit. A shaft would be lined with concrete or shotcrete with rock bolts and steel mesh, and would contain various compartments to be used for ore/waste rock hoisting, ventilation, and mine services, and supply movement into and out of the mine. Although the proposed shaft would be available for an emergency personnel escapeway from the mine, the existing decline in the East Pit would continue to serve as the primary personnel ingress/egress.

The production shaft would be supported by surface facilities, principally a hoist house and headframe. The proposed shaft hoist house would be a steel-sided building constructed on a concrete foundation. The color of the siding would be selected to blend in with the surrounding landscape. The headframe would be approximately 100 to 120 feet tall placed over the shaft (**Figure 2-13**). Additional facilities associated with the proposed shaft would include a small laydown area, office space in the hoist house, and temporary waste rock and ore stockpiles. All facilities would be located within the 5 acres of disturbance identified in **Table 2-5** (RCG 2010b).

Alternatively, a raise (**Figure 2-14**) or ramp may be constructed. Either facility also would be supported by shotcrete, with rock bolts and steel mesh. Additional facilities associated with a raise or ramp would include a small laydown area, a small building with office space not to exceed the height and dimensions of a hoist house (average size of 75 feet by 130 feet), and temporary waste rock and ore stockpiles (200 feet by 200 feet). If a ramp or a raise is chosen as the preferred method of access, it would be similarly located.

Ventilation, drainage, power, and communications with underground areas would be provided via the shaft or ramp to the underground working areas. Power would be supplied through a new overhead transmission line, described in Section 2.4.6.1, Electrical Power, and shown in **Figure 2-11**.

Waste rock removed from the HPS would be transported and placed in the existing RCG WRSF, in the proposed West Pit WRSF, or backfilled in the underground workings. Material used as backfill may be stored temporarily in the underground workings. Section 2.4.4, Waste Rock Management, describes the WRSF options and waste rock management procedures.

Access to the HPS would be via a 30-foot-wide road, (20-foot-wide running width and 5-foot-wide shoulders on each side) shown on **Figure 2-11**. Ore and waste rock would be hauled from the HPS to the WRSFs or ore stockpile for transport to the mill for processing.

#### 2.4.3.2 Ore Production

As of September 2010, RCG reported approximately 1.6 million ounces of gold equivalent measured, indicated, and inferred resources for underground deposits associated with the Hollister operations. Targeted ore production would average 750 tpd for a total of up to 275,000 tpy. Daily ore production could vary based on the geometry and grade of the deposit and may reach 1,000 tpd. All ore produced would be mill grade. The ore and waste rock tonnages (based on current economic factors) for the proposed project are summarized in **Table 2-7**. All waste rock would be expected to be PAG.

**Table 2-7 Proposed Action Ore and Waste Rock Tonnages**

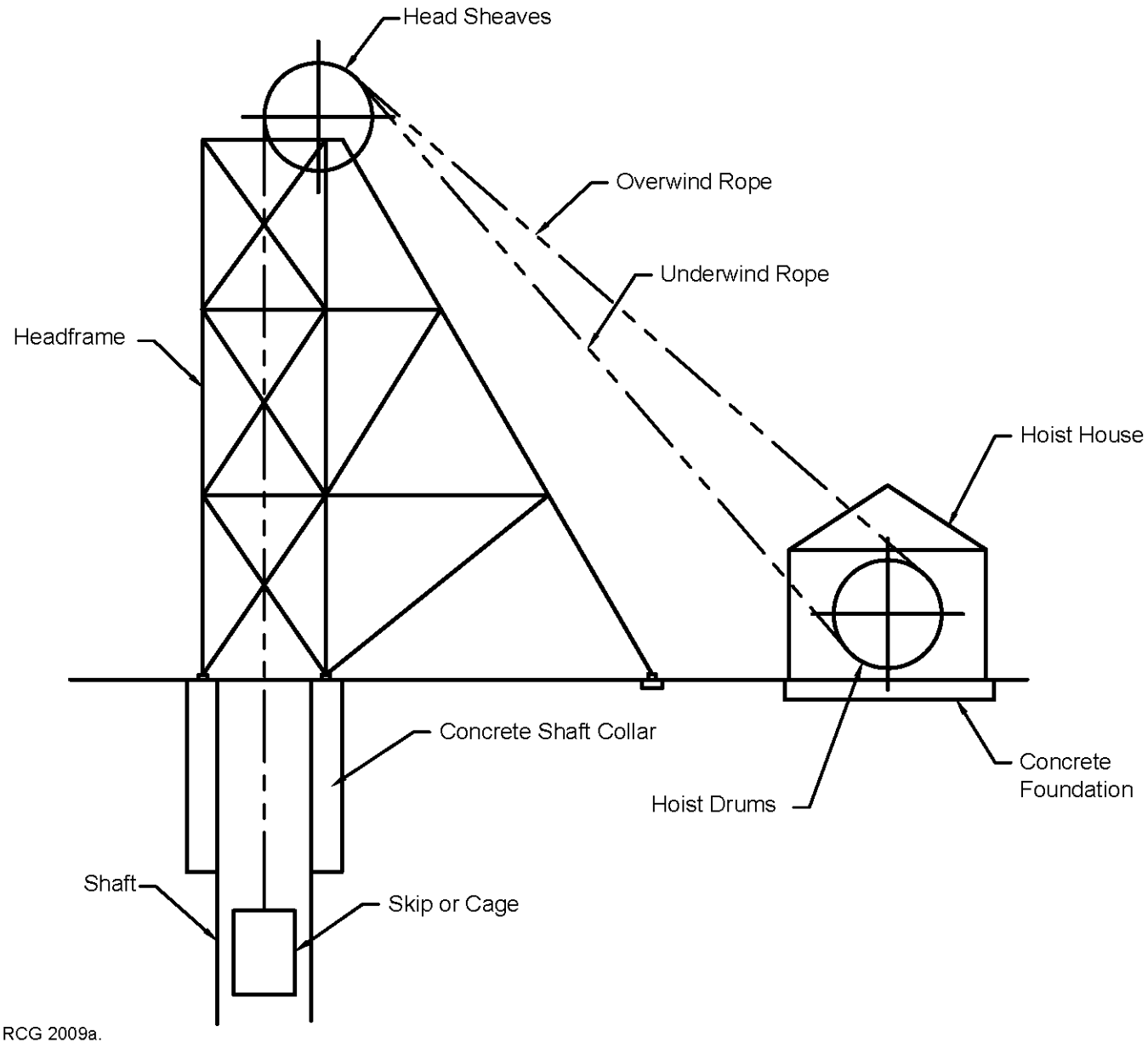
| Source of Ore and Waste Rock | Total Ore (tpd) | Waste Rock (tpd) |
|---|---|---|
| Underground Operations | 750 to 1,000 | 935 to 1,250 |

Source: RCG 2010b.

#### 2.4.3.3 Loading, Hauling, and Ore Storage

Ore material removed from the underground mine would be hauled by truck and temporarily stored on a concrete pad on top of the approved and existing RCG WRSF, or on a concrete pad adjacent to the proposed HPS. Any draindown water from ore stockpiled on the existing RCG WRSF would continue to be collected, treated, and routed via buried pipeline to the existing RIBs, as described in Section 2.2.6, Water Management. The on-site ore storage area would include a small portable crusher. The crusher could accommodate approximately 100 tph and would be used as needed.

## Typical Shaft Hoisting System



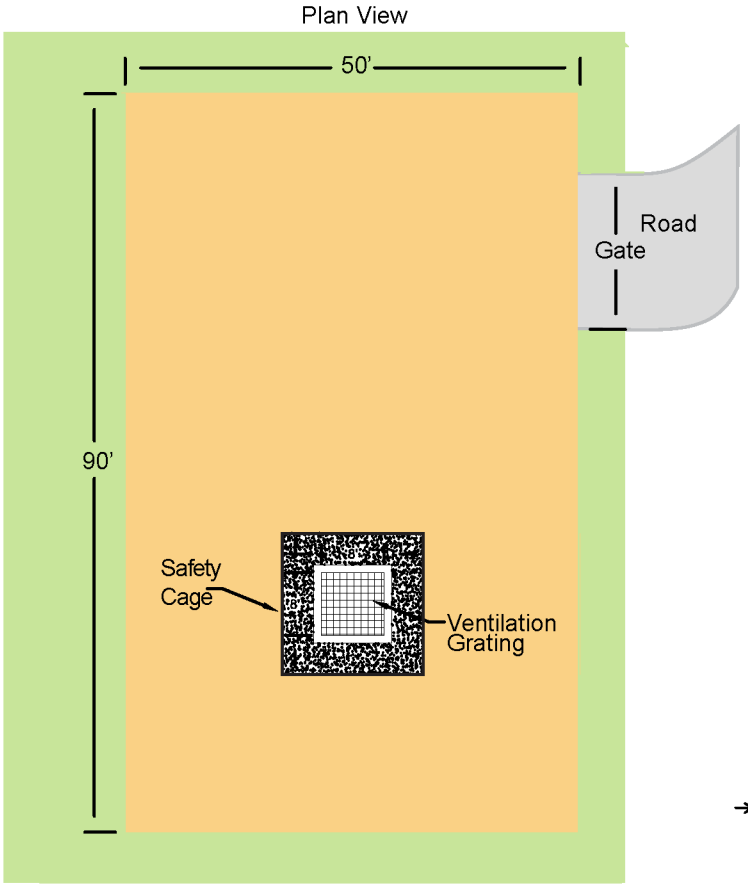

Source: RCG 2009a.

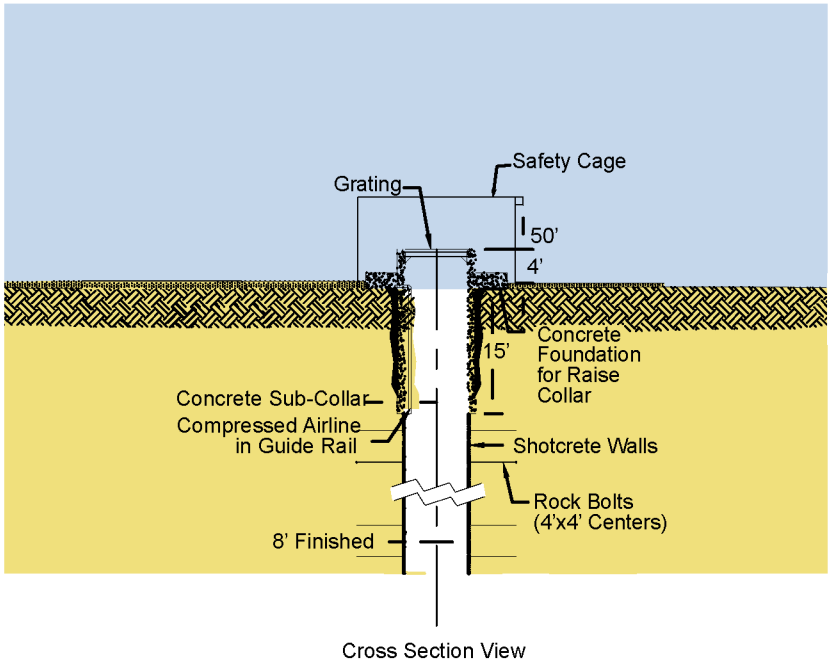
**Hollister Underground Mine Project EIS**

Figure 2-13

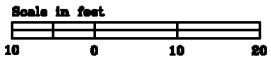
Typical Hoist House and Hoist Headframe Design

03/20/12



1" = 20'




**Hollister Underground Mine Project EIS**

Figure 2-14

Typical Raise Design

Source: RCG 2011b, 2010b.

03/23/2012

#### 2.4.3.4 Water Management

Water management under the Proposed Action consists of two separate systems, a new groundwater pumping system and continuation of the current mine water management system. To differentiate between the two, the new system is referred to as the groundwater pumping system and the existing system is referred to as the water management system. The existing water management system would continue to be utilized for the Proposed Action (see Section 2.2.6).

Pumping System

To supplement the existing water management system for the Proposed Action, 8 to 12 underground wells may be installed within the underground mine workings as necessary to improve water handling (**Figure 2-15**).Water would be removed from the underground workings up to a maximum rate of approximately 1,100 gpm on a continuous basis for the 20-year mine life. The groundwater pumping system (wells, pumps, pipelines, and tanks) would prevent groundwater from contact with the underground workings or from commingling with mine water that is handled by the existing water management system. The deepest working would be at a depth of approximately 4,000 feet amsl at the Hatter Expansion area or approximately 2,000 feet below ground surface (bgs). However, pumping water out to that depth may not be necessary because water is only pumped out when encountered. Section 3.5, Groundwater Resources and Geochemistry, describes the current groundwater elevations and expected pumping requirements for mining.

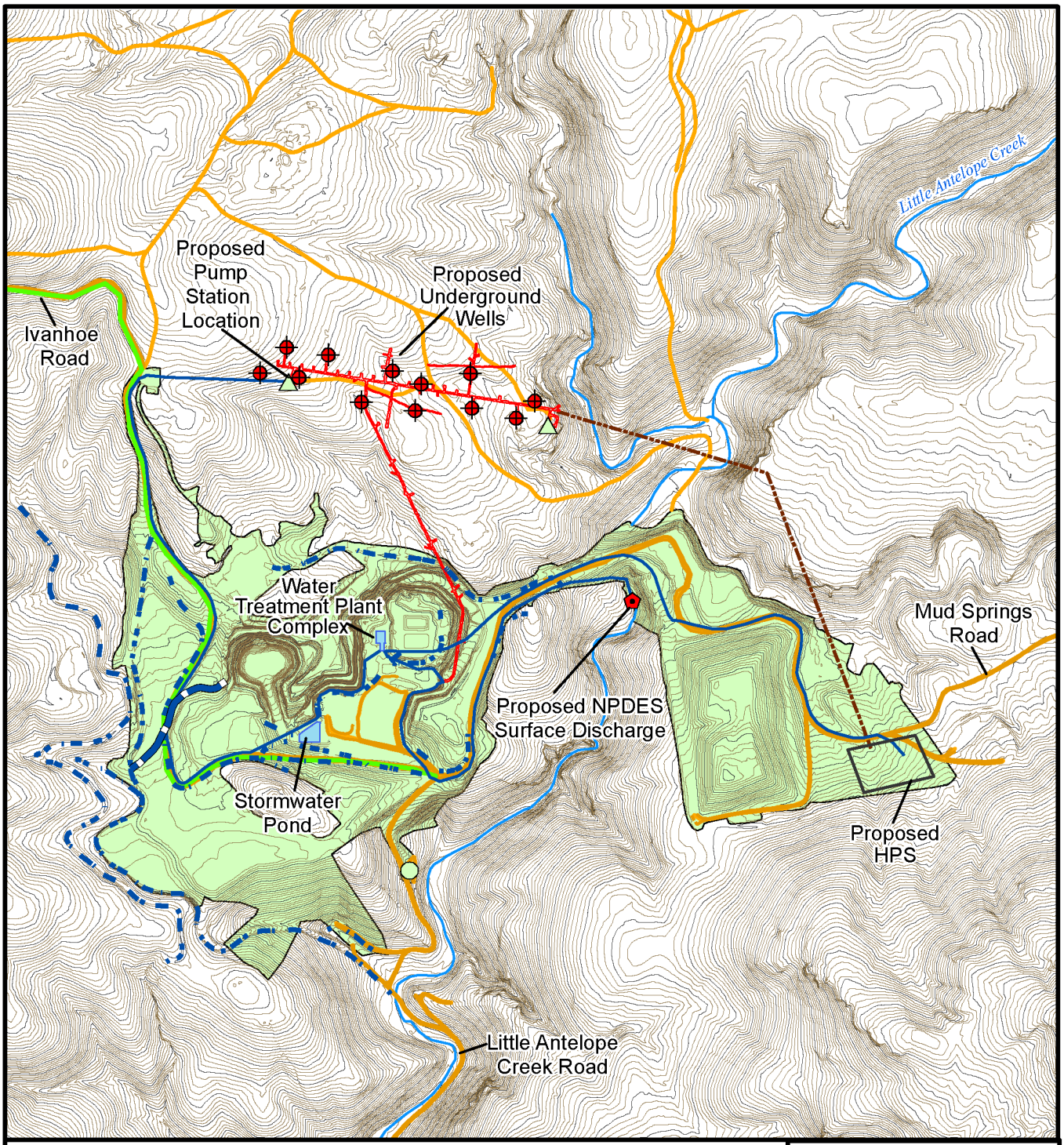
Water produced from the underground wells would be routed to underground pumping stations through dedicated pipelines. Water then would be pumped from the mine to the surface. Upon reaching the surface, this water would be gravity-fed in an existing buried pipeline to the RIBs or to the proposed NPDES discharge outfall on Little Antelope Creek (**Figure 2-15**). Pipeline diameters would vary from 6 to 8 inches.

The proposed discharge rate to Little Antelope Creek and the RIBs would be approximately equal to the groundwater pumping rate. In addition, RCG may use between 100 and 150 gpm from the underground wells to support Hollister Mine operations. **Figure 2-15** illustrates the conceptual location of underground groundwater pumping wells. RCG would obtain a NPDES permit from NDEP-Bureau of Water Pollution Control (BWPC) to allow surface discharge into Little Antelope Creek. Water discharged into Little Antelope Creek via the NPDES location would be treated, if necessary, to attain NDEP water quality standards for Rock Creek.

The Proposed Action conceptual underground expansion areas are shown in **Figure 2-16**. There are two primary areas: the Hollister expansion and the Hatter expansion. The Hollister expansion is located where RCG is currently conducting underground exploration and would be mined for the Proposed Action. The proposed Hatter expansion area is east of the Hollister expansion.

The NPDES outfall would be NDEP-approved and would disturb less than 0.5 acre of previously undisturbed land. An 18-inch-diameter water pipeline would be anchored to prevent movement and would discharge water onto bedrock to prevent splash-over flow (**Figure 2-17**).

Natural rock materials already existing in the Little Antelope Creek channel bottom and sideslopes have size gradations ranging from approximately 6 inches to 48 inches, and are expected to be adequate to ensure channel stability at the proposed NPDES outfall location at the maximum anticipated discharge rate of 1,100 gpm. Routine monitoring of the outfall would ensure continued stability. If monitoring identifies any erosion concerns at the outfall location and/or downstream of the outfall, additional rip rap material would be placed in the channel to provide additional energy dissipation.




**Legend**

**Existing/Authorized Disturbance or Facilities**

- Mining Disturbance
- Water Well
- Escapeway Raise
- Surface Water Diversion Channel
- Road
- Ivanhoe Road
- Creek

**Proposed Disturbance or Facilities**

- Underground Well Conceptual Locations
- Proposed NPDES Surface Discharge
- Buried Pipeline
- Existing Underground Exploration Workings
- Proposed Storm Water Diversion Channel
- Proposed Conceptual Underground Workings

N

0 0.1 0.2 Miles

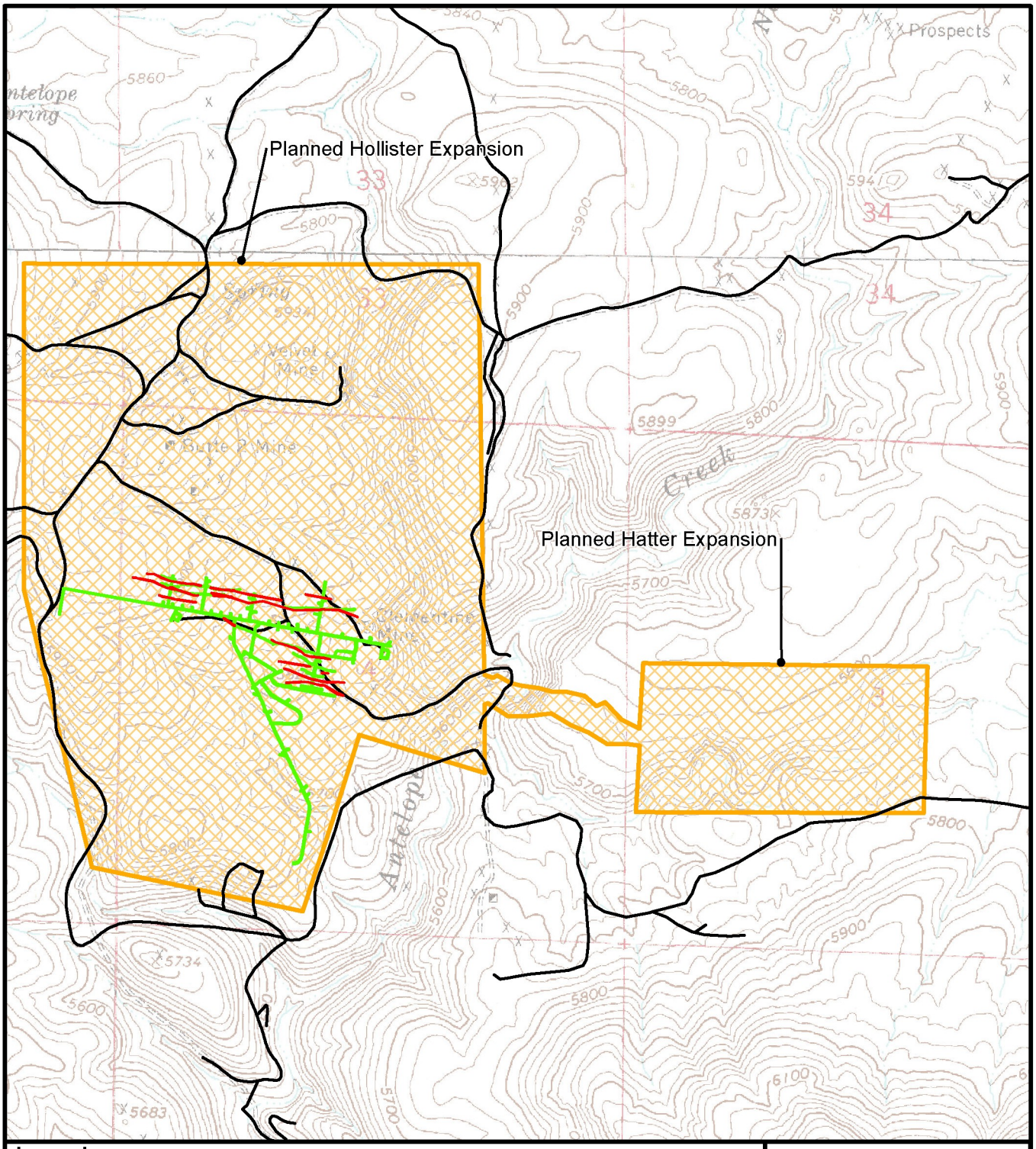
Note: Contour interval 5 feet.
Source: RCG 2009a.

**Hollister Underground Mine Project EIS**

Figure 2-15

Proposed Underground Well Locations

3/20/2012




**Legend**

- Access Road to Escapeway Raise
- Existing Underground Exploration Workings
- Vein
- Proposed Action Conceptual Underground Expansion Area

N

0 0.1 0.2 Miles

Source: Brown and Caldwell 2010a;
Montgomery and Associates 2010a; RCG 2011b.

**Hollister Underground Mine Project EIS**

Figure 2-16

Proposed Action Conceptual Underground Expansion Area

3/20/2012

**Hollister Underground Mine Project EIS**

Figure 2-17

Approximate Location of the Proposed NPDES Outfall

Source: RCG 2011b.

03/20/12

### 2.4.4 Waste Rock Management

Under the Proposed Action, waste rock would be disposed of in the existing approved RCG WRSF, in a new WRSF located in the West Pit, and/or as backfill in underground mined-out areas.

#### 2.4.4.1 Existing RCG Waste Rock Storage Facility

The existing RCG WRSF is described in Section 2.2.5, Waste Rock Management. As currently permitted, the existing RCG WRSF would be used to accommodate a portion of the waste rock generated under the Proposed Action described in Section 2.4.3, Underground Mining Operations. The design capacity of the approved WRSF is approximately 612,000 $yd^3$ (1,100,000 tons), with a surface disturbance of 7.2 acres. Under the Proposed Action, waste rock would be added to the existing RCG WRSF until its capacity is reached and reclamation is initiated. RCG has no current plans to expand the approved height or footprint of the facility.

Walker and Associates (2003) completed static ABA tests, Nevada MWMP tests, and HCTs on lithologies from the Vinini Formation that would be expected to be involved in the proposed expansion of the underground workings. Section 2.2.5, Waste Rock Management, describes the ABA, MWMP, and HCT test procedures for waste rock. Waste rock characterization tests would follow BLM IM NV-2010-014 protocols (RCG 2011b). More details regarding waste rock geochemistry can be found in Section 3.5, Groundwater Resources and Geochemistry.

#### 2.4.4.2 West Pit Waste Rock Storage Facility

Under the Proposed Action, a new WRSF would be constructed within the West Pit (**Figure 2-12**). The West Pit was excavated by previous operators during surface mining operations in the early 1990s and is in an ideal location for a WRSF for the following reasons:

- There would be no new disturbance as a result of the proposed WRSF construction;
- The pit walls provide natural containment;
- Waste rock from the Hollister Mine would partially backfill the existing West Pit, which would reduce visual impacts from the pit when the WRSF is reclaimed; and
- A properly designed WRSF could mitigate pre existing water quality impacts to groundwater in the vicinity of the West Pit.

All waste rock from the Hollister Mine is characterized as PAG based on past and ongoing geochemical analyses. Waste rock characterization would be in conformance with BLM IM NV-2010-014 protocols (RCG 2011b). Waste rock characterization methods for the West Pit WRSF are the same as current procedures used for the Existing RCG WRSF. Specialized design and construction techniques would be implemented for the proposed West Pit WRSF to control and prevent acid rock drainage (ARD). These techniques would include the use of a wet well, a liner system beneath the disposal area, and intermixing of dolomite rock into the waste rock during construction of the WRSF. The West Pit WRSF would be engineered, constructed, and reclaimed in a similar manner as the existing RCG WRSF to ensure long-term stability, provide for effective reclamation, and reduce the overall visual impact.

<u>Design and Construction</u>

The West Pit WRSF would be designed and constructed as follows (**Figure 2-18**).

1. A 10- to 12-inch polyvinyl chloride (PVC) underliner pipe would be placed along the existing access road into the West Pit to the approximate lowest point within the pit. The pipe would be wrapped in geotextile filter blanket and would be located on compacted subgrade or native material. It would be bedded in filter sand. The purpose of this underliner pipe would be to gather samples of water (if present) beneath the wet well. The piping would extend beyond the area of proposed waste rock disposal. An inclined submersible pump would be placed at the bottom of

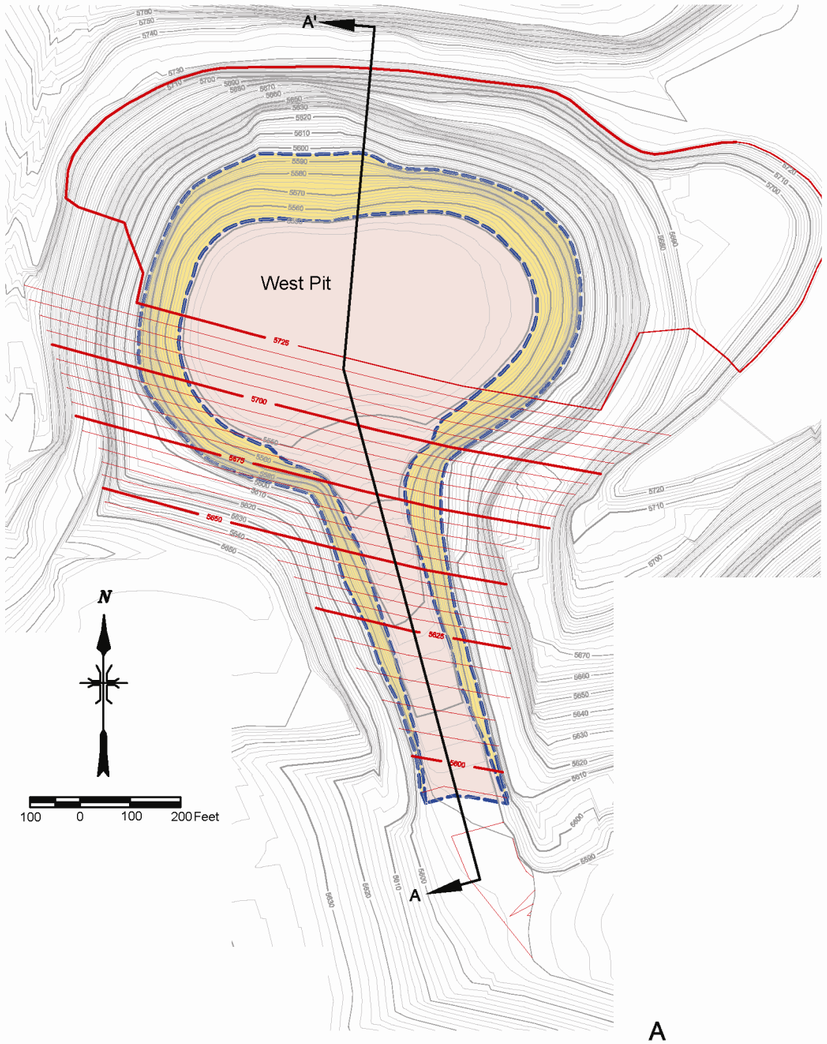
this pipe for water removal and sampling purposes. This pump would be situated such that it can be removed from the pipe if necessary for maintenance or replacement.

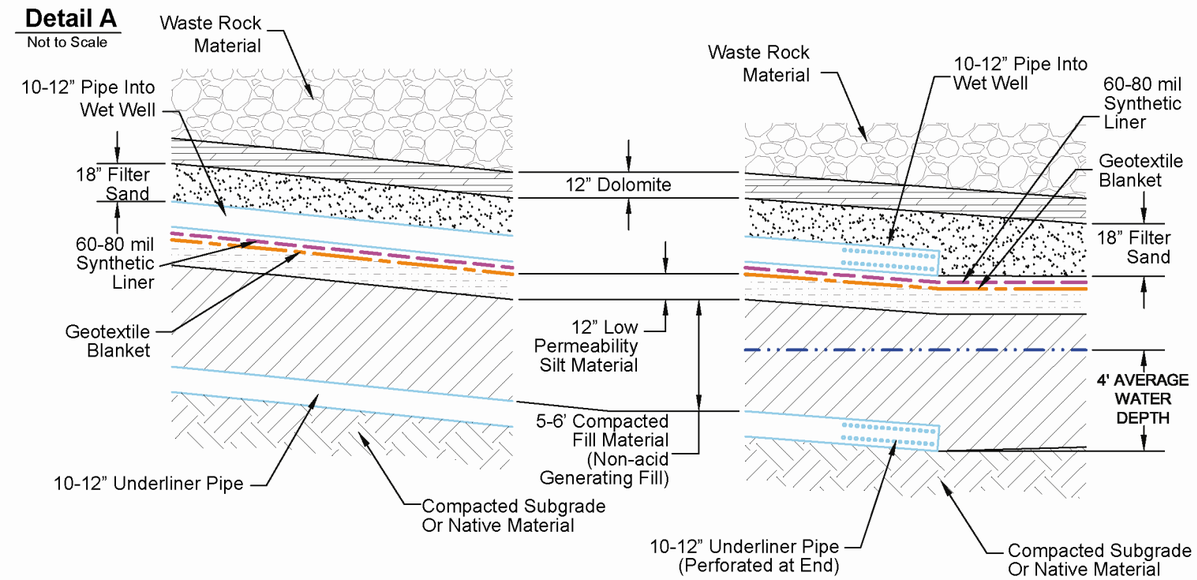
2. Approximately 5 to 6 feet of compacted (non-PAG) aggregate material would be placed in the bottom of the West Pit. The total amount would be adjusted to be sufficient to cover water (if present) in the pit. If necessary to facilitate the placement of the underliner pipe and aggregate material, any water present would be pumped from the West Pit into the existing surge ponds and processed through the on-site water treatment facility.
3. A layer of silt material would be placed on top of the aggregate. This layer would form the base for a geotextile blanket and the synthetic liner that would cover the bottom of the pit. The aggregate material would be shaped upward on the outer edges of the pit (i.e., the toe of the existing highwall) so that liner anchor trenches can be installed to secure the synthetic liner in place.
4. Similar to the underliner pipe, another 10- to 12-inch PVC pipe would be placed on top of the synthetic liner to serve as the sample mechanism for the actual wet well. Another inclined submersible pump would be placed at the bottom of this pipe. The pipe would be wrapped in geotextile filter blanket and bedded in filter sand. This pump would serve to sample water from the wet well for testing purposes.
5. A layer of dolomite, crushed to 3/8-inch minus, would be placed on top of the layer of filter sand. Dolomite also would be layered within the waste rock at intervals and at the mixing percentage for a 3:1 buffering capacity as required by the BLM for the waste rock disposal at the Hollister Site. Mixing methods are described below in PAG Waste Rock Neutralization. The source of dolomite would be off-site.
6. The highwall would be coated (sprayed) with shotcrete in horizontal layers of approximately 8 to 12 feet around the pit walls. As waste rock is disposed of in the West Pit, shotcrete would continue to be sprayed on the walls prior to each subsequent lift of waste rock. It is expected that approximately 40 to 50 feet of shotcrete would be required to form a sufficient seal in the disposal site to create a bowl-shaped protection area. Given the clayey nature of the waste rock, it is expected that waste rock would compact such that long-term permeability through the waste rock would be very low.
7. After mining is completed, the waste rock in the West Pit would be shaped to allow drainage off the facility and would be capped according to BLM- and NDEP-approved waste rock disposal capping and reclamation protocols. Capping and reclamation of the West Pit WRSF would follow the same protocols as described in Section 2.2.10.3, Reclamation of Existing RCG Waste Rock Storage Facility.

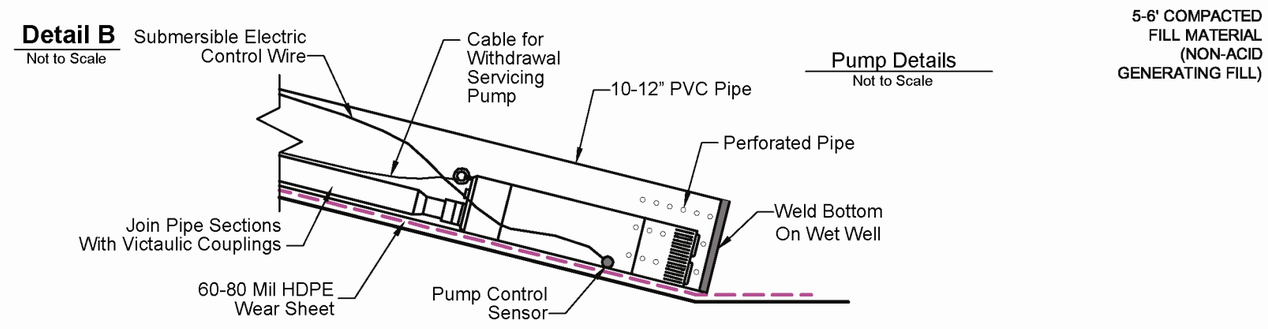
Mined waste rock would be hauled into the West Pit via an existing surface mine ramp within the pit. The WRSF would be constructed in a series of lifts within the interior of the existing West Pit. Waste rock would be placed by end-dumped lifts, progressing horizontally across the waste rock disposal site. During construction, working dump faces would be maintained at an overall angle of repose.

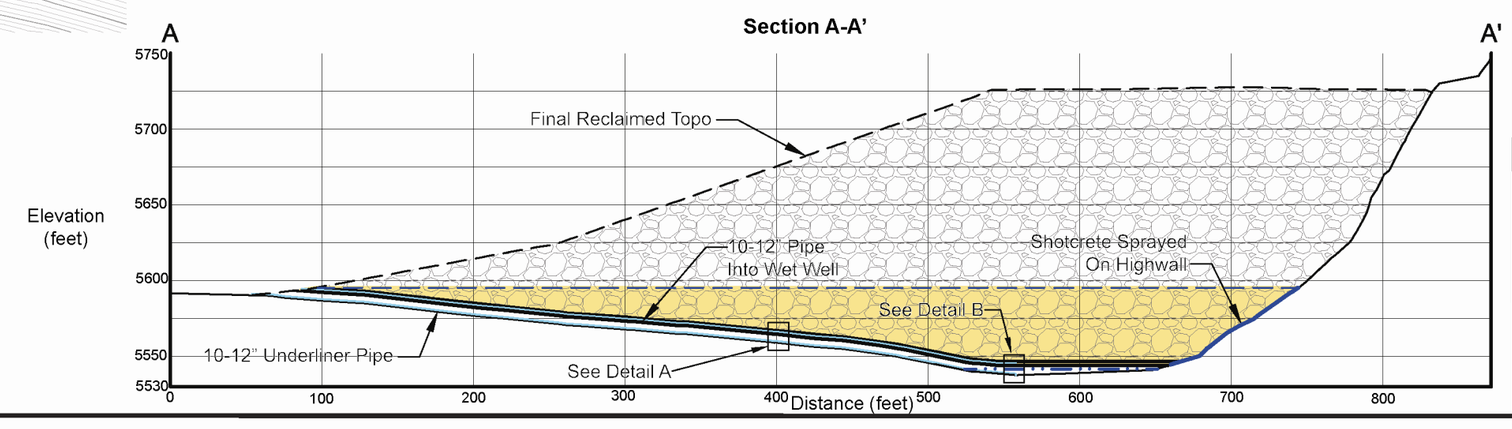
An access ramp would be constructed on the west side of the pit, and would wrap around to the north as subsequent waste rock lifts are added to the facility. This road would remain in place until the dump reaches the approximate 5,726-foot elevation amsl and contains a volume of slightly more than 900,000 $yd^3$ (1,617,647 tons). The existing ramp would then be closed, and the final filling of the West Pit would be completed from the top of the WRSF, accessed from a road external to the West Pit. Another 200,000 $yd^3$ (359,477 tons) of waste rock would be required to completely fill the West Pit WRSF.

The West Pit WRSF would accommodate up to 1.1 million $yd^3$ (1,977,124 tons) of waste rock and cover approximately 8 acres when full. The maximum height of waste rock above the floor of the West Pit would be approximately 175 feet, and the maximum crest elevation of the facility would be approximately 5,726 feet amsl. The maximum height of the facility would be below the rim of the West Pit.




**Legend**

- Existing Contours
- Final Waste Rock Contours
- Waste Rock Fill
- Dolomite
- Filter Sand
- Synthetic Liner
- Geotextile Blanket
- Bedding Material
- Compacted Fill (Non-acid Generating)
- Approximate Extent of Highwall Shotcrete
- Approximate Extent of Synthetic Liner System

Source: Czarnowsky 2010a.

**Hollister Underground Mine Project EIS**

Figure 2-18

West Pit Backfill WRSF Conceptual Design

To control erosion and for long-term stability of the West Pit WRSF, appropriate storm water controls would be constructed. The waste rock pile also would be appropriately graded to control storm water runoff and runon. Storm water would be routed to the existing storm water facility south of the West Pit.

PAG Waste Rock Neutralization

Dolomite or similar material would be added to the waste rock for in-situ neutralization of ARD at a buffering capacity of 3:1. Such material would be mixed with PAG waste rock upon placement in the West Pit. Smith et al. (1974) and Sobek et al. (1978) found that for every 1 percent of sulfur in the form of pyrite, 31.25 tons of limestone ($CaCO_3$) is required to neutralize the potential acidity in 1,000 tons of materials.

Past ABA test results for the Hollister waste rock have consistently indicated that the estimated average total pyritic sulfur content of the Hollister waste rock would be 1.26 percent. Therefore, ABA calculations predict approximately 118 tons of $CaCO_3$ (1.26% of pyritic sulfur x 31.25 tons of $CaCO_3$ x 3 for a 3:1 ratio = 118.13 tons of $CaCO_3$) would be required to effectively neutralize 1,000 tons of waste rock from the Hollister Site.

#### 2.4.4.3 Groundwater Monitoring Plan

Groundwater monitoring and reporting currently is conducted in accordance with existing permit requirements to measure the effects of groundwater pumping and discharge on groundwater quantity and quality. RCG's Groundwater Monitoring Plan would be reviewed and updated every 2 years to include additional monitoring locations if required.

The groundwater monitoring wells previously permitted under the Ivanhoe Surface Exploration PoO would be incorporated into the full-scale mine operations, including the wells permitted under the surface exploration PoO. RCG may add up to 11 total new groundwater monitoring wells and piezometers as needed to monitor the hydrogeological characteristics of the site. These include proposed installation of:

- Two separate wells (one shallow and one deep) immediately downgradient from the southernmost stream sample location GBG-04. If needed, RCG also may install a pair of shallow and deep wells approximately 1 mile downgradient of the above described wells to measure the extent of potential migration, if any, of contaminants from the historic mining operations;
- A shallow water monitoring well north of the reclaimed heap leach facility to better measure the downstream effects, if any, of water entering Little Antelope Creek; and
- Four to six piezometers in the Hatter Notice area to expand the hydrologic information base in the Hollister Mine area.

#### 2.4.4.4 Ore Transport

Under the Proposed Action, the ore would continue to be transported off-site to third-party mills, which may include the Esmeralda Mill for processing by APGI, and/or the Midas Mill for processing by Newmont. The majority of the ore would continue to be processed at the Esmeralda Mill. As described in Section 2.3.1, Transport of Ore Bulk Samples, the ore would likely continue to be hauled in trucks with an approximate capacity of 38 tons. At an estimated 750 to 1,000 tpd of ore production, ore hauling would increase to 7 days per week and there could be an increase of between 6 and 13 truck trips on each of the four segments of the ore hauling route, resulting in a maximum total of 18 to 25 truck trips for each travel segment each day. The four segments are Golconda to the Hollister Site; Hollister Site to Golconda; Golconda to Esmeralda Mill; and Esmeralda Mill to Golconda. Ore may be hauled in campaigns (12 to 15 trucks traveling together) to account for adverse weather that would temporarily increase the roundtrips per day but would lower the number of ore haulage days per month and increase highway and truck driver safety. The ore haulage would require two, 10-hour shifts per day, up to 7 days per week.

#### 2.4.4.5 Ore Processing

Ore processing would continue to be managed according to grade and metallurgy, and processed under contractual toll-milling or ore purchase arrangements with third parties, which include but are not limited to APGI at the Esmeralda Mill and/or Newmont at the Midas Mill, as described in Section 2.3.1, Transport of Ore Bulk Samples.

### 2.4.5 Surface Exploration Drilling Program

The Proposed Action also includes 25 additional acres of disturbance for surface exploration dispersed throughout the project area over the course of the 20-year mine life, for a total of up to 50 acres of authorized exploration disturbance (**Table 2-6**).

Surface exploration under the Proposed Action would continue as described in Section 2.2.3, Surface Exploration, and would occur on the previously approved areas identified as the Craig Notice, Hatter Notice, and Ivanhoe Surface Exploration PoO areas (**Figure 2-3** and **Table 2-6**). RCG proposes to consolidate the surface exploration plan and two notices into this PoO within the project area under the Proposed Action. These project areas would be replaced by the new project boundary (black line). **Table 2-6** lists the disturbance acreages associated with exploration activities. Although 50 acres is being proposed for surface exploration, disturbance could occur anywhere within the project area defined by the new project boundary (black line and does not include the transmission line analysis corridor on **Figure 2-11**). Therefore, the entire project area needs to be considered for exploration disturbance to occur.

Approximately 30 to 40 surface drill sites per year are currently permitted. This could continue under the Proposed Action for a potential total of 600 to 800 new drill sites through the life of the mine. No more than 50 total acres of unreclaimed exploration surface disturbance would be allowed at any one time in the project area.

### 2.4.6 Infrastructure

#### 2.4.6.1 Electrical Power

Within the project area is a 1,988-acre analysis corridor for the proposed transmission line route (**Figure 2-11**). The analysis corridor is a 0.25-mile-wide buffer surrounding the proposed transmission line route along Antelope Creek Road, Little Antelope Creek Road, some sections of Little Antelope and Antelope creeks, and the RIB areas. The analysis corridor contains 1,121 publically owned and 867 privately owned acres.

Under the Proposed Action, electric power would be provided by NVEnergy through a proposed transmission and distribution line (collectively called ‘transmission line’) to replace the existing diesel generators. The proposed transmission line to distribute electric power to the Hollister Mine would be approximately 11.6 miles in length, originating from an existing 120-kV transmission line at the existing Coyote Creek substation north of the Rossi Mine (**Figure 2-11**).

At the Coyote Creek substation, electric power currently is reduced from the main 345-kV transmission line to 120-kV power. From the existing 120-kV transmission line southwest of the Coyote Creek substation, a new 120-kV overhead transmission line would be routed approximately 5.4 miles to a new substation identified as the Rodeo Creek substation located on private property near the existing east RIB (**Figure 2-11**). Electric power would be reduced from 120 kV to 24.9 kV at the proposed Rodeo Creek substation, and a new 24.9-kV overhead transmission line would be constructed in a northward direction parallel to Little Antelope Creek Road. This 4.5-mile line would transmit electric power to an updated switchgear facility (20 feet by 40 feet) located in the East Pit, where the lines would be routed to various surface facilities and underground mine workings for 1.7 miles.

Transmission line poles would be wooden with wooden cross-arms. The 120-kV line would be an H-frame (two poles with one-wooden cross bar). The 24.9-kV transmission line would have single wooden poles with double support crossbars. RCG would use Avian Power Line Interaction Committee (APLIC) raptor-deterring design measures, which may include, but are not limited to, a 60-inch separation between conductors and/or grounded hardware in eagle-use areas as well as the use of insulating or cover up materials for perch management (APLIC 2006).

A temporary construction lay-down area (equipment storage) of approximately 1 acre would be established on private property adjacent to the proposed Rodeo Creek substation to facilitate temporary storage of pole structures, line spools, and miscellaneous transmission line supplies and equipment. This temporary laydown yard would be reclaimed upon completion of transmission line construction. **Table 2-5** lists disturbance associated with the transmission line and associated components.

New transmission line construction would disturb an approximate 4-foot by 4-foot area for each pole on the 24.9-kV line with an estimated 20 poles per mile. Construction of the proposed 120-kV line segment would disturb approximately a 6-foot by 6-foot area for each pole with an estimated 14 poles per mile. Disturbance acreage for the transmission line pads along the 24.9-kV and 120-kV lines was calculated to be less than 0.05 acre. However, proposed disturbance was increased to 0.1 acre to provide a construction buffer. Roads used for construction were estimated at 20 feet wide and follow the transmission lines directly. Spur roads connecting to established roads were estimated at a maximum of one every mile to access the transmission line where topography or existing roads would be difficult to drive. Total surface disturbance for construction of the proposed transmission lines, Rodeo Creek substation, temporary access roads, switch gear facility, and laydown areas is estimated at 34.7 acres (23.9 public and 10.8 private) (**Table 2-5**). Of this disturbance, 30.2 acres are for temporary access roads and would be reclaimed upon completion of the transmission line.

The transmission line and substation designs would be based on Rural Utilities Services (RUS) electrical standards for material and construction. The final transmission line design would be dependent on the final route selection and approval by NVEnergy, which would be responsible for the ownership and maintenance of the transmission lines and substations as well as obtaining the necessary right-of-way (ROW) approvals for the transmission line. RCG would assume responsibility for the electric power from NVEnergy at either the Rodeo Creek substation or the East Pit switchgear facility, either of which would serve as the NVEnergy metering location (**Figures 2-11** and **2-12**).

The existing diesel generators at the Hollister Site would remain on-site to serve as emergency electric power back-up in the case of a transmission line or substation power failure.

#### 2.4.6.2 Water Supply

Potable water demands would increase under the Proposed Action from current use of approximately 3 gpm under current conditions to an average use of 12 gpm under the Proposed Action. The existing potable water treatment facility (**Figure 2-12**) has the capacity to treat this increased volume of water. The water treatment facility includes a green sand filter to treat iron and manganese with arsenic filtration through a media followed by chlorination. Any sludge resulting from water treatment would be sampled, analyzed, and disposed of appropriately.

Water from water well #1 would be pumped to the existing potable water plant for treatment and then would be pumped to a new 10,000-gallon potable water holding tank located above the proposed mine office complex (**Figure 2-11**). Tank dimensions would be approximately 10 feet in diameter by 16 feet high. The concrete foundation for this new tank would be approximately 14 feet square and 2 feet thick. From this new tank, potable water would be gravity fed to the mine office, dry, warehouse, and foreman/safety trailers.

Under the Proposed Action, RCG also would install a 35,000-gallon fire-water storage tank to meet local and state fire protection codes. This tank would be located adjacent to the potable water storage tank

above the proposed mine office complex (**Figure 2-11**). The fire-water tank dimensions would be approximately 22 feet in diameter by 16 feet tall. The foundation dimensions of the fire-water tank would be approximately 26 feet square by 2 feet thick. In case of a fire, water from this tank would be gravity fed to a series of fire hydrants located at the mine office complex and adjacent to facilities within the East Pit. Fire hydrants and water pipelines would not be installed at the HPS.

Water pipelines from the East Pit area to the potable and fire water tanks would be buried adjacent to the existing main access road, at a minimum depth of 4 feet. A 4-inch HDPE pipeline would supply the potable water, and a 6-inch HDPE pipeline would supply the firewater tanks. There would be one valve box for each pipeline located at the upper end of the pipelines. The valve boxes would be constructed of concrete with steel covers. They would be installed belowground and covered with approximately 1 foot of gravel. No new actions are planned for the existing water well #5.

#### 2.4.6.3 Ancillary Support Facilities

Existing ancillary support facilities at the Hollister Mine would be used to support the Proposed Action. Additional support facilities would be constructed in the East Pit and at the proposed location of the new mine office complex north of the West Pit (**Figure 2-12**). The additional facilities that would be needed to support the Proposed Action are described below.

East Pit Maintenance Shop

Additional maintenance shop capacity would be created within the East Pit, at the site of the existing shop to provide suitable capability and space for on-site equipment maintenance work. The existing “tent” maintenance facility would be replaced by a new structure. The proposed maintenance facility would consist of a building (approximately 100 feet by 160 feet), with a wash bay (approximately 50 feet by 60 feet), a drain sump (approximately 20 feet by 80 feet), and a truck pad/storage area (approximately 30 feet by 70 feet) (**Figure 2-12**). The maintenance building would be of steel frame construction with metal siding and roofing. Concrete footings and slabs would be reinforced with rebar. The building would have external concrete slabs and ramps. Any sludge resulting from the maintenance shop operations would be sampled, analyzed, and disposed of appropriately.

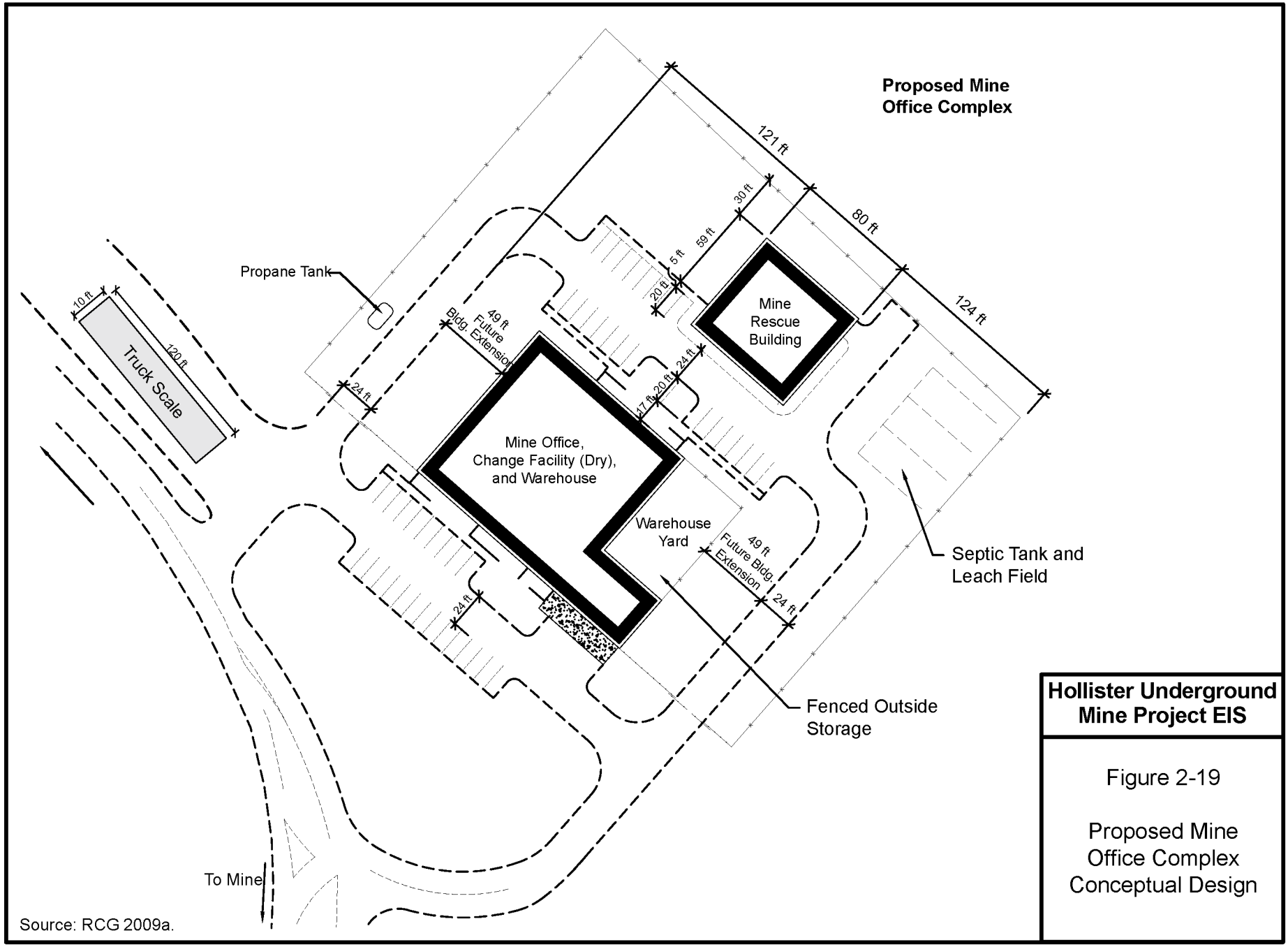
New Mine Office Complex

Under the Proposed Action, a new main office, miner change facility (dry), mine rescue building, and receiving warehouse would be constructed in an area of previous disturbance created by previous open-pit mining activities (**Figures 2-12** and **2-19**). The area proposed for the new Hollister Mine office complex was utilized during past surface mining activities as an office and storage area. This site was reclaimed. Prior to any facility installation, RCG would remove the growth media and place this material in a stockpile. The material would be seeded with a BLM-approved seed mixture to prevent the establishment of noxious weeds and non-native invasive plant species (e.g., cheatgrass) and to keep the soil micro-organisms viable.

The mine office and mine rescue buildings would be constructed on permanent concrete foundations and slabs, reinforced with rebar. The one-story buildings would be constructed from metal siding and roofing, be up to 20 feet tall, and would be coated (painted) with an earth-tone color, such as desert beige, to blend with the general surrounding color shade and hue of the existing terrain. The approximate dimensions of the new mine office and mine rescue buildings are shown in **Figure 2-19**.

The parking area at the mine office complex would be graveled. The gravel would come from an independently operated gravel pit located on private property near the Town of Midas. The mine office complex would accommodate supply trucks. The outside warehouse yard would be fenced (**Figure 2-19**).

Propane would be used at the mine office complex to heat hot water and provide heating. Propane tanks would be located adjacent to these buildings and structures. Propane would be delivered to the buildings via buried pipelines from the propane tank located northwest of the mine office building.




Source: RCG 2009a.

**Hollister Underground Mine Project EIS**

Figure 2-19

Proposed Mine Office Complex Conceptual Design

03/19/2012

Electricity would be supplied to the mine office complex via the proposed overhead transmission line routed around the north rim of the East Pit (Section 2.4.6.1, Electrical Power). The existing telephone system would be expanded to include the mine office complex. An additional micro-wave receiver would be erected near the mine office complex to receive signals from the existing receivers located above the East Pit near the present water system tanks. The components would include a 2-foot receiver antenna rod and a possible 12- to 15-foot-high mast. The actual installation location would depend on signal strength and line-of-sight from the existing antenna.

*Mine Office*

The mine office would be a one-story building of modular or steel construction placed on a concrete slab. The building would contain approximately 5,000 square feet, with offices, reception area, conference room, utility room, bathrooms, and a training room. Parking would be adjacent to the mine office for company, supplier, and visitor vehicles.

*Miner Change Facility (Dry)*

The miner change facility (dry) would be located in the same building as the receiving warehouse. The dry would contain approximately 7,500 square feet of space, with lockers and baskets, showers, and lavatory facilities. The dry would be a steel-constructed building with ample ceiling height (15 to 20 feet) to accommodate drying capabilities for the baskets and miners' gear. Buses and/or vans would transport miners and employees to the dry from Winnemucca. Vans would transport workers from the dry to the portal area for each shift.

*Warehouse*

The warehouse would be part of the same building that houses the dry. The warehouse floor space would contain approximately 4,000 square feet of interior space for parts storage. The warehouse would be configured for ease of delivery with a loading dock and an adjacent outdoor, fenced storage area.

*Mine Rescue Building*

The mine rescue building would be located northeast of the mine office and would contain emergency equipment and supplies. It would be approximately 80 feet by 80 feet in size.

*Contractor Trailers and Lay-down Storage Area*

Contractors would construct the office, dry, and warehouse facilities. Temporary contractor office trailers with adjacent equipment laydown areas would be located on the same pad planned for use for the mine office complex with a separate but adjacent laydown area located within the mine office complex.

Four to six new temporary construction trailers would be placed in the mine office complex on temporary wood-cribbed foundations and sided with sheeting. Electricity would be supplied by a temporary portable 200-kilowatt (kW) generator. A 500-gallon diesel fuel tank would be used to power the generator, and this tank would be contained in a HDPE-lined facility; a lined containment area would be constructed that would contain 110 percent of the volume contained in the tank. A propane tank also may be placed central to the trailers to facilitate the heating systems for wintertime operations. Temporary portable sanitary facilities would be located throughout the area.

The contractor trailers would be removed when construction is completed and the permanent facilities are commissioned, which is estimated to be approximately 1 year. Upon removal, the area on which the temporary contractor trailers were placed could be used for permanent mine supply storage.

<u>Truck Scale</u>

A truck scale would be installed in the mine office complex to weigh ore truck shipments from the mine. The scale would be approximately 120 feet long by 10 feet wide (**Figure 2-19**).

Guard Shack

As needed, a small portable guard shack(s) (15 feet by 25 feet) would be placed on the road at the entrance to the mining area.

#### 2.4.6.4 Storm Water Drainage Control

Engineered storm water diversions would be designed and constructed to divert runoff away from project facilities as needed based on anticipated storm water runoff calculations. BMPs for reducing erosion and sediment transport that would be implemented for the Proposed Action are described in Sections 2.4.9, Applicant-committed Environmental Protection Measures.

Under the Proposed Action, a 1,200-foot diversion channel would be constructed to direct storm water runoff along the main access road near the 90 degree turn west to the secondary diversion channel (**Figure 2-12**). This short section would redirect storm water runoff from approximately 28 acres of watershed and away from the West Pit. The proposed storm water drainage channel around the west side of the project area would most likely be a trapezoidal cross-section and would not be lined. In accordance with NDEP guidelines (McGoff 2010), it would be designed to accommodate the peak flow from a 25-year, 24-hour runoff event with freeboard. No water exchange is expected with the Newmont Reclaimed South WRSF. All storm water management practices, including diversion channels and other program features, would be implemented in accordance with the current Storm Water Pollution Prevention Plan (SWPPP) approved by the NDEP-BWPC. BMPs would be employed.

A second temporary storm water diversion around the mine office complex also would be installed for the life of the project to manage storm water. This channel would drain into an existing storm water channel along the East Pit Spur Road. The proposed mine office complex would be situated within the 28-acre watershed.

Temporary diversions would be constructed as needed to manage storm water runoff (**Figure 2-12**). All channels would be constructed in accordance with NDEP requirements and periodically would be inspected and maintained as part of the ongoing storm water management plan.

#### 2.4.6.5 Sanitary and Solid Waste Disposal

A new sewage disposal system would be installed to service the proposed mine office complex (**Figure 2-12**). This system would consist of a 10,000-gallon septic tank, associated dosing tanks, and a leach field (80 feet by 90 feet). RCG would obtain NDEP approval for the engineering designs and specifications prior to construction.

The existing septic system within the East Pit area would continue to be used during mine operations. With the relocation of the dry to the mine office complex, the need to regularly pump from the East Pit area septic system tanks for haulage to the Winnemucca sewage treatment system would be reduced from its present weekly basis to once every 8 to 10 weeks.

All non-toxic, non-hazardous solid waste materials generated at the Hollister Site currently are, and would continue to be, removed from the site, transported to, and disposed of in accordance with existing authorizations.

#### 2.4.6.6 Site Security, Fencing, and Signs

Site security, fencing, and signs at the Hollister Mine would remain the responsibility of RCG and would not change from existing procedures described in Section 2.2.7.5, Site Security, Signs, and Fencing. Temporary fences would continue to be used around exploration drill sites. Except for temporary exploration fencing and a new chainlink fence around the HPS, no new fencing is proposed for the project area. All fences would have access gates. Signs may be revised or added to reflect new facility locations or safety information.

### 2.4.7 Hazardous Materials Management

Procedures for hazardous materials transportation, storage, waste management, and spill prevention and emergency response programs currently are in place and implemented for the existing surface and underground exploration program as described in the Hollister Development Block Project Environmental Assessment (BLM 2004a) and the Solid and Hazardous Waste Management Plan (RCG 2010a). A summary of the regulatory requirements on which these procedures and programs are based is provided in Chapter 3.0, Section 3.24, Hazardous Materials and Solid Waste. RCG's existing procedures and programs would be updated, as needed, to incorporate the proposed project.

The Hollister Mine would continue to be a Conditionally Exempt Small Quantity Generator (defined by federal regulations as a facility generating less than 200 pounds of hazardous waste per month). The program of recycling (used oil, used batteries, used antifreeze, etc.) and transportation of hazardous waste to approved licensed facilities for disposal would continue under the Proposed Action.

Under the Proposed Action, there would be no change in the current production consumption rate as the operations transition from underground exploration and bulk sample testing to full-scale mine production at the Hollister Mine site with two exceptions. Diesel fuel consumption would decrease to approximately 60 percent of current volumes because the two existing diesel generators would be replaced by electricity supplied by the proposed new transmission line (RCG 2011b). In addition, due to increased ore extraction, blasting agents consumed on site would increase to approximately 1.5 times current levels. On-site product storage and use at the existing facilities would continue to be covered under existing plans and permits. New fuel and lubricant storage facilities would be constructed at the Hollister Mine. The types and quantities of materials that would be stored at these new storage facilities are presented in **Table 2-2**.

#### 2.4.7.1 Product Transport and Storage

The chemicals and fuel used and stored at the Hollister Mine is provided in **Table 2-2**. This information is updated on an annual basis as required by the Hollister Fire Marshal Hazardous Materials Permit.

Diesel fuel use would decrease (by approximately 40 percent) with installation of the proposed transmission line into the proposed Hollister Mine site due to additional diesel fuel use associated with ore transport. Gasoline usage at the site would remain approximately the same. Hollister vans and light trucks would continue to be fueled on site and at Winnemucca gas stations. The amount of lubricating oil, propane, antifreeze, and miscellaneous solvents would increase slightly at the proposed Hollister Mine, but no extra storage capacity would be needed. The same handling and environmental protection safeguards now employed by RCG would continue at the site. RCG reports chemical use volumes under the USEPA TRI program.

RCG would be responsible for clean-up of releases of hazardous substances and oil associated with the Proposed Action as required by the National Oil and Hazardous Substances Contingency Plan (40 CFR 300). RCG would notify the BLM AO, the NDEP, and the National Response Center of all reportable quantities of hazardous substances and/or oil released on public land, as required. Spills would be cleaned up in accordance with local, state, and federal regulations.

#### 2.4.7.2 Spill Prevention and Response

RCG maintains a SPCC Plan for the Hollister Mine (RCG 2008a). Prior to initiation of the proposed project, the existing plan would be amended, as necessary, to encompass the proposed facilities. The plan would be maintained and implemented, as needed, throughout the life of the project. This plan describes the prevention, response, containment, and safe cleanup of any spills or discharges of substances that potentially may degrade the environment, in addition to discovery, notification, and general cleanup procedures.

#### 2.4.7.3 Waste Management

The only RCRA hazardous waste anticipated to be generated at the Hollister Mine would be "universal wastes," which generally includes florescent bulbs, and batteries. As shown in **Table 2-2** the majority of the hazardous materials used on site would be spent or consumed during operations. Materials that are not spent or consumed (e.g., petroleum oils, antifreeze, etc.) would be recycled, to the extent possible, or disposed of off-site in an approved depository in accordance with RCG's Solid and Hazardous Waste Management Plan (RCG 2010a) and all applicable federal and state regulations.

### 2.4.8 Fire Protection

RCG's existing fire protection plan would continue to be implemented for the proposed project. The procedures outlined in the fire protection plan are in accordance with MSHA and applicable state and county fire code regulations. Adequate fire protection equipment needed to implement the plan would be maintained on site at the Hollister Mine during operations. A fire water reserve would be maintained in the facility fire water tank located adjacent to the potable water storage tank above the mine office complex.

### 2.4.9 Applicant-committed Environmental Protection Measures

During construction and operation of the Proposed Action, RCG would implement applicant-committed environmental protection measures to mitigate potential impacts to air, land, water, wildlife, cultural resources, and human resources and to prevent undue or unnecessary degradation of the environment as part of the proposed project's standard operating procedures. Pre-development planning, pollution prevention measures, and pollution control measures and equipment would be used to reduce potential project-generated environmental impacts. Some of these measures stated below are regulations, which must be followed and do not substitute as applicant-committed environmental protection measures or mitigation measures.

Proposed environmental protection measures applicable to the Proposed Action have been adopted from the PoO (RCG 2010b, 2009a) and the Hollister Development Block Project EA (BLM 2004a). These measures are identified below.

#### 2.4.9.1 Geology

- RCG would perform geotechnical monitoring, including geologic structure, mapping, and groundwater monitoring.

#### 2.4.9.2 Water Resources

- Placement of waste rock in engineered, lined WRSF facilities with limestone, dolomite, or other acid neutralizing rock, and routine monitoring of the waste rock disposal facilities during operations would be implemented to reduce the potential for acid rock drainage, per 43 CFR 3809.420 regulations.
- To abide by 43 CFR 3809.420 regulations and to limit erosion and reduce sediment transport from project disturbance areas, erosion control measures, as outlined in the project's SWPPP (Brown and Caldwell 2007) and Reclamation Plan, would be installed as needed and maintained. To further reduce erosion potential, storm water diversions would be installed upgradient and around project facilities, as needed, to divert storm water runoff around disturbance areas. Facilities would be graded appropriately and monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective and operating properly. Implementation of concurrent reclamation, if possible, would further reduce erosion potential.
- Groundwater monitoring would be conducted to ensure compliance with permit criteria and to provide for early identification of unanticipated potential impacts.

- All mineral exploration and development drill holes and monitoring and observation wells would be properly plugged and abandoned in accordance with NAC 534 regulation requirements to prevent contamination of groundwater resources.
- Limestone or dolomite would be used as needed on the mine site should ARD issues arise.

#### 2.4.9.3 Soils, Vegetation, and Non-native Invasive Plant Species

- To minimize impacts to soils and provide for re-establishment of vegetation, suitable growth media would be salvaged and stockpiled during project construction for subsequent use in reclamation, where possible, per 43 CFR 3809.420 regulations. The growth media also would be transported to, and redistributed on, mine and mineral exploration surface disturbance areas undergoing concurrent reclamation.

  In addition, the Newmont Reclaimed WRSF may contain extra growth media. RCG would test this material to determine suitability. If it is found to be suitable growth media, it would be extracted and used as a supplement to currently existing growth media stockpiles. The Newmont Reclaimed WRSF would be regraded and re-seeded so that it also would support revegetation efforts.

  Growth media could be imported to the mine site if existing stockpiles on-site are not sufficient to complete reclamation. Growth media stockpiles would be seeded with a BLM-approved interim seed mix. During reclamation, if growth media is imported from off-site public lands, it would be BLM-approved. Growth media stockpiles would be seeded with a BLM-approved interim seed mix (**Table 2-3**).
- BMPs, as described in RCG's SWPPP (Brown and Caldwell 2007), and conditions specified in the storm water permit would be implemented to limit erosion from project facilities and disturbance areas during and following construction, operations, and initial stages of reclamation, per 43 CFR 3809.420 regulations. These practices may include, but would not be limited to, installation of storm water diversions to route water around disturbance areas and project facilities using accepted engineering practices, and the placement of erosion control devices (e.g., silt fences, staked weed-free straw bales, riprap, sediment traps, etc.). To ensure long-term erosion control, all sediment and erosion control measures would be inspected quarterly and after large precipitation events, and repairs would be performed as needed.
- Waste rock facilities would be contoured to provide for the most stable reclamation landform to simulate surrounding topography.
- Per 43 CFR 3809.420 regulations, revegetation of disturbance areas would be conducted as soon as practicable (usually the first fall after disturbance, in order to maximize natural moisture content in the soil) to reduce the potential for wind and water erosion, minimize impacts to soils and vegetation, help prevent the spread of noxious weeds and non-native invasive plant species in disturbance areas, and facilitate post-mining land uses. Concurrent reclamation would be conducted to the extent practicable to accelerate revegetation of disturbance areas.
- To minimize the introduction and spread of noxious weeds and non-native invasive plant species in project-related disturbance areas, revegetation efforts described in the Reclamation Plan of the PoO (RCG 2009a) and RCG's Noxious and Invasive Weed Plan (RCG 2011a) would be implemented. These plans outline procedures for the prevention, monitoring, and treatment of noxious weed infestations. The results of the monitoring program would provide the basis for updating the Reclamation Plan, if needed. Noxious weeds and non-native invasive plant species would be controlled on site for at least 3 years after reclamation is complete.
- Certified weed-free seed mixes would be used for reclamation.

#### 2.4.9.4 Wildlife, Special Status Species, and Livestock

- In the event that construction for the Proposed Action should occur during the raptor nesting season (March 1 through July 31), a raptor survey would be conducted, and appropriate mitigation

measures, such as buffer zones around any identified occupied nests, would be developed and implemented in concert with the BLM and Nevada Department of Wildlife (NDOW), as needed.

- During the greater sage-grouse breeding season (March 15 to June 15), no exploration activities would be allowed within 3 miles or line-of-sight of an active greater sage-grouse lek from 1 hour before sunrise to 10:00 a.m.
- To protect nesting birds, surface disturbance on currently undisturbed lands in the project area would be avoided between March 1 and July 31. Should surface disturbing activities be necessary during this time period, RCG would coordinate with the BLM and NDOW to conduct breeding bird surveys and implement appropriate mitigation, such as appropriate buffer zones around occupied nests.
- To minimize wildlife/vehicle-related collision impacts during project operations, RCG would continue its mandatory employee and long-term contractor education program. Speed limits would be posted on access roads. RCG would report any vehicle collisions on roads in the project area with wildlife and any observed wildlife mortalities to NDOW, as required under the Industrial Artificial Pond Permit (IAPP).
- The existing wildlife fences around the storm water pond would continue to be maintained to restrict entry by wildlife and livestock to maintain compliance with the IAPP.
- The existing BLM-approved four-strand barbed wire fence shown on **Figure 2-2** would continue to be maintained to prevent livestock entry but allow wildlife access.
- RCG would promptly repair any fences damaged by construction activities. RCG employees and contractors would close gates when traveling through the project area to ensure livestock are excluded within the above-described fenceline.
- RCG would implement policies designed to discourage employees and contractors from illegal hunting and harassment of wildlife.
- Trash would be managed to avoid being an attraction to wildlife.
- The new transmission line would be designed and constructed to follow APLIC guidelines to minimize raptor electrocution potential. Anti-perching features would be incorporated on the new transmission line to minimize raptor predation on greater sage-grouse.
- Implementation of the proposed Reclamation Plan would minimize habitat impacts for wildlife species. Implementation of the plan also would minimize impacts to range resources through the re-establishment of forage.

#### 2.4.9.5 Cultural Resources

- RCG would abide by all stipulations described in the Programmatic Agreement (PA), per 43 CFR 3809.420 regulations. The applicant would be a signatory to the PA and has responsibilities under the agreement to protect historic properties.

#### 2.4.9.6 Air Quality

- All applicable state and federal air quality standards would be met through compliance with RCG's NDEP-Bureau of Air Pollution Control-approved air quality operating permit.
- To control combustion emissions, all installed pollution control equipment would be operated and maintained in good working order.
- Fugitive dust controls currently in place include: 1) water application on haul roads and other disturbed areas; 2) chemical dust suppressant application (e.g., magnesium chloride); and 3) the use of scrubber/sprays. Dust controls would continue to be implemented.
- Air quality would be protected in accordance with applicable state and national ambient air quality standards, per 43 CFR 3809.420 regulations.

- Temporary disturbance areas (e.g., growth media stockpiles, cut and fill embankments, etc.) would be seeded with an interim seed mix, and concurrent reclamation would be implemented on completed portions of the waste rock facilities, thereby reducing fugitive dust emissions.

#### 2.4.9.7 Visual Resources

- Waste rock facilities would be contoured where feasible to provide a natural looking post-reclamation land form.
- Concurrent reclamation would be implemented to the extent feasible.
- Following the completion of mining, structures and buildings would be dismantled and removed from the site.
- Structures at the Hollister Mine would be painted in colors that match the natural surroundings.

#### 2.4.9.8 Hazardous Materials

- Prior to the initiation of the Proposed Action, the existing SPCC Plan (RCG 2008a) would be amended, as necessary, to include the Proposed Action. Implementation of the prevention, containment, and cleanup procedures in this plan would minimize the potential for impacts to soils, vegetation, wildlife, and water resources, per 43 CFR 3809.420 regulations.
- Prior to the initiation of the project, the existing Solid and Hazardous Waste Management Plan (RCG 2010a) would be amended, as necessary, to include the Proposed Action. Implementation of the management procedures for the handling of solid and hazardous waste generated at the site, reagent storage, transportation, and handling requirements would minimize the potential for impacts to soils, vegetation, wildlife, and water resources.

#### 2.4.9.9 General Measures

- To the extent practicable, RCG would protect all survey monuments, witness corners, reference monuments, bearing trees, and line trees against destruction or damage per 3809.420 regulations. Public land survey system monuments would be protected and preserved in accordance with Nevada BLM IM No. NV-2007-003. If destroyed, RCG immediately would report the matter to the BLM AO.

### 2.4.10 Reclamation and Site Closure

The reclamation program would restore the site to a beneficial post-mining land use, prevent undue or unnecessary degradation of the environment, and reclaim disturbed areas such that they would be compatible with the surrounding topography.

RCG would implement reclamation practices and procedures consistent with the requirements of the following applicable laws and regulations:

- NAC 519A regulations;
- BLM's surface management regulations at 43 CFR 3809; and
- Final Version of the Revised Guidelines for Successful Mining and Exploration Revegetation (Instructional Memorandum No. NV-99-013).

Most of the area for Hollister Mine surface facilities and infrastructure has been previously disturbed by open-pit mining and subsequently reclaimed by other operators. RCG's Reclamation Plan includes closing and sealing mine portals (**Figure 2-6**), escape raises, and the HPS (**Figure 2-7**); removing surface facilities and infrastructure; and establishing a vegetative community on the surface areas disturbed by the Proposed Action and existing Hollister operations.

The final grading plan for the project is designed, in part, to minimize the visual impacts of unnatural lines and landforms. Slopes would be regraded to blend with surrounding topography, and to facilitate revegetation. Waste rock facilities would have rounded crests and variable slope angles to more closely resemble natural landforms. The conceptual post-mining reclamation topography for the Proposed Action is shown in **Figure 2-20**.

Revegetation of disturbed areas would be conducted as soon as practicable (usually the first fall after disturbance, in order to maximize natural moisture content in the soil) to reduce the potential for wind and water erosion. Following construction activities, areas such as cut-and-fill embankments and growth media stockpiles would be seeded. Section 2.4.9.3, Soils, Vegetation, and Non-native Invasive Plant Species, describes potential growth media sources. Concurrent reclamation would be conducted to the extent practicable to accelerate revegetation of disturbed areas. All sediment and erosion control measures and revegetated areas would be inspected periodically (after high precipitation events, etc.) to ensure long-term erosion control and successful reclamation. Seed bed preparation and seed mixes are described in Section 2.2.10, Reclamation of Existing Facilities.

#### 2.4.10.1 Proposed Reclamation Schedule

Upon completion of mining, final reclamation of facilities would be completed pursuant to the final closure plan and schedule that would be submitted to the BLM and NDEP for approval. The detailed closure plan for each facility component would be prepared at least 2 years prior to the anticipated closure date (NAC 445A.447), and would conform with the WPCP regulations in effect at the time of closure.

#### 2.4.10.2 Post-mining Land Use and Reclamation Goals

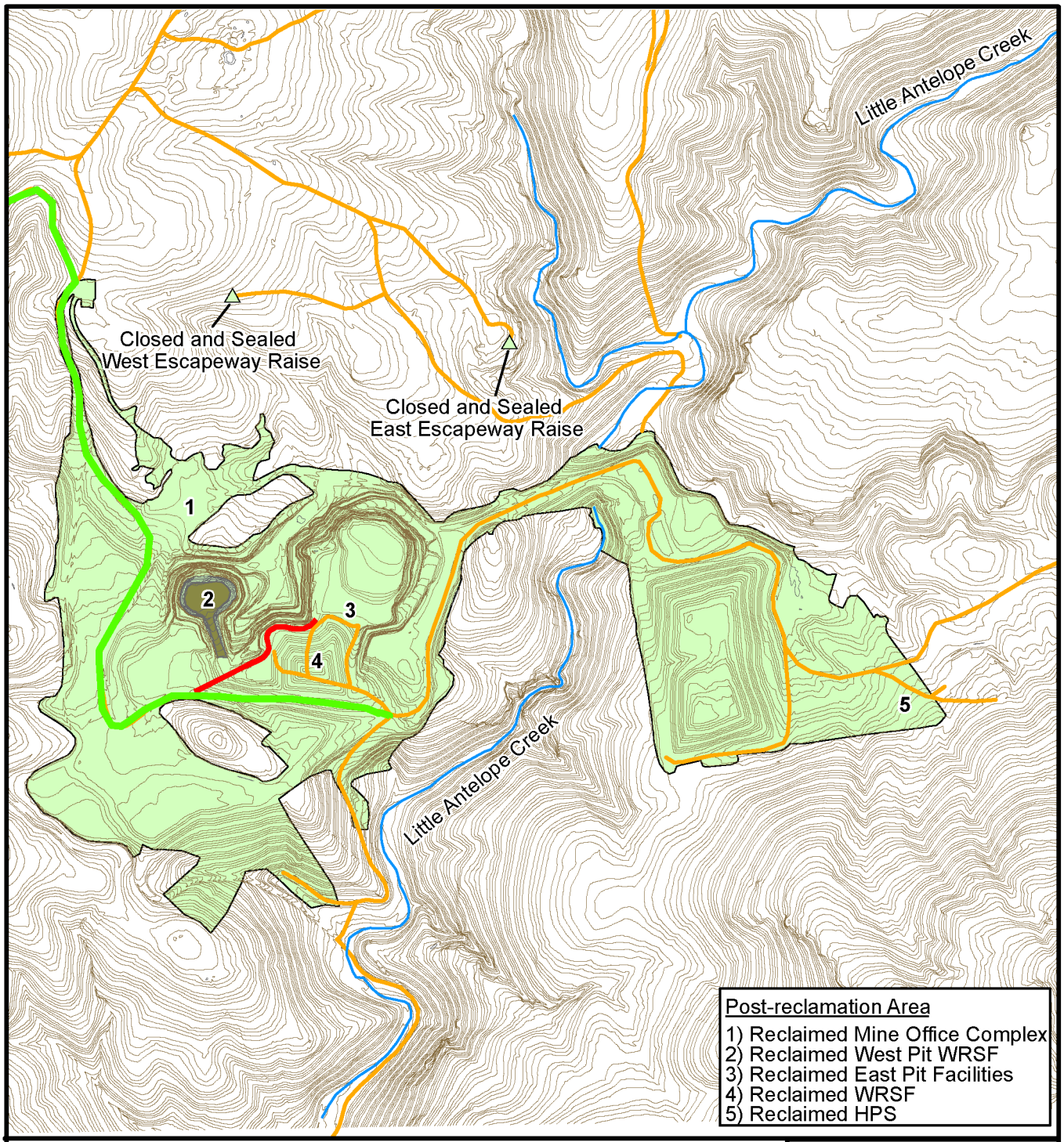
The primary existing land uses in the project vicinity include mineral exploration and development, livestock grazing, wildlife habitat, and dispersed recreation. Following closure and final reclamation, the site would support the multiple land uses of livestock grazing, wildlife habitat, and recreation. The identified post-closure land uses would be in conformance with the BLM Elko Resource Management Plan and Elko County zoning ordinances.

The goals of the reclamation program are as follows:

- Provide a stable post-mining landform that would support defined land uses;
- Minimize erosion and protect water resources through control of storm water runoff;
- Establish post-reclamation surface soil conditions conducive to the regeneration of a stable plant community through stripping, stockpiling, and reapplication of growth media;
- Revegetate disturbed areas with a diversity of plant species in order to establish productive long-term plant communities compatible with post-mining land uses;
- Maintain public safety by stabilizing or limiting access to man-made landforms that could constitute a public hazard; and
- Maintain continued enjoyment/visitation of Tosawihi Quarries by Shoshone and other people.

#### 2.4.10.3 Growth Media Stockpiling and Salvage

Where possible, growth media would be removed from areas to be affected by any new Hollister project surface facilities. This material would be stockpiled for final reclamation and protected from wind and water by seeding and establishment of a vegetative cover to minimize any erosion. During the first full planting season following development of the growth media stockpile, the stockpile would be seeded with a seed mixture developed from the reclamation plant list shown in **Table 2-3**.




**Legend**

- Existing/Authorized Mining Surface Disturbance
- Post-reclamation Contours
- Unreclaimed Road
- Reclaimed Two-track Road
- Ivanhoe Road
- Surface Water
- Reclaimed West Pit Waste Rock Storage Facility

Contour interval: 5 feet.
Source: RCG 2009a.

N

0 500 1,000 Feet

**Hollister Underground Mine Project EIS**

Figure 2-20

Post-mining Topography for Proposed Action

3/20/2012

#### 2.4.10.4 Seed Mixes

Prior to seeding, disturbance areas would be recontoured, surfaces would be ripped or scarified (where conditions warrant), and growth media would be redistributed. Where possible, seedbed preparation would be performed immediately prior to seeding to allow seed placement prior to soil recompaction. Seedbed preparation would consist of scarification. Seed would be applied with either a rangeland drill or with a mechanical broadcaster and harrow, depending on accessibility. A hand-held broadcaster would be used on minor disturbed areas such as drill sites or access roads. Seedbed preparation and seeding would take place in the fall after grading and topsoiling of reclaimed areas.

Proposed reclamation seed mixtures and applications rate based on reclamation experience at other mining and exploration operations in northern Nevada and agency requirements would be developed from the reclamation plant list shown in **Table 2-3**. BLM-approved seed mixes would provide forage and cover species similar to the pre-disturbance conditions, facilitating the post-mining land uses of livestock grazing and wildlife habitat. In addition, the seed mixes would be determined based on the species' effectiveness in providing erosion protection, the ability to grow within the constraints of the low annual precipitation experienced in the region, its suitability for site aspect, and the elevation and soil type. Broadcast seeding would be conducted at 1.5 to 2 times the proposed seed application rate.

Species to be used during reclamation could be augmented from the BLM's plant list provided in **Table 2-3**. The species used would be dependent on availability and cost, and would be applied at a rate of approximately 11 to 15 pounds PLS per acre. Modifications in the seed list, application rates, cultivation methods, and techniques could occur based on success of concurrent reclamation. Changes and/or adjustments to seed mixtures and application rates would be developed through consultation with and approval by the BLM and NDEP. Seedlings may be substituted for seeds. The seed mixes selected would represent a reclaimed desired plant community, and the mixes would be appropriate for each ecological site in the project area.

#### 2.4.10.5 Noxious Weed Management

RCG has developed and implemented a noxious weed monitoring and control program for the Hollister Site, which would continue for the Proposed Action. The results of the annual monitoring program are used to update the plan and develop annual treatment programs. Weeds are actively monitored and managed at the Hollister Site using prevention, training, monitoring, and eradication techniques. Disturbed ground is kept to a minimum to discourage weeds from establishing.

RCG's noxious weeds and non-native invasive plant species management program consists of the following general measures.

- Hand pulling and/or hand digging may be used to remove noxious weeds.
- BLM-approved herbicides would be used to prevent and restrict the spread of noxious weeds and non-native invasive plant species.
- Earthmoving equipment would be washed before mobilizing onto the site.
- Areas traversed in the project area by equipment, including water trucks and pickup trucks, would be inspected for noxious weeds and appropriately treated.
- Certified noxious weed-free mulch and seed mixtures would be used to reclaim disturbed areas and control the spread of noxious weeds and non-native invasive plant species.
- Noxious weeds and non-native invasive plant species monitoring and control would be implemented during operations and until the BLM releases RCG from the reclamation responsibility.

#### 2.4.10.6 Hollister Mine Facility Reclamation

Surface disturbance associated with underground mining activities would be recontoured and revegetated. **Figure 2-20** illustrates the post-mining reclamation topography for the Hollister Mine facilities. During reclamation, the side slopes of the WRSFs would be regraded to achieve an average final slope not steeper than 2.5 horizontal (H):1.0 vertical (V). Water treatment ponds would be reclaimed by folding in the pond liners to create an envelope. Pond areas then would be back-filled with a minimum of 5 feet of material, covered with 12 inches of growth media, and regraded to blend with adjacent topography. Growth media placed throughout the site would be graded to allow free drainage for better seedling establishment.

Drill Hole and Water Well Abandonment

RCG would abandon and plug exploration drill holes, water wells, and water monitoring wells in accordance with the NAC 534 regulations. The closure plugging and abandonment procedures are described in Section 2.2.10, Reclamation of Existing Facilities.

Closure of Underground Operations

Underground facilities would be closed in phases starting at the lowest point of the underground mine working up to the surface. The closure procedures are described in Section 2.2.10.2, Closure of Underground Operations.

Reclamation of Waste Rock Facilities

Reclamation of the Existing RCG WRSF is described in Section 2.2.10.3, Reclamation of Existing RCG Waste Rock Storage Facility. The reclamation goals for the West Pit WRSF include stabilizing slopes, ensuring mass stability, shaping the edges to minimize visual impacts, revegetating surfaces, and erosion control. Reclamation procedures for the West Pit WRSF would be the same as for the existing RCG WRSF.

Reclamation of Roads, Parking Lots, Washbay, and Other Compacted Areas

Reclamation of the roads, parking lots, washbay and other compacted areas would be accomplished using the procedures described in Section 2.2.10.4, Reclamation of Roads, Parking Lots, Washbay, and Other Compacted Areas.

Demolition and Disposition of Buildings and Ancillary Facilities

Demolition and disposition of buildings and ancillary facilities would be accomplished using the procedures described in Section 2.2.10.5, Demolition and Disposition of Buildings and Ancillary Facilities. In addition, concrete foundations and slabs would be broken up and buried in place as described below.

Salvageable equipment and trailers would be moved to another project, sold, or properly disposed of off-site. Unsalvageable portions of any facilities, such as a concrete pad used at the office complex and the maintenance shop, would be broken up and buried on-site, either in the bottom of the existing recycle ponds or within the final lifts of the WRSF. The burial would occur prior to final recontouring and would be at a depth suitable to ensure that the materials are not exposed in the future. A minimum of 5 feet of cover would be placed over the concrete within the recycle ponds or the WRSF. If the concrete is subjected to a hazardous substance or oil during the operations, a cleaner or polymer would be applied to neutralize any deleterious residue. RCG also would obtain a NDEP Class III landfill waiver prior to initiating this activity. All burial plans would be BLM-approved.

The RIBs near Little Antelope Creek would be reclaimed as described in Section 2.2.10.6, Reclamation of Storm Water and Surge Ponds. Upon permanent mine closure, pumping of water from the underground operation would cease, and water would be allowed to fill the workings. Section 3.5, Groundwater Resources and Geochemistry, describes predicted post-mining groundwater levels and groundwater chemistry.

The Rodeo Creek substation would be disconnected, disassembled, and hauled off site. The transmission line would be removed upon permanent mine closure. Lines would be disconnected, reeled onto spools, and removed from the site. Poles would be cut at the base (below ground surface), loaded onto flatbed trucks, transported, and disposed of at an approved off site location. Any two-track spur roads accessing pole sites would be scarified and seeded. Holes would be filled, covered, and re-seeded with seed mixtures derived from the list described in **Table 2-3**.

Reclamation of Storm Water and Surge Ponds

All equipment and surface piping associated with the storm water and surge ponds would be reclaimed as described in Section 2.2.10.6, Reclamation of Storm Water and Surge Ponds.

## 2.5 Alternatives to the Proposed Action

Reasonable alternatives to the Proposed Action include those that are practical or feasible from a technical and economic standpoint. Each alternative, except for the No Action Alternative, represents an alternative means of potentially reducing environmental impacts to one or more resources.

The issues and concerns identified during the scoping process focused primarily on potential impacts to cultural resources and resources important to Native Americans, water quantity and quality, air quality, and wildlife. These issues guided the development of alternatives to be evaluated in the EIS. However, other issues also have been considered in identifying alternatives. The following alternatives are discussed in detail in this EIS.

### 2.5.1 Alternatives Considered in Detail

Mine operations are composed of a number of facility components. There can be alternative means and locations to implement these components in most settings. The alternatives are limited, however, by the location of the mineral deposit, land and mineral ownership, and existing physical constraints, both natural and man-made. At Hollister, the location of the proposed facilities is constrained by the location of the ore deposit, physical constraints of the geology and hydrology of the area, concentrations of cultural resources, and the topographic and environmental features of the project vicinity.

#### 2.5.1.1 No Action Alternative

Under the No Action Alternative, BLM would not approve the proposed project. RCG would continue to conduct surface and underground exploration and bulk sampling under the current exploration permits, notices and approvals as authorized by the BLM and State of Nevada. Reclamation and closure of the existing exploration facilities would proceed under the current permits and approvals as described in Section 2.2, Existing Hollister Operations. Existing major facilities that may continue to operate under the No Action Alternative would include the existing surface exploration; existing portal, decline, and underground workings; associated water management and RIB infiltration system; the existing RCG WRSF; and ancillary support facilities. Approved surface disturbance for the Hollister operation under the No Action Alternative is approximately 77 acres for the underground exploration and bulk sampling program (**Table 2-5**). These facilities are described in Section 2.2, Existing Hollister Operations.

Exploration would continue within the Ivanhoe, Craig, and Hatter areas under current authorizations or until such time as the Craig and Hatter Notices expire or the BLM requires these areas to be permitted under a PoO. Based on the authorization for the existing exploration program, the total permitted disturbance for surface exploration is 28 acres, which includes the Ivanhoe Exploration PoO (15 acres), the Hatter Notice (5 acres), the Craig Notice (5 acres) and Water Well #5 and associated facilities (3 acres) (**Table 2-6**).

Under current authorizations, underground exploration at the Hollister Site and associated water management operations could be conducted with a groundwater pumping rate of approximately 400 to

700 gpm. Short duration surge flows could reach 900 gpm (BLM 2004a). This water could be used for exploration operations or discharged at the RIBs.

Under the No Action Alternative, ore extraction rates for bulk sampling and testing range from 280 to 400 tpd (RCG 2010b). Ore extracted for bulk testing may continue to be transported in 38-ton trucks from the mine site for processing at the Esmeralda Mill, the Midas Mill, or to other mill facilities capable of processing Hollister ore. Waste rock tonnages range from 350 to 500 tpd (RCG 2010b) and would continue to be disposed of in the existing RCG WRSFs.

Under the No Action Alternative, the existing facilities would be closed and reclaimed in accordance with the currently approved Reclamation Plan, current permits, and applicable federal and state closure and reclamation requirements. Final closure and reclamation of the project site are discussed in the Hollister Development Block EA (BLM 2004a) and generally would follow the procedures described in Section 2.2.10, Reclamation of Existing Facilities. The post-mining reclamation topography for the No Action Alternative is presented in **Figure 2-21**.

#### 2.5.1.2 Mud Springs Road Transmission Line Alternative

Under this alternative, electric power would be provided by NVEnergy through a proposed overhead transmission line that is north of the Proposed Action transmission line route (**Figure 2-22**). Two alignments were considered for the Mud Springs Road Transmission Line Alternative, a North Option and a South Option.

North Option

The Mud Springs Road Transmission Line Alternative (North Option) would be approximately 7.0 miles in length, originating from a new substation (in the southeast quarter of Section 10, T37N, R49E) adjacent to the existing Coyote Creek substation north of the Rossi Mine and terminating at the HPS (**Figure 2-22**).

At the existing Coyote Creek substation, electric power is currently reduced from the main 345-kV line to 120-kV power. The new substation would further reduce power from 120 kV to 24.9 kV, and a new 24.9-kV transmission line would be constructed westward for a distance of approximately 2.7 miles on the north alignment until reaching Mud Springs Road. At the road, the proposed route would essentially parallel the road westward for 4.2 miles until reaching the HPS where the line would travel to the upgraded switchgear facility in the East Pit. The voltage would be further reduced and routed to various surface facilities and the underground mine workings for 1.7 miles. As described in **Table 2-8**, the new substation would disturb approximately 2 acres. Temporary access roads for construction and a temporary 1-acre construction lay-down area would be established adjacent to the proposed new substation to facilitate temporary storage of pole structures, line spools, and miscellaneous transmission line supplies. This temporary laydown yard would be reclaimed upon completion of transmission line construction.

The North Option alternative transmission line construction also would disturb an approximately 4-foot by 4-foot area for each pole on the 24.9-kV line with an estimated 20 poles per mile. This estimated total long-term disturbance area is 0.2 acre (**Table 2-8**). Access for transmission line construction would use existing roads where feasible and overland travel along the proposed route. Temporary access roads would disturb 22 acres on a short-term basis. Total surface disturbance for construction of the North Option of the Mud Springs Road Transmission Line Alternative, new substation, and laydown area would be 25.2 acres (**Table 2-8**).

**Table 2-8 Disturbance Associated with the Mud Springs Road Transmission Line Alternative**

| Component | North Option Disturbance | | | South Option Disturbance | | |
|---|---|---|---|---|---|---|
| | Public Acres | Private Acres | Total Acres | Public Acres | Private Acres | Total Acres |
| **Alternative Transmission Line and Associated Components** | | | | | | |
| Optional Substation[1] | - | 2.0 | 2.0 | 2.0 | - | 2.0 |
| Transmission Line Pads: 24.9-kV[2] | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 |
| Temporary Access Roads: 24.9-kV [3] | 20.1 | 1.9 | 22.0 | 13.4 | 2.9 | 16.3 |
| Laydown Areas: 24.9-kV | 1.0 | - | 1.0 | 1.0 | - | 1.0 |
| **Total Alternative Transmission Line and Associated Components[4]** | **21.2** | **4.0** | **25.2** | **16.5** | **3.0** | **19.5** |
| **All Other Mine Components Disturbances[5]** | **57.3** | **0.0** | **57.3** | **57.3** | **0.0** | **57.3** |
| **Total[6]** | **78.5** | **4.0** | **82.5** | **73.8** | **3.0** | **76.8** |

[1] Includes temporary laydown area that would be reclaimed after facility construction.

[2] Assumes 4-foot by 4-foot pads, 20 per mile along the entire 24.9-kV transmission line route, rounded up to the nearest tenth of an acre.

[3] Transmission line temporary access roads assume 20-foot width, following the transmission line directly with spur roads at a maximum of one every mile for access to transmission line where topography or existing road would be difficult to access.

[4] The proposed disturbance associated with the alternative transmission line would be mostly on previously undisturbed land.

[5] Includes mining facilities, water management facilities, roads, and ancillary facilities as calculated in **Table 2-5** above for the Proposed Action.

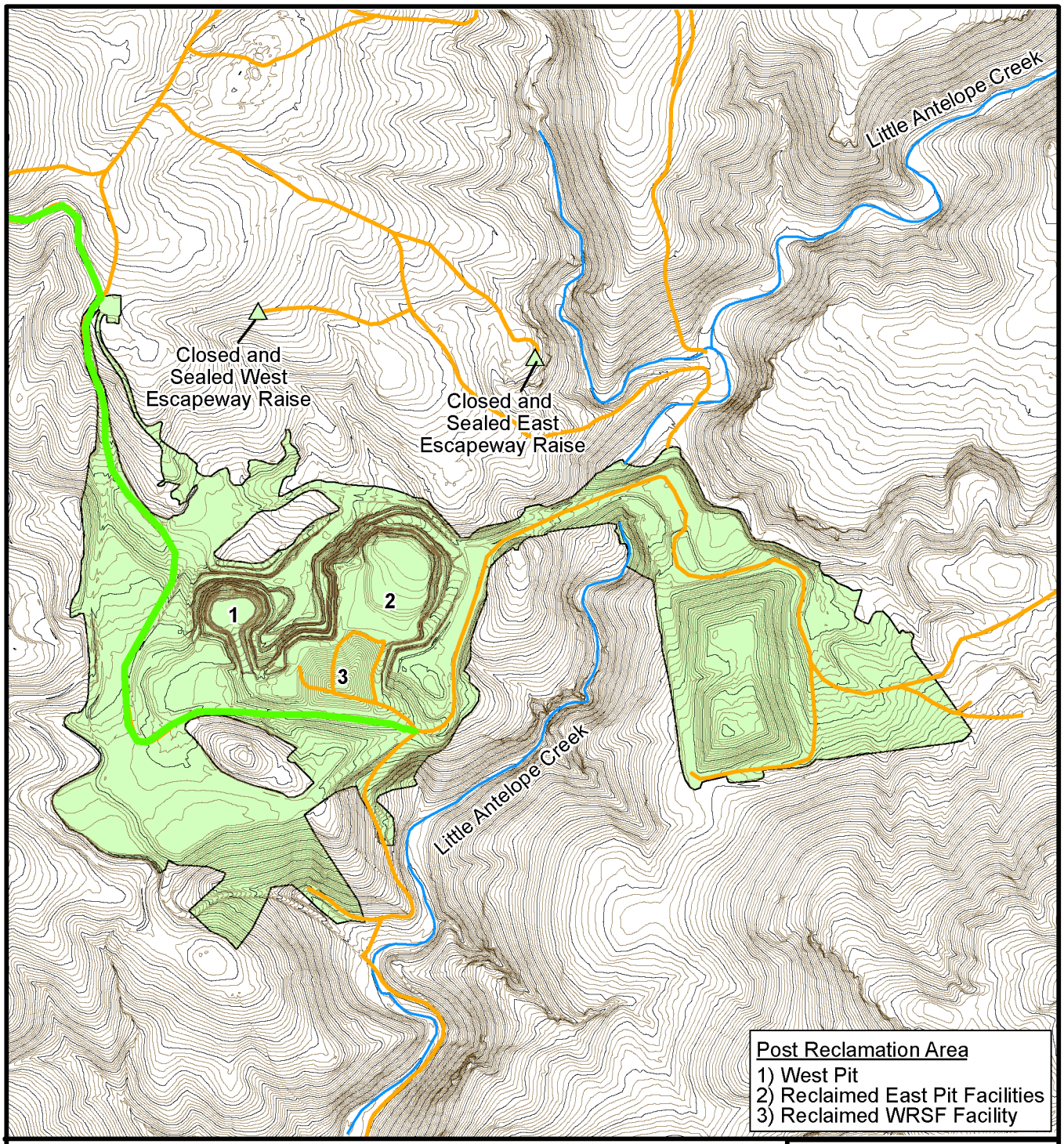
[6] Due to rounding and use of significant digits, sums do not always total across rows and columns.

Source: BLM 2010c; RCG 2010b, 2009a.

The 24.9-kV line pole structures on the Mud Springs Road Transmission Line Alternative route would have the same design as the 24.9-kV line pole structures used elsewhere on site and described in Section 2.4.6.1, Electrical Power.

South Option

The South Option route would locate the new substation in the NW¼ of Section 21, T37N, R49E on BLM land adjacent to the existing 120-kV line and along the Mud Springs Road just west of the Rossi Mine (**Figure 2-22**). The South Option of the 24.9-kV transmission line would originate from this substation location and head northwest for 1.8 miles until intersecting with the Mud Springs Transmission Line Route in Section 7, T37N, R49E (**Figure 2-22**). The total length of the 24.9-kV line along the South Option from the new optional substation #2 to the HPS where the line would travel to the upgraded switchgear facility in the East Pit would be 6.1 miles with 19.5 acres of surface disturbance for the transmission line, new substation, temporary access roads, and laydown area (**Table 2-8**). As with the Proposed Action and the North Option, the voltage would be further reduced and routed to various surface facilities and underground workings for 1.7 miles.




**Legend**

- Existing/Authorized Mining Surface Disturbance
- Post-reclamation Contours
- Unreclaimed Road
- Ivanhoe Road
- Surface Water

N

0 0.1 0.2 Miles

Note: Contour interval: 5 feet.

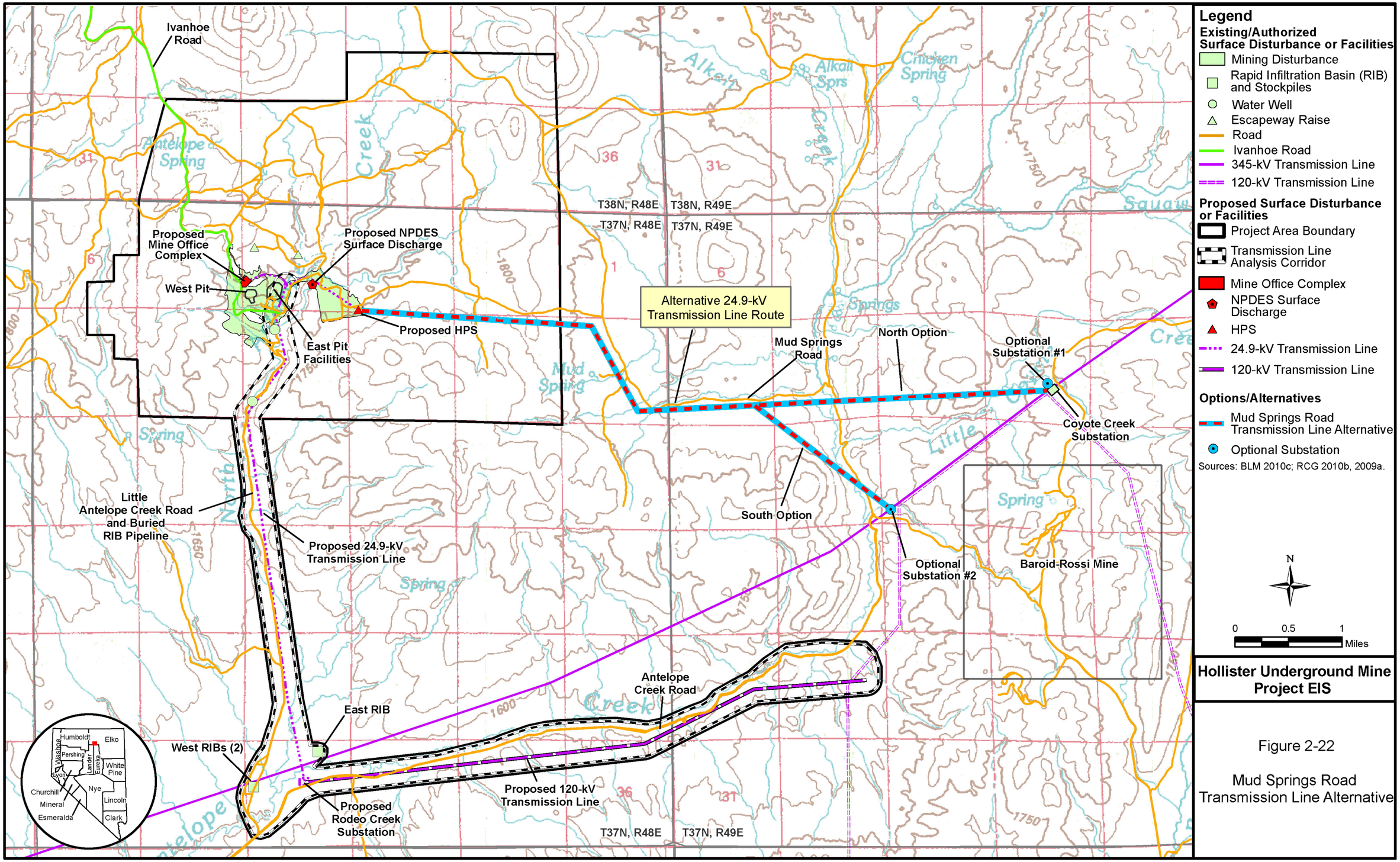
Source: RCG 2011b, 2010b.

**Hollister Underground Mine Project EIS**

Figure 2-21

Post-mining Topography for No Action Alternative

3/23/2012




**Hollister Underground Mine Project EIS**

Figure 2-22

Mud Springs Road Transmission Line Alternative

3/19/2012

As for the transmission line route for the Proposed Action, the alternative transmission line and substation designs would be based on RUS electrical standards for material and construction. The final transmission line design would be dependent on the final route selection and approval by the BLM. The existing diesel generators at the Hollister Site would remain on-site to serve as emergency electric power in the case of a transmission line or substation failure. The 24.9-kV line pole structures on the Mud Springs Road Transmission Line Alternative route would have the same design as the 24.9-kV line pole structures used elsewhere on site and described in Section 2.4.6.1, Electrical Power.

#### 2.5.1.3 Mud Springs Waste Rock Storage Facility Alternative

Under this alternative, the Mud Springs WRSF would be located in an area east of the historic surface mine heap leach pad facility (**Figure 2-23**). This location could store 1.1 million $yd^3$ (1,977,124 tons) of waste rock material. Other areas within 0.5 mile of the Hollister project outside of existing disturbed areas were eliminated from consideration for waste rock storage because they included major drainages, require a steep uphill haul of waste rock, have steep topography that would hinder the liner installation, require new roads, and or could affect the Tosawihi Quarries or other cultural sites.

Under the Mud Springs WRSF Alternative, waste rock would be hauled from the existing East Pit Portal or from the proposed HPS on the upgraded segment of Mud Springs Road.

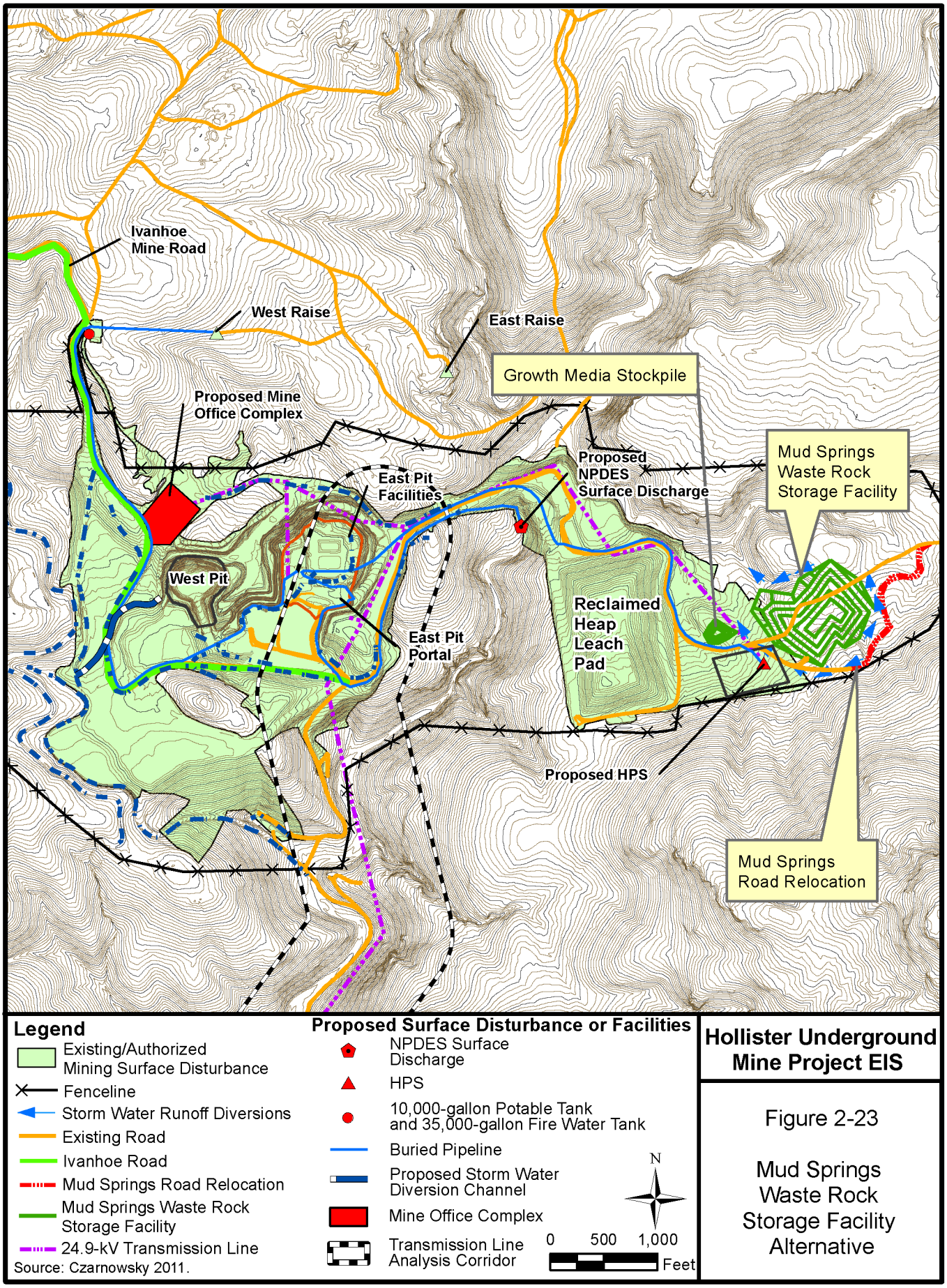
BLM's design, construction, and implementation performance standards for the Mud Springs WRSF would be met, and include:

- A stable design and construction based on a stability analysis so that the WRSF would not fail and no ARD or any other adverse fluid drainage or seepage would flow from the facility;
- A regrade during reclamation of the facility to meet the overall slope angle of 3:1 (with no angle of repose);
- A final shape of the WRSF that would blend into the natural topography in the area and would shed water so that no ponding would occur on the facility;
- Diversion ditches constructed as necessary to restore drainage around the facility and to prevent ponding uphill of the facility or stability problems; and
- Native self-sustaining vegetation established on the WRSF in a weed-free vegetation community.

Construction techniques and environmental safeguards would be similar to those used for the existing RCG WRSF at Hollister (Section 2.2.5, Waste Rock Management) to control and prevent ARD from impacting the environment. These techniques would include a liner system installed beneath the disposal area, and a wet well or an external sump pond to collect any seepage through the WRSF. Surface water diversion channels would be constructed to route runoff from upslope undisturbed areas around the site of the new WRSF.

The construction of this WRSF would require the relocation of approximately 2,080 feet of the existing Mud Springs Road and the upgrading of about 1,800 feet of road to haul road condition with an estimated 40-foot running surface (**Figure 2-23**). Additional field adjustments to roads (access and/or haul roads) and fences would be completed as necessary.

The construction of the Mud Springs WRSF and ancillary facilities would disturb approximately 21 acres, 90 percent of which would be new surface disturbance (**Table 2-9**). The actual area to contain the required 1.1 million yd3 (1,977,124 tons) of waste rock would be about 16 acres, while the ancillary disturbance for the Mud Springs Road relocation, the external drain sump, diversion channels, and the growth media stockpile would disturb approximately 5 acres (**Table 2-9**). It is estimated that about 6 to 12 inches of growth media would be salvaged from the site and stockpiled for use in final reclamation.




**Hollister Underground Mine Project EIS**

Figure 2-23

Mud Springs Waste Rock Storage Facility Alternative

2/28/2012

**Table 2-9 Mud Springs Road Waste Rock Facility Disturbance**

| Facility | Surface Disturbance (acres) |
|---|---|
| Mud Springs Road WRSF | 16.0 |
| External Sump (in place of wet well) | 0.1 |
| Growth Media Stockpile | 1.0 |
| Diversion Channels | 1.4 |
| Mud Springs Road Relocation | 1.2 |
| Haul Road Construction | 1.3 |
| **Total** | **21.0** |

Source: Czarnowsky 2011.

Haul ramps of 8 to 10 percent slope would be constructed until the dump reaches its ultimate height of approximately 80 feet above the existing high point within the WRSF footprint (elevation 5,740 feet amsl).

The average round-trip haul distance on the surface from the existing mine portal to the centroid of the WRSF and back to the mine portal would be nearly 3.1 miles. This long distance is due to the nature of the existing roads at the site. It may not be efficient to use underground haul trucks to haul waste rock this distance. Therefore, waste rock would be hauled and temporarily stored on the existing RCG WRSF in the East Pit. Periodically, about every 2 to 3 months, a contractor with large surface loading and hauling equipment would be hired to move this waste rock from the East Pit to the Mud Springs WRSF.

The Mud Springs WRSF would be reclaimed upon permanent cessation of mining operations. Slopes would be graded to a 2.5H:1V or 3H:1V configuration. Cover material would be required, and the stored growth media would be replaced. The area would be seeded with plant species as described in **Table 2-3**. This reclamation work would be similar to what would be conducted at the existing RCG WRSF (Section 2.2.10.3), except that a considerable amount of cover material would be required (approximately 79,000 $yd^3$ [130,350 tons] to obtain the 36-inch-thick cover compared to about 24,000 $yd^3$ [39,600 tons] required for the Proposed Action West Pit WRSF). This cover material would be imported to the site and approved by BLM if imported from public lands.

#### 2.5.1.4 Backfill Alternative

Under the Proposed Action, RCG would cover the production shaft and East and West escapeway/ventilation raises (raises) with reinforced concrete cover or steel plates after permanent cessation of mining activities or when it is determined that future access into the underground workings to recover a future resource is considered unnecessary. An alternative to capping the production shaft and site raises is to backfill these facilities with waste rock materials, and cover with a concrete slab or dirt cover. This alternative would enhance public safety by permanently eliminating the possibility of access.

This alternative would include implementation of all components described in the Proposed Action (**Figure 2-24**). The estimated volume of waste rock needed to backfill the production shaft and the site raises is described in **Table 2-10**. Waste rock generated from the Hollister underground mining operation would be used as backfill for the shafts. Waste rock would be recovered from one of the waste rock disposal facilities at the mining operation, crushed to 3-inch minus size material, hauled to the appropriate shaft/raise site, and then placed as backfill material.

**Table 2-10 Waste Rock Backfill Volumes for the Production Shaft and Site Raises**

| Facility | Estimated Backfill Amounts | | |
|---|---|---|---|
| | Bank Cubic Feet | Bank Cubic Yards | Tons[1] |
| Production Shaft[2] | 384,000 | 14,220 | 30,720 |
| East Raise[3] | 43,740 | 1,620 | 3,500 |
| West Raise[4] | 58,320 | 2,160 | 4,670 |

[1] Assume 0.08 ton/cubic foot (rounded to the nearest 10 tons).

[2] Production shaft dimensions: 2,000 feet deep with sectional dimensions of 8 feet by 24 feet.

[3] East Raise dimensions: 540 feet deep with sectional dimensions of 9 feet by 9 feet.

[4] West Raise dimensions: 720 feet deep with sectional dimensions of 9 feet by 9 feet.

The use of 20-ton capacity trucks to deliver waste rock for backfill would require the approximate following traffic for these trucks:

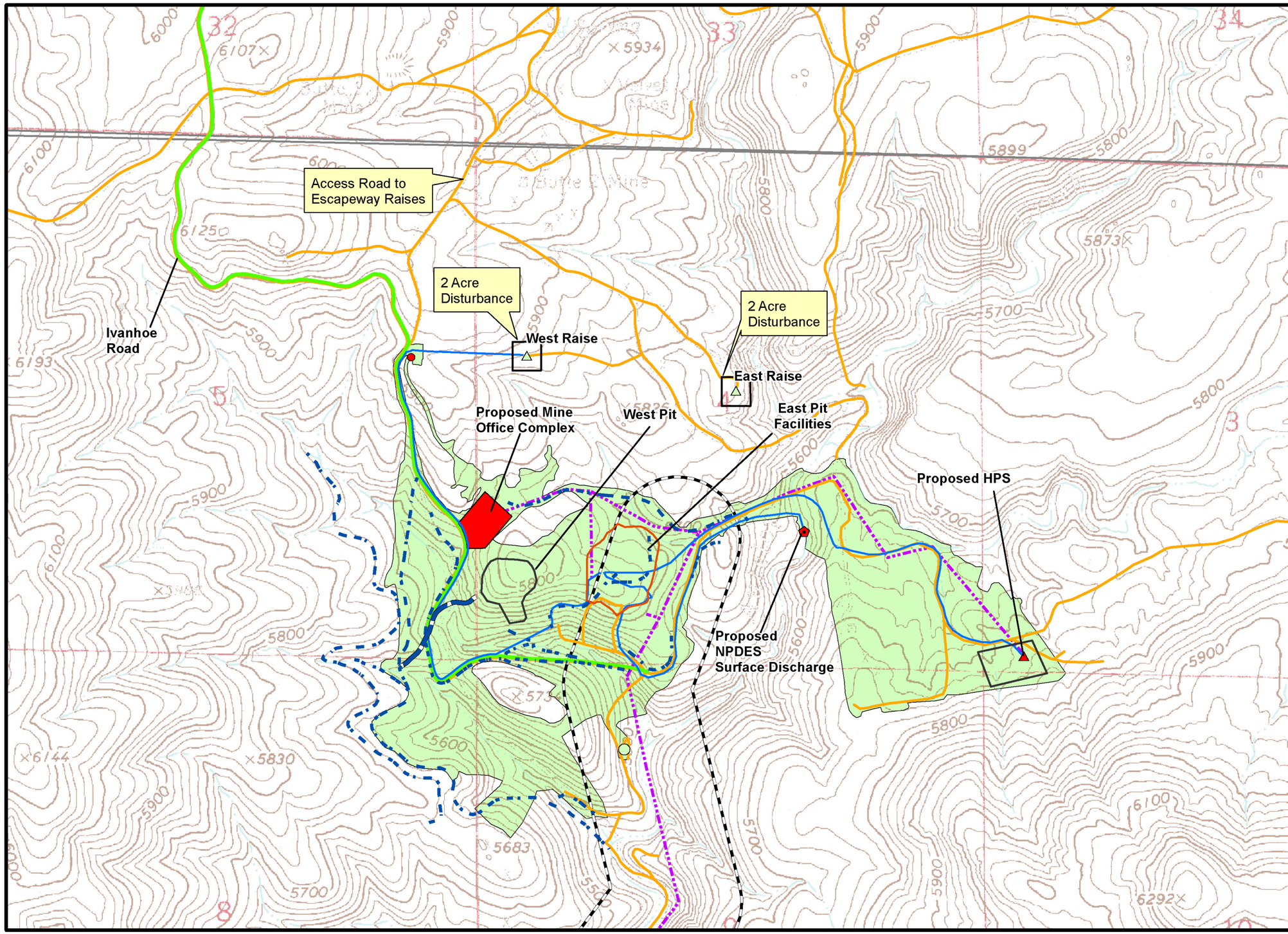
- Production shaft: 1,536 round trips
- East Raise: 175 round trips
- West Raise: 234 round trips

The production shaft would be concrete lined and thus provide neutralization capacity. However, if additional buffering capacity is needed, dolomite or limestone would be added.

Removal of waste rock for use as backfill would not result in a reduction in surface disturbance for the WRSFs. Due to the long-term potential of waste rock settlement in the production shaft and the raises, backfilling the openings also would require a concrete or steel pad or a polyurethane foam plug; these would be placed at the collar of the shaft and raises. The backfilled openings would then be covered with a mound of rock/dirt/growth medium material to facilitate reclamation and diversion of surface drainage off the mound and the concrete plug.

Backfilling would require an additional 2 acres disturbance around each raise site for backfilling operations to accommodate the stockpiling of waste rock material that would fill the raises, and the maneuvering (turning) of the trucks used to deliver the waste rock. Waste rock would be pushed into the opening with a bulldozer or dumped into the opening with a frontend loader. Backfilling openings would be conducted in a safe manner consistent with RCG and MSHA safety regulations.

The access road to the production shaft would be upgraded as part of the Proposed Action to allow for haul trucks as described in Section 2.4, Proposed Action. No additional road widening or disturbance acreage would be needed in the production shaft area for this alternative. However, the existing two-track roads to the raises would require upgrades to accommodate the trucks that would transport rock material to be used in raise backfilling. At a minimum, the road upgrades to the site raises would include blading to smooth and widen the road surfaces to allow the estimated truck and support vehicle traffic. In addition, some rock surface material (gravel or sub-base road rock) and temporary culverts may be needed to facilitate the expected traffic and vehicles. The necessary road upgrades, berms (20-foot widths) and turnouts (of 1 acre each) would disturb 6.6 acres of land (**Figure 2-24**). Each raise also would require up to 2 acres of surface disturbance to accommodate the backfill activities for a total of 10.6 acres of surface disturbance associated with this alternative.




## Legend

**Existing/Authorized Surface Disturbance or Facilities**

- Mining Disturbance
- Water Well
- Escapeway Raise
- Road
- Ivanhoe Road
- Storm Water Diversion Channel
- East Pit Facilities

**Proposed Surface Disturbance or Facilities**

- Transmission Line Analysis Corridor
- Mine Office Complex
- NPDES Surface Discharge
- HPS
- 10,000-gallon Potable Tank and 35,000-gallon Fire Water Tank
- 24.9-kV Transmission Line
- Buried Pipeline
- Proposed Storm Water Diversion Channel

Sources: BLM 2010c; RCG 2009a.

N

0 900 1,800 Feet

**Hollister Underground Mine Project EIS**

Figure 2-24

Backfill Alternative

Backfilling of the shaft and raises permanently eliminate the possibility of re-entry into underground workings if future resources are discovered or economics shift so that existing resources become economic to recover.

Under this alternative, backfill and permanent closure of the production shaft and raises would occur at such time that RCG decides to begin final reclamation and site closure and that no further access or activity is required in the Hollister Underground Mine. All closure activities would be in conformance with applicable regulations.

### 2.5.2 Alternatives Considered but Eliminated from Detailed Analysis

This section describes the alternatives previously considered but subsequently eliminated from detailed analysis by the BLM and the rationale for their elimination. Each potential alternative was evaluated to determine: 1) whether it was technologically and economically feasible and 2) its potential to address and reduce impacts to environmental and cultural resource issues.

#### 2.5.2.1 Irrigation Alternative

This alternative is the same as the Proposed Action except that excess mine water would be piped from the RIBs to nearby ranches for use during the irrigation season. Depending on legal contractual agreements, irrigation would take place April through September at off-site private lands owned by a third-party. Preliminary discussions with area ranches indicate that there is an interest in further developing this alternative. However, this alternative was eliminated from further consideration because of the third-party obligation that could not be required by this EIS, and legal contractual agreements currently do not exist between the parties involved regarding this action.

#### 2.5.2.2 Belowground Transmission Line Alternative

Under this alternative, the proposed 120-kV and 24.9-kV transmission lines would be buried underground to reduce visual and wildlife impacts from an aboveground transmission line. Assuming a 30-foot-wide temporary disturbance width for vehicle and equipment access and installation of the underground transmission line, several access roads, and an 11.6-mile transmission line (following the same route as the Proposed Action), the total long-term surface disturbance would be approximately 42.2 acres. The disturbance would be categorized as long-term because of the long time necessary for the existing sagebrush habitat to re-establish. The belowground transmission line alternative would increase impacts to soils, vegetation, surface water, and cultural resources due to greater surface disturbance for installation of the underground transmission line and the necessity to maintain a cleared ROW. From an electrical engineering and construction standpoint, underground 120-kV and 24.9-kV transmission lines are economically prohibitive due to higher construction, maintenance, and safety costs (American Electric Power 2010).

#### 2.5.2.3 Open-pit Mining of Hollister Narrow Vein Ore Deposits

The underground ore potentially could be extracted using surface mining methods. However, the mineral resource targeted by RCG exists primarily as a small, narrow vein deposit that is not as economically viable using surface mining methods. Surface mining methods were used to extract gold and silver resources from the area in the original Ivanhoe Project in the 1990s, thus creating the existing East and West pits at the Hollister Site. Surface mining of the narrow vein mineral resources would result in increased surface disturbance through excavation of overburden and pit laybacks to access the mineral resource compared with more location-specific underground extraction methods. Surface mining would increase the amount of waste rock produced, thus increasing the size of the existing RCG WRSF as well as increasing the volume of haul road traffic. Additional haul roads would be required, resulting in additional surface disturbance. A leach pad also may be required to process low grade ore from surface deposits, resulting in more disturbance. The increase in surface disturbance would affect sensitive cultural resources within and near the Tosawihi Quarries Archaeological District as well as other environmental resources such as increased surface disturbance, increased potential for soil and water erosion, increased

potential for noxious weeds and non-native invasive plant species establishment, increased noise levels, and increased removal of sagebrush habitat in an area that sustained habitat loss in several wildfires from 2001 to 2006. For these reasons, this alternative was eliminated from further consideration.

#### 2.5.2.4 On-site Ore Processing Alternative

RCG has not proposed on-site ore processing as part of the Proposed Action. However, on-site ore processing would be feasible and is an alternative to the ore transport and off-site ore processing included in the Proposed Action. This alternative would include the construction and operation of on-site ore processing and tailings facilities within the project area in close proximity to the underground mining operations under the Proposed Action. Employment for operation of the facility would range from 30 to 50 employees during full-time operations. Construction would be completed by contractors, and no employment figures have been estimated for construction. RCG would add one to two additional buses to transport workers to and from the mill site.

Potential New On-Site Mill

A potentially viable mill circuit could contain primary and secondary crushers, conveyor systems, a semi-autogenous grinding (SAG) mill, one or more ball mills, vibrating screens, flotation concentrators, thickeners, a regrind mill, CIL agitated leaching tanks, Merrill-Crowe system, reagent handling, a cyanide neutralization circuit, and associated equipment. The production rate could be up to 1,000 tpd and would operate 24 hours per day, 7 days per week. Based on recent expansions of similar facilities, the likely surface disturbance necessary to construct a new mill and support facilities would range between 50 to 150 acres, depending on topography. Depending on location, this disturbance could be on public or private land within or near the project area, and portions of the facilities could be constructed on existing disturbance, previously reclaimed mining disturbance or be new disturbance.

Ore Crushing and Concentration Processing

The ore would be fed to the crusher using front-end loaders or haul trucks. The crusher reduces ore to an appropriate size, after which the ore is conveyed to the crushed ore stockpile. The crushed ore from the stockpile is then fed to the SAG mill. Water is added to the crushed ore as it enters the SAG mill where the ore is milled to minus 0.5 inch. The slurry from the SAG mill is pumped to a set of four cyclones for size classification. The cyclone underflow (oversize material) is recycled to one of two ball mills. The cyclone overflow material is fed to the CIL circuit where cyanide is added. The dissolved precious metals are absorbed onto the carbon, and the tailings pumped to the tailings impoundment.

Tailings Impoundment Facilities

One or more new tailings impoundment facilities would be required to contain up to approximately 8 million tons of tailings over the 20-year proposed life of mine in order to process the authorized 1,000 tpd for an annual throughput of up to 366,000 tpy from full-scale underground mining at Hollister. The specific location and number of tailings impoundments would need to be determined based on technical and feasibility studies that have not been undertaken. Based on recent expansions of similar facilities, the likely surface disturbance necessary to construct one or more tailings impoundments, reclaim ponds and other process facilities would range between 50 to 250 acres, depending on topography. Depending on location, this disturbance could be on public or private land within or near the project area, and portions of the facilities could be constructed on existing disturbance, previously reclaimed mining disturbance or be new disturbance.

The tailings impoundments would be designed and operated in accordance with the NAC 445A regulations. The tailings impoundments would likely be equipped with a peripheral tailings line that rests inside an embankment crest. Tailings slurry would be spigotted from the peripheral line controlling deposition within the impoundment. The tailings material would consolidate in the impoundment.

The tailings embankment(s) would be constructed utilizing non-PAG materials. The tailings impoundment facility would have a synthetic HDPE liner with a sub-grade secondary liner. The tailings impoundment facility would be constructed with a drain system to reduce the hydraulic head on the synthetic liner. A series of perforated pipes encased in gravel would be positioned across the top of the synthetic liner at specified intervals. These pipes would drain to a collection pond below the tailings dam, where the reclaimed water would be pumped back to the mill circuit.

An on-site mill and associated tailings facility would be constructed near or within the project area, much of which overlaps the Tosawihi Quarries Archaeological District, and other areas that contain sensitive cultural resources important to area Native Americans and the public. While RCG conducted preliminary internal review of a potential on-site mill and tailings facility, in order to honor the concerns expressed by Native Americans about on-site processing in this area, it was removed from the Proposed Action prior to submitting the Hollister project PoO. Consequently, although technically and economically feasible, BLM eliminated this alternative from further consideration due to effects on sensitive cultural resources and Native American concerns.

#### 2.5.2.5 Upgrade of Antelope and Little Antelope Creek Roads

This alternative would provide an alternate access and haul road to and from the Hollister Mine in addition to the Ivanhoe Road. This alternative would involve upgrading portions of the Antelope Creek and Little Antelope Creek roads from Battle Mountain to the Hollister Mine. These upgrades would include widening and improving the Little Antelope Creek and Antelope Creek roads from the mine to the Lander County line. Approximately 30 miles of the existing road would need to be improved, including the Little Antelope Creek Road, portions of the Antelope Creek Road, and the Izzenhood Ranch Road to the Lander County line. Additional permits and National Environmental Policy Act analyses would be needed to analyze the impacts at the Rock Creek crossings.

This alternative would provide additional all-season access to the mine, and would provide access to the Hollister Mine from Battle Mountain and Elko, which would be more convenient for some employees. The majority (70 percent) of Hollister employees and contractors live and come from Winnemucca. However, this alternative would result in greater impacts to wildlife and cultural resources due to the location of the road along Little Antelope and Antelope creeks. This alternative was eliminated from further analysis due to greater impacts to wildlife and cultural resources and high costs to upgrade the road. The majority of traffic to the Hollister Site travels established routes on Midas-Tuscarora and Ivanhoe roads.

#### 2.5.2.6 Upgrade of Mud Springs Road

The current Mud Springs Road is a two-track road and largely impassable in inclement weather. This alternative would provide additional access to and from the project area for employees and vendors traveling from the southeast on Dunphy Road. This alternative would require widening and improving the existing road which extends 9.3 miles. It also would require realigning portions of the road to allow safe passage for larger vehicles. Upgrades to creek crossings also may be required. The total disturbance for this alternative would be 31.6 acres.

This alternative would provide additional all-season access from eastern towns such as Carlin and Elko, which would be more convenient for some employees and vendors. This alternative was eliminated from further analysis due to economic costs and the existence of extensive cultural sites that would be impacted by increased road use and upgrades. The majority (70 percent) of Hollister Site employees and contractors travel to Hollister from the Winnemucca area; 9 percent come from the Elko and Carlin area.

#### 2.5.2.7 Expansion of the Newmont Reclaimed South Waste Rock Storage Facility

This alternative would expand the Newmont Reclaimed South WRSF with waste rock from the Hollister Underground Mine. It would eliminate the need for the West Pit to serve as a WRSF. It would require the use of a liner to separate the previous waste rock currently stored in the facility from the new waste rock

material and to capture draindown solution to prevent creating a complex ARD situation. This alternative also would require a method for capturing or re-routing the meteoric water that falls on the WRSF.

Expansion of the Newmont Reclaimed South WRSF alternative was eliminated from consideration due to potential ARD issues, engineering needs, and the potential visual impacts from Big Butte depending on the size of the expanded facility.

#### 2.5.2.8 Midas Substation for Transmission Line

This alternative would provide electric power from the existing substation located at the Midas Mine, located 20 miles north of the Hollister Mine. However, the existing Midas substation does not have the capacity required for the Hollister Mine electric power needs. Upgrading the existing station would require construction of multiple transmission line power back-ups. This alternative was eliminated from consideration due to greater surface impacts and the extensive required upgrades and power back-ups, which would result in economic infeasibility. This alternative would impact multiple cultural resources sites and has the potential to create impacts to greater sage-grouse in areas that currently do not have transmission lines.

## 2.6 BLM-preferred Alternative

The BLM has selected a preferred alternative based on the analysis in this EIS. This preferred alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, considering economic, environmental, technical, and other factors. The BLM has determined that the preferred alternative is the Proposed Action and Backfill Alternative.